

FLTK 1.4.0 Programming Manual



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Chapter 1

FLTK Programming Manual

	<p style="text-align: center;">FLTK 1.4.0 Programming Manual</p> <p style="text-align: center;">By F. Costantini, D. Gibson, M. Melcher, A. Schlosser, B. Spitzak and M. Sweet.</p> <p style="text-align: center;">Copyright © 1998 - 2024 by Bill Spitzak and others.</p>
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<p>Preface</p> <p>Introduction to FLTK</p> <p>FLTK Basics</p> <p>Common Widgets and Attributes</p> <ul style="list-style-type: none"> • Colors • Box Types • Labels and Label Types • Drawing Images <p>Coordinates and Layout Widgets</p> <p>How Does Resizing Work?</p> <p>Designing a Simple Text Editor</p> <p>Drawing Things in FLTK</p> <ul style="list-style-type: none"> • When Can You Draw Things in FLTK? • What Units Do FLTK Functions Use? • Drawing Functions • Drawing Images • Offscreen Drawing <p>Handling Events</p> <ul style="list-style-type: none"> • Fl::event_*() methods • Event Propagation 	<p>Adding and Extending Widgets</p> <p>Using OpenGL</p> <p>Programming with FLUID</p> <ul style="list-style-type: none"> • GUI Attributes • Selecting and Moving Widgets • Image Labels <p>FLTK Runtime Options</p> <p>Advanced FLTK</p> <p>Unicode and UTF-8 Support</p> <p>Appendices:</p> <ul style="list-style-type: none"> • Constants and Enumerations • GLUT Compatibility <ul style="list-style-type: none"> – class Fl_Glut_Window • Forms Compatibility • Operating System Issues • Migrating Code from FLTK 1.3 to 1.4 • Software License • Example Source Code • FAQ (Frequently Asked Questions)
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1.1 Preface

This manual describes the Fast Light Tool Kit ("FLTK") version 1.4.0, a C++ Graphical User Interface ("GUI") toolkit for UNIX, Microsoft Windows and Apple OS X.

Version 1.4.0 introduces support for a new windowing system under Linux/Unix: Wayland. FLTK applications under Linux/Unix run, unchanged, as Wayland or X11 clients depending on what's available at run-time.

Each of the chapters in this manual is designed as a tutorial for using FLTK, while the appendices provide a convenient reference for all FLTK widgets, functions, and operating system interfaces.

This manual may be printed, modified, and/or used under the terms of the FLTK license provided in [Software License](#).

1.1.1 Organization

This manual is organized into the following chapters and appendices:

- [Introduction to FLTK](#)
- [FLTK Basics](#)
- [Common Widgets and Attributes](#)

- [Designing a Simple Text Editor](#)
- [Drawing Things in FLTK](#)
- [Handling Events](#)
- [Adding and Extending Widgets](#)
- [Using OpenGL](#)
- [Programming with FLUID](#)
- [FLTK Runtime Options](#)
- [Advanced FLTK](#)
- [Unicode and UTF-8 Support](#)
- [Constants and Enumerations](#)
- [GLUT Compatibility](#)
- [Forms Compatibility](#)
- [Operating System Issues](#)
- [Migrating Code from FLTK 1.3 to 1.4](#)
- [Developer Information](#)
- [Software License](#)
- [Example Source Code](#)

1.1.2 Conventions

This manual was generated using Doxygen (see <http://www.doxygen.org/>) to process the source code itself, special comments in the code, and additional documentation files. In general, Doxygen recognizes and denotes the following entities as shown:

- classes, such as [Fl_Widget](#),
- methods, such as [Fl_Widget::callback\(Fl_Callback* cb, void* p\)](#),
- functions, such as [fl_draw\(const char *str, int x, int y\)](#),
- internal links, such as [Conventions](#),
- external links, such as <http://www.stack.nl/~dimitri/doxygen/>

Other code samples and commands are shown in `regular courier` type.

1.1.3 Abbreviations

The following abbreviations are used in this manual:

X11

The X Window System version 11.

Xlib

The X Window System interface library.

MS Windows, `WIN32`

The Microsoft Windows Application Programmer's Interface for Windows 2000, Windows XP, Windows Vista, Windows 7 and later Windows versions. FLTK uses the preprocessor definition `_WIN32` for the 32 bit and 64 bit MS Windows API.

OS X, `APPLE`

The Apple desktop operating system OS X 10.0 and later. MacOS 8 and 9 support was dropped after FLTK 1.0.10. FLTK uses the preprocessor definition `APPLE` for OS X.

1.1.4 Copyrights and Trademarks

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1.2 Introduction to FLTK

The Fast Light Tool Kit ("FLTK") is a cross-platform C++ GUI toolkit for UNIX®/Linux® (X11 or Wayland), Microsoft® Windows®, and Apple® macOS®.

FLTK provides modern GUI functionality without the bloat and supports 3D graphics via OpenGL® and its built-in GLUT emulation. It was originally developed by Mr. Bill Spitzak and is currently maintained by a small group of developers across the world with a central repository in the US.

1.2.1 History of FLTK

It has always been Bill's belief that the GUI API of all modern systems is much too high level. Toolkits (even FLTK) are *not* what should be provided and documented as part of an operating system. The system only has to provide arbitrary shaped but featureless windows, a powerful set of graphics drawing calls, and a simple *unalterable* method of delivering events to the owners of the windows. NeXT (if you ignored NextStep) provided this, but they chose to hide it and tried to push their own baroque toolkit instead.

Many of the ideas in FLTK were developed on a NeXT (but *not* using NextStep) in 1987 in a C toolkit Bill called "views". Here he came up with passing events downward in the tree and having the handle routine return a value indicating whether it used the event, and the table-driven menus. In general he was trying to prove that complex UI ideas could be entirely implemented in a user space toolkit, with no knowledge or support by the system.

After going to film school for a few years, Bill worked at Sun Microsystems on the (doomed) NeWS project. Here he found an even better and cleaner windowing system, and he reimplemented "views" atop that. NeWS did have an unnecessarily complex method of delivering events which hurt it. But the designers did admit that perhaps the user could write just as good of a button as they could, and officially exposed the lower level interface.

With the death of NeWS Bill realized that he would have to live with X. The biggest problem with X is the "window manager", which means that the toolkit can no longer control the window borders or drag the window around.

At Digital Domain Bill discovered another toolkit, "Forms". Forms was similar to his work, but provided many more widgets, since it was used in many real applications, rather than as theoretical work. He decided to use Forms, except he integrated his table-driven menus into it. Several very large programs were created using this version of Forms.

The need to switch to OpenGL and GLX, portability, and a desire to use C++ subclassing required a rewrite of Forms. This produced the first version of FLTK. The conversion to C++ required so many changes it made it impossible to recompile any Forms objects. Since it was incompatible anyway, Bill decided to incorporate his older ideas as much as possible by simplifying the lower level interface and the event passing mechanism.

Bill received permission to release it for free on the Internet, with the GNU general public license. Response from Internet users indicated that the Linux market dwarfed the SGI and high-speed GL market, so he rewrote it to use X for all drawing, greatly speeding it up on these machines. That is the version you have now.

Digital Domain has since withdrawn support for FLTK. While Bill is no longer able to actively develop it, he still contributes to FLTK in his free time and is a part of the FLTK development team.

1.2.2 Features

FLTK was designed to be statically linked. This was done by splitting it into many small objects and designing it so that functions that are not used do not have pointers to them in the parts that are used, and thus do not get linked in. This allows you to make an easy-to-install program or to modify FLTK to the exact requirements of your application without worrying about bloat. FLTK works fine as a shared library, though, and is now included with several Linux distributions.

Here are some of the core features unique to FLTK:

- `sizeof(FI_Widget) == 64 to 92.`
- The "core" (the "hello" program compiled & linked with a static FLTK library using gcc on a 486 and then stripped) is 114K.
- The FLUID program (which includes every widget) is 538k.

- Written directly atop core libraries (Xlib, Wayland, Windows or Cocoa) for maximum speed, and carefully optimized for code size and performance.
- Precise low-level compatibility between the X11, Windows and MacOS versions - only about 10% of the code is different.
- Interactive user interface builder program. Output is human-readable and editable C++ source code.
- Support for overlay hardware, with emulation if none is available.
- Very small & fast portable 2-D drawing library to hide Xlib, Cairo, Windows, or macOS Quartz.
- OpenGL/Mesa drawing area widget.
- Support for OpenGL overlay hardware on both X11 and Windows, with emulation if none is available.
- Text widgets with cut & paste, undo, and support for Unicode text and international input methods.
- Compatibility header file for the GLUT library.
- Compatibility header file for the XForms library.

1.2.3 Licensing

FLTK comes with complete free source code. FLTK is available under the terms of the [GNU Library General Public License](#) with exceptions that allow for static linking. Contrary to popular belief, it can be used in commercial software - even Bill Gates could use it!

1.2.4 What Does "FLTK" Mean?

FLTK was originally designed to be compatible with the Forms Library written for SGI machines. In that library all the functions and structures started with "fl_". This naming was extended to all new methods and widgets in the C++ library, and this prefix was taken as the name of the library. It is almost impossible to search for "FL" on the Internet, due to the fact that it is also the abbreviation for Florida. After much debating and searching for a new name for the toolkit, which was already in use by several people, Bill came up with "FLTK", including a bogus excuse that it stands for "The Fast Light Toolkit".

1.2.5 Building and Installing FLTK with CMake

Starting with version 1.4, the recommended FLTK building system is CMake. See file README.CMake of the FLTK source tree for all information. It's also possible to use `configure` and `make` as follows to build and install FLTK.

1.2.6 Building and Installing FLTK Under UNIX and macOS with make

In most cases you can just type "make". This will run configure with the default of no options and then compile everything.

FLTK uses GNU autoconf to configure itself for your UNIX platform. The main things that the configure script will look for are the X11 and OpenGL (or Mesa) header and library files. If these cannot be found in the standard include/library locations you'll need to define the CFLAGS, CXXFLAGS, and LDFLAGS environment variables. For the Bourne and Korn shells you'd use:

```
CFLAGS=-Iincludedir; export CFLAGS
CXXFLAGS=-Iincludedir; export CXXFLAGS
LDFLAGS=-Llibdir; export LDFLAGS
```

For C shell and tcsh, use:

```
setenv CFLAGS "-Iincludedir"
setenv CXXFLAGS "-Iincludedir"
setenv LDFLAGS "-Llibdir"
```

By default configure will look for a C++ compiler named CC, c++, g++, or gcc in that order. To use another compiler you need to set the CXX environment variable:

```
CXX=x1C; export CXX
setenv CXX "x1C"
```

The CC environment variable can also be used to override the default C compiler (cc or gcc), which is used for a few FLTK source files.

You can run configure yourself to get the exact setup you need. Type "./configure <options>", where options are:

-enable-cygwin

Enable the Cygwin libraries under Windows

-enable-debug

Enable debugging code & symbols

-disable-gl

Disable OpenGL support

-disable-svg

Disable support of reading and writing of Support Vector Graphics (.svg) files.

-disable-print

Disable print support for an X11/Wayland platform

-enable-shared

Enable generation of shared libraries

-enable-threads

Enable multithreading support

-enable-wayland

This is the default for Linux and FreeBSD systems equipped with the Wayland software. Enable the use of Wayland for all window operations, of Cairo for all graphics and of Pango for text drawing. Resulting FLTK apps run as Wayland clients if a Wayland compositor is available at run-time, and as X11 clients otherwise but keep using Cairo and Pango for all graphics.

-disable-xft

Disables the Xft library, resulting in non anti-aliased fonts (X11 platform).

-enable-usecairo

All drawing operations use the Cairo library (rather than Xlib) producing antialiased graphics (X11 platform, implies `-enable-pango`).

-enable-pango

Enable the Pango library for drawing any text in any script with any font under X11/Wayland.

-enable-x11

When targeting cygwin, build with X11 GUI instead of windows GDI. Also applicable to macOS platforms supplemented with XQuartz.

-enable-cairo

Enable support of class [Fl_Cairo_Window](#) (all platforms, requires the Cairo library).

-enable-cairoext

Enable the FLTK instrumentation for cairo extended use (requires `-enable-cairo`).

-disable-gdiplus

Don't use GDI+ when drawing curves and oblique lines (Windows platform).

-enable-cp936

Under X11, enable use of the GB2312 locale

-bindir=/path

Set the location for executables [default = \$prefix/bin]

`-datadir=/path`

Set the location for data files. [default = \$prefix/share]

`-libdir=/path`

Set the location for libraries [default = \$prefix/lib]

`-includedir=/path`

Set the location for include files. [default = \$prefix/include]

`-mandir=/path`

Set the location for man pages. [default = \$prefix/man]

`-prefix=/dir`

Set the directory prefix for files [default = /usr/local]

When the configure script is done you can just run the "make" command. This will build the library, FLUID tool, and all of the test programs.

To install the library, become root and type "make install". This will copy the "fluid" executable to "bindir", the header files to "includedir", and the library files to "libdir".

1.2.7 Building FLTK Under Microsoft Windows

NOTE: This documentation section is currently under review. More up-to-date information for this release may be available in the file "README.Windows.txt" and you should read that file to determine if there are changes that may be applicable to your build environment.

FLTK 1.3 is officially supported on Windows (2000,) 2003, XP, and later. Older Windows versions prior to Windows 2000 are not officially supported, but may still work. The main reason is that the OS version needs to support UTF-8. FLTK 1.3 is known to work on recent versions of Windows such as Windows 7, Windows 8/8.1 and Windows 10 and has been reported to work in both 32-bit and 64-bit versions of these.

FLTK currently supports the following development environments on the Windows platform:

CAUTION: Libraries built by any one of these build environments can not be mixed with object files from any of the other environments! (They use incompatible C++ conventions internally.)

Free Microsoft Visual C++ 2008 Express and Visual C++ 2010 Express or later versions using workspace and project files generated by CMake. Older versions and the commercial versions can be used as well, if they can open the project files. Be sure to get your service packs!

Since FLTK 1.4 the project files MUST be generated with CMake. Please read "README.CMake.txt" for more information about this.

1.2.7.1 GNU toolsets (Cygwin or MinGW) hosted on Windows

If using Cygwin with the Cygwin shell, or MinGW with the Msys shell, these build environments behave very much like a Unix or macOS build and the notes above in the section on *Building and Installing FLTK Under UNIX and Apple macOS* apply, in particular the descriptions of using the "configure" script and its related options.

In general for a build using these tools, e.g. for the Msys shell with MinGW, it should suffice to "cd" into the directory where you have extracted the FLTK tarball and type:

```
./configure
make
```

This will build the FLTK libraries and they can then be utilised directly from the build location. NOTE: this may be simpler than "installing" them in many cases as different tool chains on Windows have different ideas about where the files should be "installed" to.

For example, if you "install" the libraries using Msys/MinGW with the following command:

```
make install
```

Then Msys will "install" the libraries to where it thinks the path "/usr/local/" leads to. If you only ever build code from within the Msys environment this works well, but the actual "Windows path" these files are located in will be something like "C:\msys\1.0\local\lib", depending on where your Msys installation is rooted, which may not be useful to other tools.

If you want to install your built FLTK libraries in a non-standard location you may do:

```
sh configure --prefix=C:/FLTK
make
```

Where the value passed to "prefix" is the path at which you would like FLTK to be installed.

A subsequent invocation of "make install" will then place the FLTK libraries and header files into that path.

The other options to "configure" may also be used to tailor the build to suit your environment.

1.2.7.2 Using the Visual C++ DLL Library

The "fltkdll.dsp" project file builds a DLL-version of the FLTK library. Because of name mangling differences between PC compilers (even between different versions of Visual C++!) you can only use the DLL that is generated with the same version compiler that you built it with.

When compiling an application or DLL that uses the FLTK DLL, you will need to define the `FL_DLL` preprocessor symbol to get the correct linkage commands embedded within the FLTK header files.

1.2.8 Internet Resources

FLTK is available on the 'net in a bunch of locations:

WWW

```
https://www.fltk.org/
https://www.fltk.org/bugs.php [for reporting bugs]
https://www.fltk.org/software.php [download source code]
https://www.fltk.org/newsgroups.php [newsgroup/forums]
```

NNTP Newsgroups

```
https://groups.google.com/forum/#!forum/fltkgeneral [Google Groups interface]
news://fltk.org:1024/ [NNTP interface]
https://www.fltk.org/newsgroups.php [web interface]
```

1.2.9 Reporting Bugs

To report a bug in FLTK, or for feature requests, please use the form at <https://www.fltk.org/bugs.php>, and click on "Submit Bug or Feature Request".

You'll be prompted for the FLTK version, operating system & version, and compiler that you are using. We will be unable to provide any kind of help without that basic information.

For general support and questions, please use the fltk.general newsgroup (see above, "NNTP Newsgroups") or the web interface to the newsgroups at <https://www.fltk.org/newsgroups.php>.

1.3 FLTK Basics

This chapter teaches you the basics of writing and compiling programs that use FLTK.

1.3.1 Writing Your First FLTK Program

Up to FLTK 1.3.x all FLTK programs were required to include the file `<FL/Fl.H>` as the first FLTK header file.

Since FLTK 1.4.0 this requirement was relaxed and `<FL/Fl.H>` needs only be included if the class `Fl` is used or if some other stuff like enumerations is used in the source code. Example code in this documentation may still include it "everywhere" even if it is no longer strictly required.

In addition the program must include a header file for each FLTK class it uses. Listing 1 shows a simple "Hello, World!" program that uses FLTK to display the window.

Listing 1 - "hello.cxx"

```
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Box.H>

int main(int argc, char **argv) {
    Fl_Window *window = new Fl_Window(340, 180);
    Fl_Box *box = new Fl_Box(20, 40, 300, 100, "Hello, World!");
    box->box(FL_UP_BOX);
    box->labelfont(FL_BOLD + FL_ITALIC);
    box->labelsize(36);
    box->labeltype(FL_SHADOW_LABEL);
    window->end();
    window->show(argc, argv);
    return Fl::run();
}
```

After including the required header files, the program then creates a window. All following widgets will automatically be children of this window.

```
Fl_Window *window = new Fl_Window(340, 180);
```

Then we create a box with the "Hello, World!" string in it. FLTK automatically adds the new box to window, the current grouping widget.

```
Fl_Box *box = new Fl_Box(20, 40, 300, 100, "Hello, World!");
```

Next, we set the type of box and the font, size, and style of the label:

```
box->box(FL_UP_BOX);
box->labelfont(FL_BOLD + FL_ITALIC);
box->labelsize(36);
box->labeltype(FL_SHADOW_LABEL);
```

We tell FLTK that we will not add any more widgets to window.

```
window->end();
```

Finally, we show the window and enter the FLTK event loop:

```
window->show(argc, argv);  
return Fl::run();
```

The resulting program will display the "Hello, World!" window:

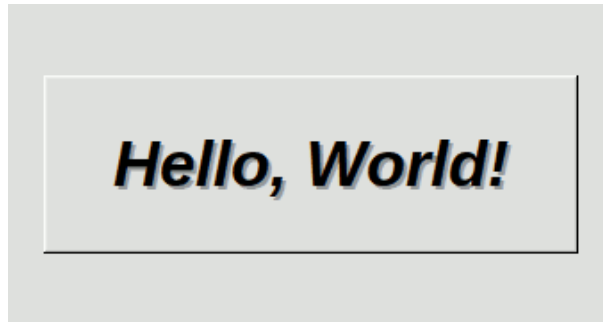


Figure 1.1 The Hello, World! Window

You can quit the program by closing the window or pressing the `ESCape` key.

1.3.1.1 Creating the Widgets

The widgets are created using the C++ `new` operator. For most widgets the arguments to the constructor are:

```
Fl_Widget(x, y, width, height, label)
```

The `x` and `y` parameters determine where the widget or window is placed on the screen. In FLTK the top left corner of the window or screen is the origin (i.e. `x = 0`, `y = 0`).

The `width` and `height` parameters determine the size of the widget or window. The maximum widget size is typically governed by the underlying window system or hardware.

[What Units Do FLTK Functions Use?](#) describes the unit FLTK employs for `x`, `y`, `width`, and `height`, and more generally, for all graphical quantities.

`label` is a pointer to a character string to label the widget with or `NULL`. If not specified the label defaults to `NULL`. The label string must be in static storage such as a string constant because FLTK does not make a copy of it - it just uses the pointer.

1.3.1.2 Creating Widget Hierarchies

Widgets are commonly ordered into functional groups, which in turn may be grouped again, creating a hierarchy of widgets. FLTK makes it easy to fill groups by automatically adding all widgets that are created between a `myGroup->begin()` and `myGroup->end()`. In this example, `myGroup` would be the *current* group.

Newly created groups and their derived widgets implicitly call `begin()` in the constructor, effectively adding all subsequently created widgets to itself until `end()` is called.

Calling `end()` on one group widget transfers the "current group" property to the **parent** of that widget. Calling `end()` on a top level window (which has no parent) sets the current group to `NULL`.

Setting the current group to `NULL` will stop automatic hierarchies. New widgets can now be added manually using `Fl_Group::add(...)` and `Fl_Group::insert(...)`.

1.3.1.3 Get/Set Methods

`box->box(FL_UP_BOX)` sets the type of box the [Fl_Box](#) draws, changing it from the default of `FL_NO_BOX`, which means that no box is drawn. In our "Hello, World!" example we use `FL_UP_BOX`, which means that a raised button border will be drawn around the widget. More details are available in the [Box Types](#) section.

You could examine the box type by doing `box->box()`. FLTK uses method name overloading to make short names for get/set methods. A "set" method is always of the form "void name(type)", and a "get" method is always of the form "type name() const".

1.3.1.4 Redrawing After Changing Attributes

Almost all of the get/set pairs are very fast, short inline functions and thus very efficient. However, *the "set" methods do not call `redraw()`* - you have to call it yourself. This greatly reduces code size and execution time. The only common exceptions are `value()` which calls `redraw()` and `label()` which calls `redraw_label()` if necessary.

1.3.1.5 Labels

All widgets support labels. In the case of window widgets, the label is used for the label in the title bar. Our example program calls the `labelfont()`, `labelsize()`, and `labeltype()` methods.

The `labelfont()` method sets the typeface and style that is used for the label, which for this example we are using `FL_BOLD` and `FL_ITALIC`.

The `labelsize()` method sets the height of the font in FLTK units.

The `labeltype()` method sets the type of label. FLTK supports normal, embossed, and shadowed labels internally, and more types can be added as desired.

A complete list of all label options can be found in the section on [Labels and Label Types](#).

1.3.1.6 Showing the Window

The `show()` method shows the widget or window. For windows you can also provide the command-line arguments to allow users to customize the appearance, size, and position of your windows.

1.3.1.7 The Main Event Loop

All FLTK applications (and most GUI applications in general) are based on a simple event processing model. User actions such as mouse movement, button clicks, and keyboard activity generate events that are sent to an application. The application may then ignore the events or respond to the user, typically by redrawing a button in the "down" position, adding the text to an input field, and so forth.

FLTK also supports idle, timer, and file pseudo-events that cause a function to be called when they occur. Idle functions are called when no user input is present and no timers or files need to be handled - in short, when the application is not doing anything. Idle callbacks are often used to update a 3D display or do other background processing.

Timer functions are called after a specific amount of time has expired. They can be used to pop up a progress dialog after a certain amount of time or do other things that need to happen at more-or-less regular intervals. FLTK timers are not 100% accurate, so they should not be used to measure time intervals, for example.

File functions are called when data is ready to read or write, or when an error condition occurs on a file. They are most often used to monitor network connections (sockets) for data-driven displays.

FLTK applications must periodically check ([Fl::check\(\)](#)) or wait ([Fl::wait\(\)](#)) for events or use the [Fl::run\(\)](#) method to enter a standard event processing loop. Calling [Fl::run\(\)](#) is equivalent to the following code:

```
while (Fl::wait());
```

[Fl::run\(\)](#) does not return until all of the windows under FLTK control are closed by the user or your program.

1.3.2 Naming Conventions

All public symbols in FLTK start with the characters 'F' and 'L':

- Functions are either `Fl::foo()` or `fl_foo()`.
- Class and type names are capitalized: `Fl_Foo`.
- [Constants and Enumerations](#) are uppercase: `FL_FOO`.
- All header files start with `<FL/...>`.

1.3.3 Header Files

The proper way to include FLTK header files is:

```
#include <FL/Fl_xyz.H>
```

Note

Case *is significant* on many operating systems, and the C standard uses the forward slash (/) to separate directories. *Do not use any of the following include lines:*

```
#include <FL\Fl_xyz.H>  
#include <fl/fl_xyz.h>  
#include <Fl/fl_xyz.h>
```

1.3.4 Compiling Programs that Use FLTK

Since FLTK 1.4 CMake is the recommended build system. The details below show the "old" methods and reference information in case you like to write your build configuration manually (e.g. Makefiles, Visual Studio, other IDE's ...).

CMake can simplify this task substantially. For now, refer to README.CMake.txt for further information.

Todo This section needs a major rework. Add a chapter "Building FLTK with CMake".

1.3.4.1 Compiling Programs with Standard Compilers

Under UNIX (and under Microsoft Windows when using the GNU development tools) you will probably need to tell the compiler where to find the header files. This is usually done using the `-I` option:

```
c++ -I/usr/local/include ...
```

Note

You need a C++ compiler to build FLTK. The commands given in this chapter are **examples** using 'c++'. Please replace this command with the C++ compiler suitable for your system or use the `fltk-config` script as described below (this is recommended).

1.3.4.2 Compiling Programs with the 'fltk-config' Script

The `fltk-config` script included with FLTK can be used on systems with a Posix compliant shell, for instance Unix/Linux, macOS, Windows with MinGW, MSYS2, or Cygwin.

Note

`fltk-config` is not designed to work on Windows with Visual Studio compilers. If it works, then only by accident and this is undefined behavior.

```
fltk-config --help
```

displays all available options.

`fltk-config` can be used to get the compiler and the options that are required by your compiler to build a program using the FLTK library:

```
fltk-config --cc
fltk-config --cxx
```

return the C and C++ compiler commands used to build FLTK.

```
c++ `fltk-config --cxxflags` ...
```

can be used to include the required compiler flags in the command line.

Similarly, when linking your application you will need to tell the compiler to use the FLTK library:

```
c++ ... -L/usr/local/lib -lfltk -lXext -lX11 ... -lm -ldl
```

Aside from the "fltk" library, there are also the following libraries

- "fltk_forms" for the XForms compatibility classes (deprecated)
- "fltk_gl" for the OpenGL and GLUT classes
- "fltk_images" for the image file classes, [Fl_Help_Dialog](#) widget, and system icon support.

The libraries are named `fltk.lib`, `fltk_forms.lib`, `fltk_gl.lib`, and `fltk_images.lib` under Windows.

Note

The separate `fltk_cairo` library is no longer necessary since FLTK 1.4.0. However, this release of FLTK builds a dummy `fltk_cairo` library for backwards compatibility. You are advised to remove the usage of the `fltk_cairo` library from your build systems and tools. **The `fltk_cairo` library will be removed in a future release.**

As before, the `fltk-config` script can be used to get the options that are required by your linker:

```
c++ ... `fltk-config --ldflags`
```

The forms, GL, and images libraries are included with the "--use-foo" options, as follows:

```
c++ ... `fltk-config --use-forms --ldflags`
c++ ... `fltk-config --use-gl --ldflags`
c++ ... `fltk-config --use-images --ldflags`
c++ ... `fltk-config --use-cairo --ldflags`
c++ ... `fltk-config --use-forms --use-gl --use-images --ldflags`
```

The option `--use-cairo` may be used to build your program with Cairo libs if you use Cairo in your code. It does no longer include the `fltk_cairo` lib but all necessary Cairo compiler flags and Cairo libs, if and only if FLTK has been built with the optional Cairo support by configure or CMake.

Finally, you can use the `fltk-config` script to compile one or more source files as a FLTK program.

The following examples will create an executable named `filename` (or `filename.exe` under Windows) from a single source file:

```
fltk-config --compile filename.cxx
fltk-config --use-forms --compile filename.cpp
fltk-config --use-gl --compile filename.C
fltk-config --use-images --compile filename.cc
fltk-config --use-cairo --compile filename.cpp
fltk-config --use-forms --use-gl --use-images --compile filename.cpp
```

Note

'`fltk-config --compile`' accepts only a limited set of file extensions for C++ source files: `'.cpp'`, `'.cxx'`, `'.cc'`, and `'.C'` (capital 'C').

1.3.4.3 Compiling Multiple Source Files with 'fltk-config'

Before version 1.4.0 `fltk-config` accepted only a single source file and no additional compiler options or libraries. As of FLTK 1.4.0 it is possible to use additional compiler flags, more than one source file, and additional link libraries.

This is intended to be used for quick prototyping and not for production code development. It can be used to test compiler command options (like `-Wall` or `-Wextra`) or additional link libraries if these are required.

Building from more than one source file with flags and libraries can be achieved as follows:

```
fltk-config [USE-FLAGS] --compile MAIN [FLAGS] [SOURCES] [--link LFLAGS LIBS]
```

where

- arguments in [...] are optional
- USE-FLAGS are as described above, e.g. `--use-images`
- MAIN is the main C++ source file as documented above
- FLAGS are additional compiler flags
- SOURCES are additional source files or libraries
- `--link` is used to separate source files and flags from linker flags and libs
- LFLAGS are optional linker flags
- LIBS are additional libraries to link against

The final commandline is composed like this example:

```
$ fltk-config --compile main.cxx button.o -Wextra x1.a --link -L/usr/include/cairo/ -lcairo
```

```
g++ {fltk-flags} -o main -Wextra main.cxx button.o x1.a {fltk-libs} -L/usr/include/cairo/ -lcairo
```

where `{fltk-flags}` are the compiler flags generated by `fltk-config` as before and `{fltk-libs}` are the usual linker flags and libraries. All optional parameters are used as-is, i.e. there is no syntax checking or special parsing except: the order of flags and source files is preserved (from the commandline) but all flags (`-something`) are positioned before all sources, i.e. arguments w/o leading dash ('-'). All compiler flags and libraries generated from the library build follow all options and source files given on the commandline, and finally everything after `--link` is appended.

1.3.4.4 Compiling Programs with Makefiles

The previous sections described how to use `fltk-config` to build a program from the command line, and this is very convenient for small test programs. But `fltk-config` can also be used to set the compiler and linker options as variables within a `Makefile` that can be used to build larger programs.

```
CXX      = $(shell fltk-config --cxx)
DEBUG    = -g
CXXFLAGS = $(shell fltk-config --use-gl --use-images --cxxflags) -I.
LDLFLAGS = $(shell fltk-config --use-gl --use-images --ldflags)
LDSTATIC = $(shell fltk-config --use-gl --use-images --ldstaticflags)
LINK     = $(CXX)

TARGET = cube
OBJS = CubeMain.o CubeView.o CubeViewUI.o
SRCS = CubeMain.cxx CubeView.cxx CubeViewUI.cxx

.SUFFIXES: .o .cxx
%.o: %.cxx
    $(CXX) $(CXXFLAGS) $(DEBUG) -c $<

all: $(TARGET)
    $(LINK) -o $(TARGET) $(OBJS) $(LDSTATIC)

$(TARGET): $(OBJS)
CubeMain.o: CubeMain.cxx CubeViewUI.h
CubeView.o: CubeView.cxx CubeView.h CubeViewUI.h
CubeViewUI.o: CubeViewUI.cxx CubeView.h

clean: $(TARGET) $(OBJS)
    rm -f *.o 2> /dev/null
    rm -f $(TARGET) 2> /dev/null
```


1.3.4.5 Compiling Programs with Microsoft Visual C++

In Visual C++ you will need to tell the compiler where to find the FLTK header files. This can be done by selecting "Settings" from the "Project" menu and then changing the "Preprocessor" settings under the "C/C++" tab.

You will also need to add the following libraries to the `Linker` settings:

- `fltk.lib` or `fltkd.lib`, the main FLTK library (postfix 'd' = Debug)
- all FLTK libraries your program requires (`fltk_gl`, `fltk_images`, ...)
- additional libraries like `libpng.lib`, `libjpeg.lib`, etc.
- the Windows Common Controls (`comctl32.lib`) and
- the GDIplus library if used to build FLTK (`gdiplus.lib`) and
- the Windows Socket (`ws2_32.lib`) libraries.

Note

There's a `Linker` setting "Additional Library Directories" or similar; the exact name depends on the Visual Studio version you're using. You can and **should** use this to simplify adding the libraries above. If you set this to the FLTK library path you can just use the library **names** and don't need to use the full paths to all libraries.

You must also define `_WIN32` if the compiler doesn't do this. Currently all known Windows compilers define `_WIN32` - unless you use Cygwin (that's correct, you must not define `_WIN32` if you use Cygwin).

More information can be found in `README.Windows.txt`.

You can build your Microsoft Windows applications as Console or Desktop applications. If you want to use the standard C `main()` function as the entry point, FLTK includes a `WinMain()` function that will call your `main()` function for you.

1.4 Common Widgets and Attributes

This chapter describes many of the widgets that are provided with FLTK and covers how to query and set the standard attributes.

1.4.1 Buttons

FLTK provides many types of buttons:

- [Fl_Button](#) - A standard push button.
- [Fl_Check_Button](#) - A button with a check box.
- [Fl_Light_Button](#) - A push button with a light.
- [Fl_Repeat_Button](#) - A push button that repeats when held.

- [Fl_Return_Button](#) - A push button that is activated by the `Enter` key.
- [Fl_Round_Button](#) - A button with a radio circle.

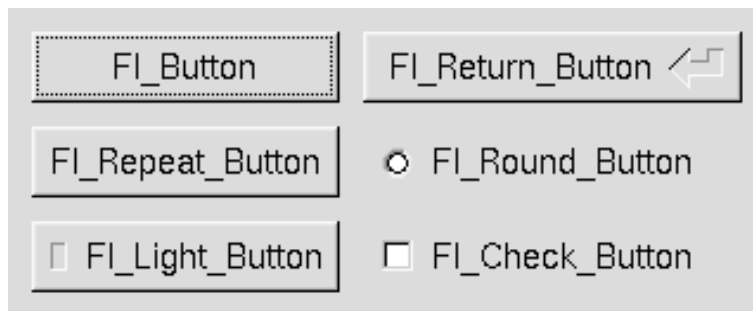


Figure 1.2 FLTK Button Widgets

All of these buttons just need the corresponding `<FL/Fl_xyz_Button.H>` header file. The constructor takes the bounding box of the button and optionally a label string:

```
Fl_Button *button = new Fl_Button(x, y, width, height, "label");
Fl_Light_Button *lbutton = new Fl_Light_Button(x, y, width, height);
Fl_Round_Button *rbutton = new Fl_Round_Button(x, y, width, height, "label");
```

Each button has an associated `type()` which allows it to behave as a push button, toggle button, or radio button:

```
button->type(FL_NORMAL_BUTTON);
lbutton->type(FL_TOGGLE_BUTTON);
rbutton->type(FL_RADIO_BUTTON);
```

For toggle and radio buttons, the `value()` method returns the current button state (0 = off, 1 = on). The `set()` and `clear()` methods can be used on toggle buttons to turn a toggle button on or off, respectively. Radio buttons can be turned on with the `setonly()` method; this will also turn off other radio buttons in the same group.

1.4.2 Text

FLTK provides several text widgets for displaying and receiving text:

- [Fl_Input](#) - A one-line text input field.
- [Fl_Output](#) - A one-line text output field.
- [Fl_Multiline_Input](#) - A multi-line text input field.
- [Fl_Multiline_Output](#) - A multi-line text output field.
- [Fl_Text_Display](#) - A multi-line text display widget.
- [Fl_Text_Editor](#) - A multi-line text editing widget.
- [Fl_Help_View](#) - A HTML text display widget.

The [Fl_Output](#) and [Fl_Multiline_Output](#) widgets allow the user to copy text from the output field but not change it.

The `value()` method is used to get or set the string that is displayed:

```
Fl_Input *input = new Fl_Input(x, y, width, height, "label");
input->value("Now is the time for all good men...");
```

The string is copied to the widget's own storage when you set the `value()` of the widget.

The [Fl_Text_Display](#) and [Fl_Text_Editor](#) widgets use an associated [Fl_Text_Buffer](#) class for the value, instead of a simple string.

1.4.3 Valuators

Unlike text widgets, valuators keep track of numbers instead of strings. FLTK provides the following valuators:

- [FL_Counter](#) - A widget with arrow buttons that shows the current value.
- [FL_Dial](#) - A round knob.
- [FL_Roller](#) - An SGI-like dolly widget.
- [FL_Scrollbar](#) - A standard scrollbar widget.
- [FL_Slider](#) - A scrollbar with a knob.
- [FL_Value_Slider](#) - A slider that shows the current value.

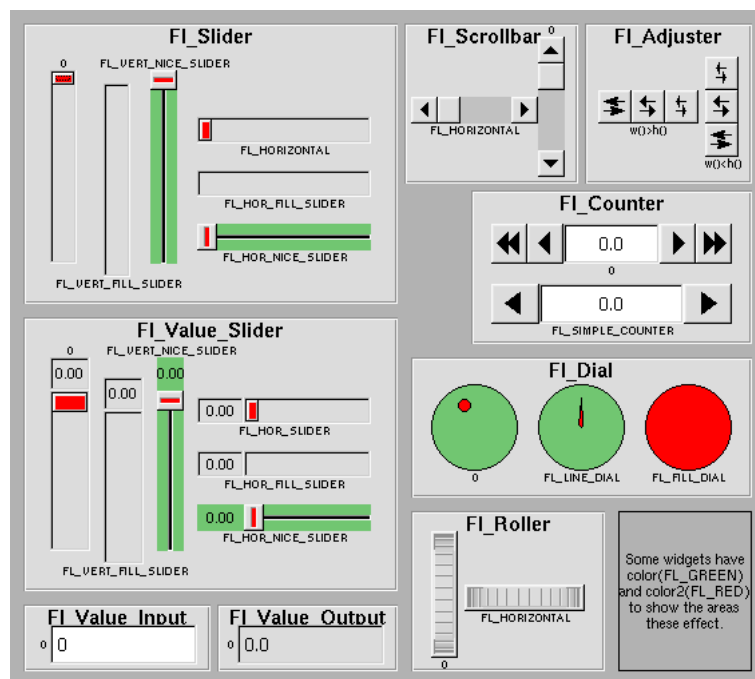


Figure 1.3 FLTK valuator widgets

The `value()` method gets and sets the current value of the widget. The `minimum()` and `maximum()` methods set the range of values that are reported by the widget.

1.4.4 Groups

The `FL_Group` widget class is used as a general purpose "container" widget. Besides grouping radio buttons, the groups are used to encapsulate windows, tabs, and scrolled windows. The following group classes are available with FLTK:

- `FL_Double_Window` - A double-buffered window on the screen.
- `FL_Gl_Window` - An OpenGL window on the screen.
- `FL_Group` - The base container class; can be used to group any widgets together.
- `FL_Pack` - A collection of widgets that are packed into the group area.
- `FL_Scroll` - A scrolled window area.
- `FL_Tabs` - Displays child widgets as tabs.
- `FL_Tile` - A tiled window area.
- `FL_Window` - A window on the screen.
- `FL_Wizard` - Displays one group of widgets at a time.

1.4.5 Setting the Size and Position of Widgets

The size and position of widgets is usually set when you create them. You can access them with the `x()`, `y()`, `w()`, and `h()` methods.

You can change the size and position by using the `position()`, `resize()`, and `size()` methods:

```
button->position(x, y);
group->resize(x, y, width, height);
window->size(width, height);
```

If you change a widget's size or position after it is displayed you will have to call `redraw()` on the widget's parent.

1.4.6 Colors

FLTK stores the colors of widgets as an 32-bit unsigned number that is either an index into a color palette of 256 colors or a 24-bit RGB color. The color palette is *not* the X or MS Windows colormap, but instead is an internal table with fixed contents.

See the [Colors](#) section of [Drawing Things in FLTK](#) for implementation details.

There are symbols for naming some of the more common colors:

- FL_BLACK
- FL_RED
- FL_GREEN
- FL_YELLOW
- FL_BLUE
- FL_MAGENTA
- FL_CYAN
- FL_WHITE

Other symbols are used as the default colors for all FLTK widgets.

- FL_FOREGROUND_COLOR
- FL_BACKGROUND_COLOR
- FL_INACTIVE_COLOR
- FL_SELECTION_COLOR

The full list of named color values can be found in [FLTK Enumerations](#).

A color value can be created from its RGB components by using the `fl_rgb_color()` function, and decomposed again with `Fl::get_color()`:

```
Fl_Color c = fl_rgb_color(85, 170, 255); // RGB to Fl_Color
Fl::get_color(c, r, g, b); // Fl_Color to RGB
```

The widget color is set using the `color()` method:

```
button->color(FL_RED); // set color using named value
```

Similarly, the label color is set using the `labelcolor()` method:

```
button->labelcolor(FL_WHITE);
```

The `Fl_Color` encoding maps to a 32-bit unsigned integer representing RGBI, so it is also possible to specify a color using a hex constant as a color map index:

```
button->color(0x000000ff); // colormap index #255 (FL_WHITE)
```

or specify a color using a hex constant for the RGB components:

```
button->color(0xff000000); // RGB: red
button->color(0x00ff0000); // RGB: green
button->color(0x0000ff00); // RGB: blue
button->color(0xffff0000); // RGB: white
```

Note

If TrueColor is not available, any RGB colors will be set to the nearest entry in the colormap.

1.4.7 Box Types

The type `Fl_Boxtype` stored and returned in `Fl_Widget::box()` is an enumeration defined in `Enumerations.H`.

These are the standard box types included with FLTK:

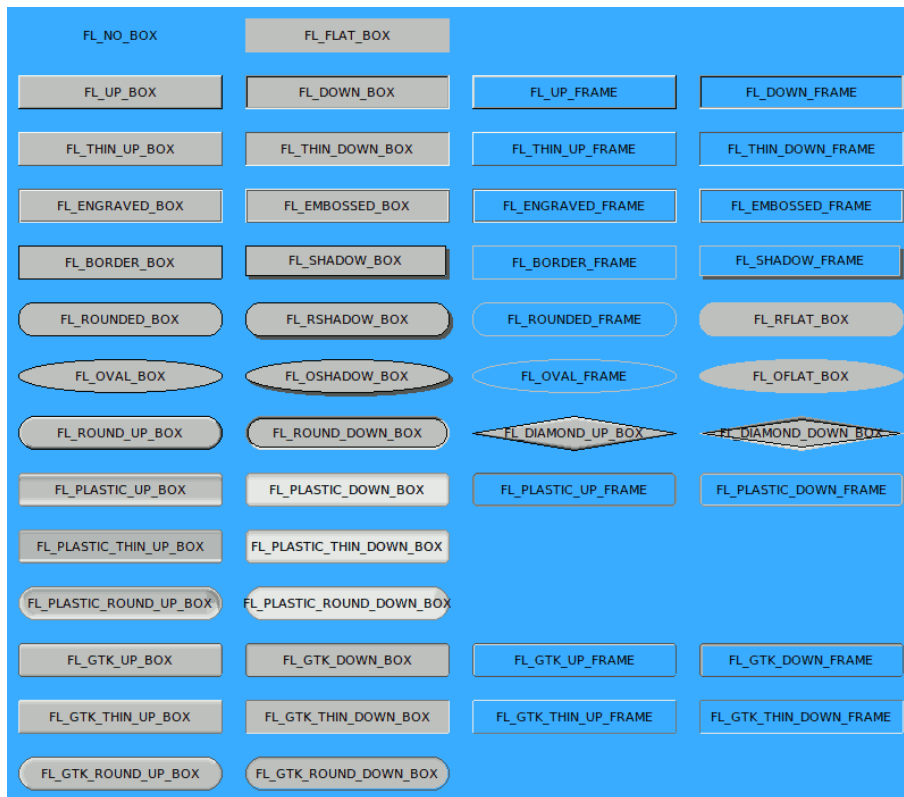


Figure 1.4 FLTK Standard Box Types

`FL_NO_BOX` means nothing is drawn at all, so whatever is already on the screen remains. The `FL_..._FRAME` types only draw their edges, leaving the interior unchanged. The blue color in the image above is the area that is not drawn by the frame types.

1.4.7.1 Making Your Own Boxtypes

You can define your own boxtypes by making a small function that draws the box and adding it to the table of boxtypes.

The Drawing Function

The drawing function is passed the bounding box and background color for the widget:

```
void xyz_draw(int x, int y, int w, int h, Fl_Color c) {
  ...
}
```

A simple drawing function might fill a rectangle with the given color and then draw a black outline:

```
void xyz_draw(int x, int y, int w, int h, Fl_Color c) {
  fl_color(c);
  fl_rectf(x, y, w, h);
  fl_color(FL_BLACK);
  fl_rect(x, y, w, h);
}
```

`Fl_Boxtype fl_down(Fl_Boxtype b)`

`fl_down()` returns the "pressed" or "down" version of a box. If no "down" version of a given box exists, the behavior of this function is undefined and some random box or frame is returned. See [Drawing Functions](#) for more details.

FI_Boxtype `fl_frame(FI_Boxtype b)`

`fl_frame()` returns the unfilled, frame-only version of a box. If no frame version of a given box exists, the behavior of this function is undefined and some random box or frame is returned. See [Drawing Functions](#) for more details.

FI_Boxtype `fl_box(FI_Boxtype b)`

`fl_box()` returns the filled version of a frame. If no filled version of a given frame exists, the behavior of this function is undefined and some random box or frame is returned. See [Drawing Functions](#) for more details.

Adding Your Box Type

The `Fl::set_boxtype()` method adds or replaces the specified box type:

```
#define XYZ_BOX FL_FREE_BOXTYPE
Fl::set_boxtype(XYZ_BOX, xyz_draw, 1, 1, 2, 2);
```

The last 4 arguments to `Fl::set_boxtype()` are the offsets for the `x`, `y`, `width`, and `height` values that should be subtracted when drawing the label inside the box.

A complete box design contains four box types in this order: a filled, neutral box (`UP_BOX`), a filled, depressed box (`DOWN_BOX`), and the same as outlines only (`UP_FRAME` and `DOWN_FRAME`). The function `fl_down(FI_Boxtype)` expects the neutral design on a boxtype with a numerical value evenly dividable by two. `fl_frame(FI_Boxtype)` expects the `UP_BOX` design at a value dividable by four.

1.4.8 Labels and Label Types

The `label()`, `align()`, `labelfont()`, `labelsize()`, `labeltype()`, `image()`, and `deimage()` methods control the labeling of widgets.

label()

The `label()` method sets the string that is displayed for the label. Symbols can be included with the label string by escaping them using the "@" symbol - "@@" displays a single at sign. These are the available symbols:



Figure 1.5 FLTK label symbols

The @ sign may also be followed by the following optional "formatting" characters, in this order:

- '#' forces square scaling, rather than distortion to the widget's shape.
- +[1-9] or -[1-9] tweaks the scaling a little bigger or smaller.
- '\$' flips the symbol horizontally, '%' flips it vertically.
- [0-9] - rotates by a multiple of 45 degrees. '5' and '6' do no rotation while the others point in the direction of that key on a numeric keypad. '0', followed by four more digits rotates the symbol by that amount in degrees.

Thus, to show a very large arrow pointing downward you would use the label string "@+92->".

Symbols and text can be combined in a label, however the symbol must be at the beginning and/or at the end of the text. If the text spans multiple lines, the symbol or symbols will scale up to match the height of all the lines.

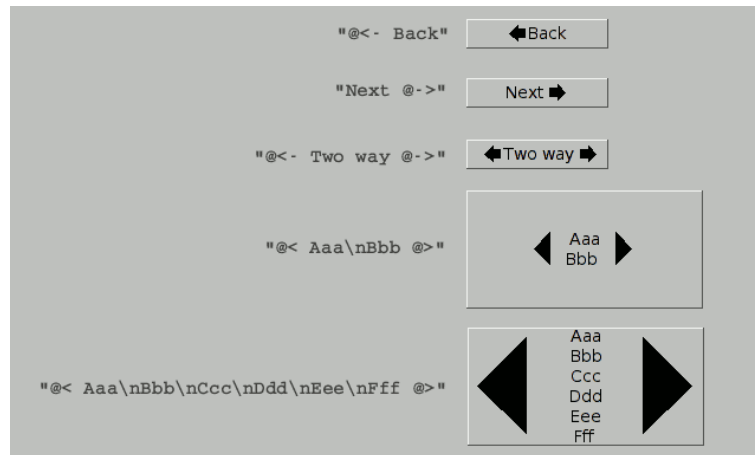


Figure 1.6 FLTK symbols and text

`align()`

The `align()` method positions the label. The following constants are defined and may be OR'd together as needed:

- `FL_ALIGN_CENTER` - center the label in the widget.
- `FL_ALIGN_TOP` - align the label at the top of the widget.
- `FL_ALIGN_BOTTOM` - align the label at the bottom of the widget.
- `FL_ALIGN_LEFT` - align the label to the left of the widget.
- `FL_ALIGN_RIGHT` - align the label to the right of the widget.
- `FL_ALIGN_LEFT_TOP` - The label appears to the left of the widget, aligned at the top. Outside labels only.
- `FL_ALIGN_RIGHT_TOP` - The label appears to the right of the widget, aligned at the top. Outside labels only.
- `FL_ALIGN_LEFT_BOTTOM` - The label appears to the left of the widget, aligned at the bottom. Outside labels only.
- `FL_ALIGN_RIGHT_BOTTOM` - The label appears to the right of the widget, aligned at the bottom. Outside labels only.
- `FL_ALIGN_INSIDE` - align the label inside the widget.
- `FL_ALIGN_CLIP` - clip the label to the widget's bounding box.
- `FL_ALIGN_WRAP` - wrap the label text as needed.
- `FL_ALIGN_TEXT_OVER_IMAGE` - show the label text over the image.
- `FL_ALIGN_IMAGE_OVER_TEXT` - show the label image over the text (default).
- `FL_ALIGN_IMAGE_NEXT_TO_TEXT` - The image will appear to the left of the text.
- `FL_ALIGN_TEXT_NEXT_TO_IMAGE` - The image will appear to the right of the text.
- `FL_ALIGN_IMAGE_BACKDROP` - The image will be used as a background for the widget.

labeltype()

The `labeltype()` method sets the type of the label. The following standard label types are included:

- `FL_NORMAL_LABEL` - draws the text.
- `FL_NO_LABEL` - does nothing.
- `FL_SHADOW_LABEL` - draws a drop shadow under the text.
- `FL_ENGRAVED_LABEL` - draws edges as though the text is engraved.
- `FL_EMBOSSSED_LABEL` - draws edges as though the text is raised.
- `FL_ICON_LABEL` - draws the icon ([FI_Image](#)) associated with the text.
- `FL_IMAGE_LABEL` - draws the image ([FI_Image](#)) associated with the text.
- `FL_MULTI_LABEL` - draws multiple parts side by side, see [FI_Multi_Label](#).

Note

Some of these labeltypes are no longer necessary for normal widgets. Widgets allow for an image and a text side by side, depending on the widget's `align()` flag. `FL_MULTI_LABEL` was designed to be used with [FI_Menu_Item](#)'s to support icons or small images, typically left of the menu text.

As of this writing (FLTK 1.4.0, Sep 2017) [FI_Menu_Items](#) support only one label part (text or image), but using [FI_Multi_Label](#) as the label can extend this to more than one part.

See also

class [FI_Multi_Label](#), [FI_Widget::align\(\)](#)

image() and deimage()

The `image()` and `deimage()` methods set an image that will be displayed with the widget. The `deimage()` method sets the image that is shown when the widget is inactive, while the `image()` method sets the image that is shown when the widget is active.

To make an image you use a subclass of [FI_Image](#).

Making Your Own Label Types

Label types are actually indexes into a table of functions that draw them. The primary purpose of this is to use this to draw the labels in ways inaccessible through the `fl_font()` mechanism (e.g. `FL_ENGRAVED_LABEL`) or with program-generated letters or symbology.

Label Type Functions

To setup your own label type you will need to write two functions: one to draw and one to measure the label. The draw function is called with a pointer to a `Fl_Label` structure containing the label information, the bounding box for the label, and the label alignment:

```
void xyz_draw(const Fl_Label *label, int x, int y, int w, int h, Fl_Align align) {
    ...
}
```

The label should be drawn *inside* this bounding box, even if `FL_ALIGN_INSIDE` is not enabled. The function is not called if the label value is `NULL`.

The measure function is called with a pointer to a `Fl_Label` structure and references to the width and height:

```
void xyz_measure(const Fl_Label *label, int &w, int &h) {
    ...
}
```

The function should measure the size of the label and set `w` and `h` to the size it will occupy.

Adding Your Label Type

The `Fl::set_labeltype()` method creates a label type using your draw and measure functions:

```
#define XYZ_LABEL FL_FREE_LABELTYPE

Fl::set_labeltype(XYZ_LABEL, xyz_draw, xyz_measure);
```

The label type number `n` can be any integer value starting at the constant `FL_FREE_LABELTYPE`. Once you have added the label type you can use the `labeltype()` method to select your label type.

The `Fl::set_labeltype()` method can also be used to overload an existing label type such as `FL_NORMAL_LABEL`.

Making your own symbols

It is also possible to define your own drawings and add them to the symbol list, so they can be rendered as part of any label.

To create a new symbol, you implement a drawing function `void drawit(Fl_Color c)` which typically uses the functions described in [Drawing Complex Shapes](#) to generate a vector shape inside a two-by-two units sized box around the origin. This function is then linked into the symbols table using `fl_add_symbol()`:

```
int fl_add_symbol(const char *name, void (*drawit)(Fl_Color), int scalable)
```

`name` is the name of the symbol without the "@"; `scalable` must be set to 1 if the symbol is generated using scalable vector drawing functions.

```
int fl_draw_symbol(const char *name, int x, int y, int w, int h, Fl_Color col)
```

This function draws a named symbol fitting the given rectangle.

1.4.9 Callbacks

Callbacks are functions that are called when the value of a widget changes. A callback function is sent a `Fl_Widget` pointer of the widget that changed and a pointer to data that you provide:

```
void xyz_callback(Fl_Widget *w, void *data) {
    ...
}
```

The `callback()` method sets the callback function for a widget. You can optionally pass a pointer to some data needed for the callback:

```
int xyz_data;

button->callback(xyz_callback, &xyz_data);
```

Note

You cannot delete a widget inside a callback, as the widget may still be accessed by FLTK after your callback is completed. Instead, use the `Fl::delete_widget()` method to mark your widget for deletion when it is safe to do so.

Many programmers new to FLTK or C++ try to use a non-static class method instead of a static class method or function for their callback. Since callbacks are done outside a C++ class, the `this` pointer is not initialized for class methods.

To work around this problem, define a static method in your class that accepts a pointer to the class, and then have the static method call the class method(s) as needed. The data pointer you provide to the `callback()` method of the widget can be a pointer to the instance of your class.

```
class Foo {
    void my_callback(Fl_Widget *w);
    static void my_static_callback(Fl_Widget *w, void *f) { ((Foo *)f)->my_callback(w); }
    ...
}
...
w->callback(my_static_callback, (void *)this);
```

In an effort to make callbacks easier, more flexible, and type safe, FLTK provides three groups of macros that generate the code needed to call class methods directly with up to five custom parameters.

- `FL_FUNCTION_CALLBACK_#(WIDGET, FUNCTION, ...)` creates code for callbacks to functions and static class methods with up to five arguments. The `#` must be replaced by the number of callback arguments.
- `FL_METHOD_CALLBACK_#(WIDGET, CLASS, SELF, METH, ...)` creates code for callbacks to arbitrary public class methods
- `FL_INLINE_CALLBACK_#(WIDGET, ..., FUNCTION_BODY)` creates code for callback functions that are very close to (almost in the same line) the widget creation code, similar to lambda function in C++11. The last argument of this macro is the callback code.

The syntax is a bit unconventional, but the resulting code is flexible and needs no additional maintenance. It is also C++98 compatible. For example:

```
#include <FL/fl_callback_macros.H>
...
Fl_String *str = new Fl_String("FLTK");
Fl_Button *btn = new Fl_Button(10, 10, 100, 100);
FL_METHOD_CALLBACK_2(btn, Fl_String, str, insert, int, 2, const char*, "...");
...
Fl_Button *inline_cb_btn_2 = new Fl_Button(390, 60, 180, 25, "2 args");
FL_INLINE_CALLBACK_2( inline_cb_btn_2,
    const char *, text, "FLTK", int, number, 2,
    {
        fl_message("We received the message %s with %d!", text, number);
    }
);
```

See also

`Fl_Widget::callback(Fl_Callback*, void*)`, `FL_FUNCTION_CALLBACK_3`, `FL_METHOD_CALLBACK_1`, `FL_INLINE_CALLBACK_2`

1.4.10 When and Reason

Normally callbacks are performed only when the value of the widget changes. You can change this using the `Fl_Widget::when()` method:

```
button->when (FL_WHEN_NEVER);
button->when (FL_WHEN_CHANGED);
button->when (FL_WHEN_RELEASE);
button->when (FL_WHEN_RELEASE_ALWAYS);
button->when (FL_WHEN_ENTER_KEY);
button->when (FL_WHEN_ENTER_KEY_ALWAYS);
button->when (FL_WHEN_CHANGED | FL_WHEN_NOT_CHANGED);
```

Within the callback, you can query why the callback was called using `Fl::callback_reason()`. For example, setting `myInput->when (FL_WHEN_RELEASE | FL_WHEN_CHANGED)`

for a text input field may return `FL_REASON_LOST_FOCUS` or `FL_REASON_CHANGED` as a callback reason.

1.4.11 Shortcuts

Shortcuts are key sequences that activate widgets such as buttons or menu items. The `shortcut()` method sets the shortcut for a widget:

```
button->shortcut (FL_Enter);
button->shortcut (FL_SHIFT + 'b');
button->shortcut (FL_CTRL + 'b');
button->shortcut (FL_ALT + 'b');
button->shortcut (FL_CTRL + FL_ALT + 'b');
button->shortcut (0); // no shortcut
```

The shortcut value is the key event value - the ASCII value or one of the special keys described in [Fl::event_key\(\) Values](#) combined with any modifiers like `Shift`, `Alt`, and `Control`.

1.5 Coordinates and Layout Widgets

This chapter describes the coordinate systems that apply when positioning widgets manually, and some of the basics of FLTK layout widgets that are used to position widgets automatically.

1.5.1 The Widget Coordinate System

All widgets have constructors with `x` and `y` parameters to let the programmer specify the desired initial position of the top left corner during explicit manual layout within `Fl_Window` and `Fl_Group` container widgets.

This position is always relative to the enclosing `Fl_Window`, which is usually, but not always, the top-level application window, or a free-floating pop-up dialog window. In some cases it could also be a subwindow embedded in a higher-level window, as shown in the figure below.

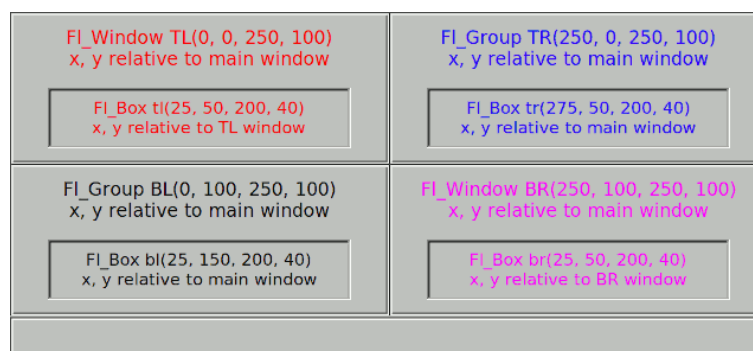


Figure 1.7 FLTK coordinate system

The positions of the TL and BR sub-windows and the TR and BL groups are all relative to the top-left corner of the main window. The positions of the boxes inside the TR and BL groups are also relative to the main window, but the boxes inside the TL and BR sub-windows are positioned relative to the enclosing sub-window.

In other words, the widget hierarchy and positions can be summarized as:

```

Fl_Window main window
  Fl_Window TL subwindow      # x, y relative to main window
    Fl_Box tl box            # x, y relative to TL subwindow
  Fl_Window BR subwindow      # x, y relative to main window
    Fl_Box br box            # x, y relative to BR subwindow
  Fl_Group TR group           # x, y relative to main window
    Fl_Box tr box            # x, y relative to main window
  Fl_Group BL group           # x, y relative to main window
    Fl_Box bl box            # x, y relative to main window

```

1.5.2 Layout and Container Widgets

There are four main groups of widgets derived from `Fl_Group` for a range of different purposes.

The first group are composite widgets that each contain a fixed set of components that work together for a specific purpose, rather than layout widgets as such, and are not discussed here.

The second group are basically containers offering the same manual layout features as `Fl_Group`, as described above, but which add one new capability. These widgets are `Fl_Scroll`, `Fl_Tabs` and `Fl_Wizard`.

The third group are layout managers that relocate and resize the child widgets added to them in order to satisfy a particular layout algorithm. These widgets are `Fl_Flex`, `Fl_Grid`, `Fl_Pack`, and `Fl_Tile`.

The final group consists of `Fl_Window` and its derivatives. Their special capability is that they can be top-level application windows and dialogs that interface with the operating system window manager, but can also be embedded within other windows and groups as shown in the example above. Note that the window manager may impose its own constraints on the position of top-level windows, and the `x` and `y` position parameters may be treated as hints, or even ignored. The `Fl_Window` class has an extra constructor that omits them.

Descriptions of layout and container widgets follow in alphabetical order.

1.5.2.1 The `Fl_Flex` Layout Widget

The `Fl_Flex` widget allows the layout of its direct children as a single row or column. If its `type()` is set to give the row or horizontal layout, the children are all resized to have the same height as the `Fl_Flex` and are moved next to each other. If set to give the column or vertical layout, the children are all resized to have the same width as the `Fl_Flex` and are then stacked below each other.

Widget positions (`x`, `y`) need not be given by the user because widgets are positioned inside the `Fl_Flex` container in the order of its children. Widget sizes can be set to (0, 0) as in `Fl_Pack` since they are calculated by `Fl_Flex`.

This is similar to `Fl_Pack` described below and `Fl_Flex` is designed to act as a drop-in replacement of `Fl_Pack` with some minor differences.

Other than `Fl_Pack` the `Fl_Flex` widget does **not** resize itself but resizes its children to fill the entire space of the `Fl_Flex` container. Single children of `Fl_Flex` can be set to fixed sizes to inhibit this resizing behavior. In this case the remaining space is distributed to all non-fixed widgets.

`Fl_Flex` widgets can be nested inside each other and with `Fl_Grid` in any combination.

The name `Fl_Flex` was inspired by the CSS 'flex' container.

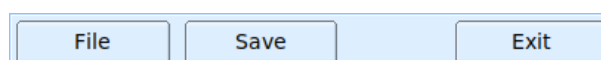


Figure 1.8 Simple `Fl_Flex` Layout

`Fl_Flex` was added in FLTK 1.4.0.

1.5.2.2 The `Fl_Grid` Layout Widget

`Fl_Grid` is the most flexible layout container in FLTK 1.4. It is based on a flexible grid of **cells** that can be assigned one widget per cell which is the *anchor* of the widget. Widgets can span multiple rows and columns and the cells can constitute a sparse matrix. Widgets can be aligned inside their cells in several ways (left, right, top, bottom) and can stretch horizontally, vertically, or both, i.e. fill the entire cell.

Widget positions (x, y) need not be given by the user because widgets are assigned to a particular grid cell by row and column number. Widget sizes can be given as their **minimal** sizes and will be resized appropriately depending on the free space.

Optional margins around all cells inside the widget border and gaps between rows and cells make the layout even more flexible.

The `Fl_Grid` widget should be designed with a grid (matrix) and its minimal size in mind. It is designed to **enlarge** cells and widgets in a flexible way when the `Fl_Grid` widget itself is created or resized.

Additional free space inside the `Fl_Grid` container is distributed to widgets by considering minimal row heights, column widths, sizes of widgets, and row and column *weights*. These weights are used to distribute the free space proportionally according to the row and column weights.

`Fl_Grid` widgets can be nested inside each other and with `Fl_Flex` and other subclasses of `Fl_Group` in any combination.

Note

We don't recommend to use `Fl_Pack` as child widgets although this **may** work as well.

The name `Fl_Grid` was inspired by the CSS 'grid' container but it has some properties in common with HTML `<table>` containers as well, for instance row and column spanning.

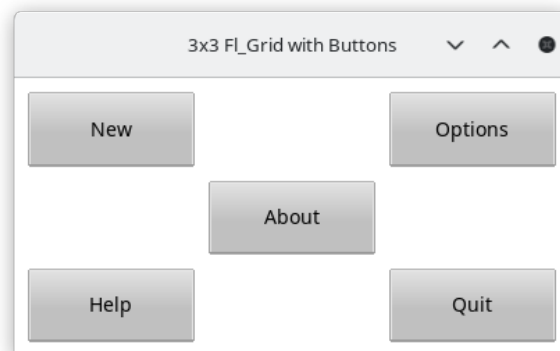


Figure 1.9 Simple `Fl_Grid` Layout

`Fl_Grid` was added in FLTK 1.4.0.

1.5.2.3 The `Fl_Pack` Layout Widget

The `Fl_Pack` widget allows the layout of its direct children as a single row, or column. If its `type()` is set to give the row or horizontal layout, the children are all resized to have the same height as the `Fl_Pack` and are moved next to each other. If set to give the column or vertical layout, the children are all resized to have the same width as the `Fl_Pack` and are then stacked below each other. The `Fl_Pack` then resizes itself to shrink-wrap itself around all of the children.

`Fl_Pack` widgets are often used inside an `Fl_Scroll`, as shown in the diagram below, to avoid having to deal with tricky resize behavior when used with nested widgets.

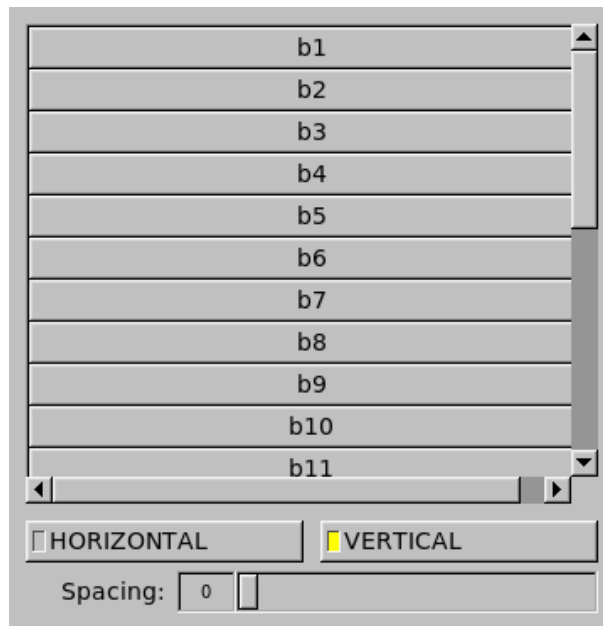


Figure 1.10 `Fl_Pack` test program screenshot

Since FLTK 1.4.0 `Fl_Flex` (described above) can in many cases be used as a drop-in replacement for `Fl_Pack` if this "shrink-wrap" behavior is not required. Note that the `Fl_Pack` layout algorithm can cause some issues because its widget size can change depending on its children and particularly because this is done late, i.e. during `draw()` and not as usual during resize of the window.

Note

We recommend that developers evaluate whether using `Fl_Flex` or `Fl_Grid` instead of `Fl_Pack` can be a better solution with more predictable and reliable resizing behavior of the overall program layout.

1.5.2.4 The `Fl_Scroll` Container Widget

The `Fl_Scroll` container widget can hold an assortment of widgets that may extend beyond its own width and height, in which case horizontal and/or vertical scrollbars may appear automatically so that you can scroll and view the entire contents.

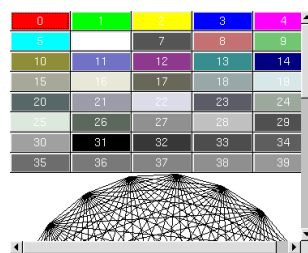


Figure 1.11 `Fl_Scroll` container widget

1.5.2.5 The FI_Tabs Container Widget

The `FI_Tabs` widget provides a front-to-back stack of individual panels which usually contain `FI_Group` widgets and their children. The user can switch between panels by clicking on the small tabs that protrude from the panels. The appearance of each tab is determined by the child widget's label and related attributes.

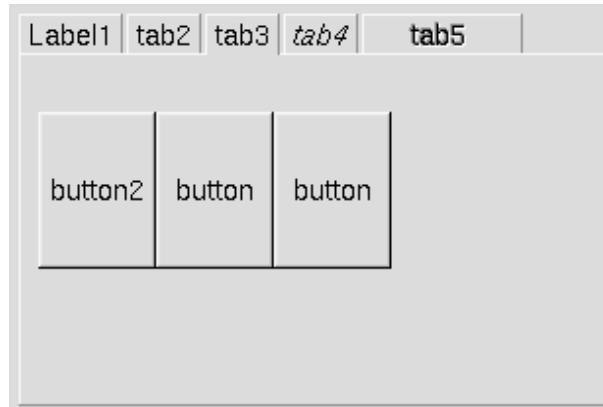


Figure 1.12 `FI_Tabs` container widget

1.5.2.6 The FI_Tile Layout Widget

The `FI_Tile` widget allows the user to resize one or more of its children by dragging on the border between adjacent child widgets. However, the programmer must first explicitly layout the child widgets so that their borders exactly fill the width and height of the `FI_Tile` without having any gaps between them, or at the edges. Some care is needed when initially positioning the children and setting the `resizable()` widget within the `FI_Tile` to prevent squeezing a child to have a zero width or height. For more information see the `FI_Tile` widget manual page, and [How Does Resizing Work?](#).

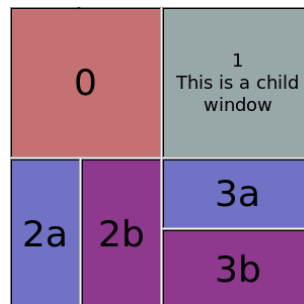


Figure 1.13 The `FI_Tile` layout widget

1.5.2.7 The FI_Wizard Container Widget

The `FI_Wizard` widget derives from the `FI_Tabs` class, but instead of having tabs that the user can click to select the corresponding panel, the programmer uses the `prev()`, `next()` or `value()` methods to show the appropriate panel. For example, the user might be able to click on "Next" and "Prev" navigation buttons or keys, as shown below.



Figure 1.14 `FI_Wizard` container widget

1.6 How Does Resizing Work?

This chapter describes the basic mechanism behind the creation of resizable user interface elements in FLTK.

FLTK uses a simple, but very versatile system to resize even the most complex dialogs and interfaces. The resizing is implemented within the `Fl_Group` widget, and the exact resizing behavior of that group is determined by its `resizable()` attribute.

1.6.1 Resizing can be disabled

Summary:

```
group = new Fl_Group(xg, yg, wg, hg, "No Resizing");
child1 = new Fl_Box(xb, yb, wb, hb, "B"); // or other widget type
. . .
group->resizable((Fl_Widget*)0); // no resizing
group->end()
```

The `resizable` may be set to the NULL pointer, which means that the group will not resize. Note that this is the default behavior for `Fl_Window` and `Fl_Pack` derived widgets, and therefore the programmer must explicitly set the window's `resizable` attribute if they want to allow the window to be resized.

1.6.2 Resizing can be simple

Summary:

```
group = new Fl_Group(xg, yg, wg, hg, "Simple Resizing");
child1 = new Fl_Box(xb, yb, wb, hb, "B"); // or other widget type
. . .
group->resizable(group); // simple proportional resizing
group->end()
```

The `resizable` may be set to the group itself, which means that all widgets within the group will resize as the group itself is resized. This is the default behavior for `Fl_Group` widgets, and is shown in the diagram below.

If the group is stretched horizontally, the widths of the widgets within the group are adjusted proportionally. The same is true for vertical resizing.

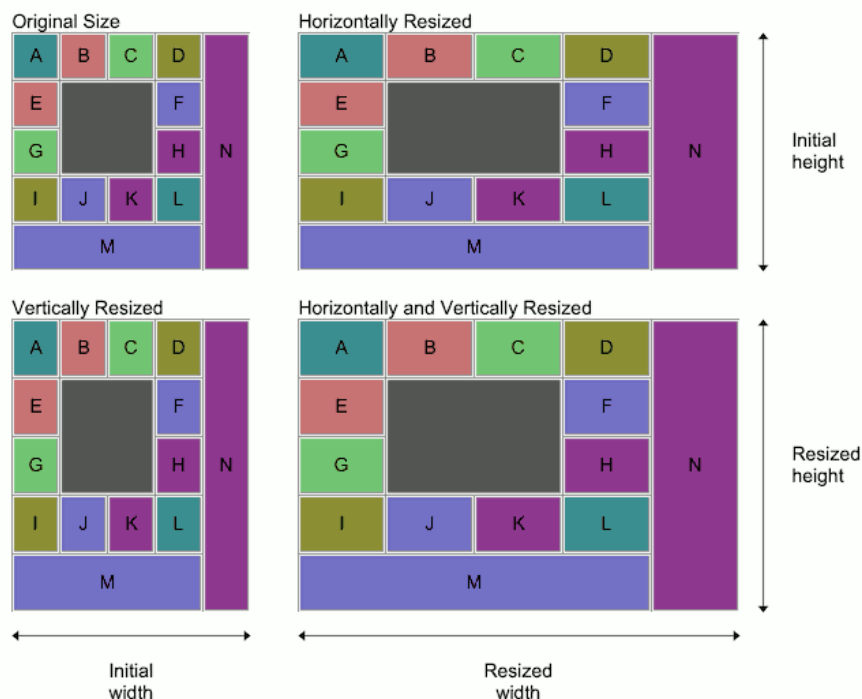


Figure 1.15 Proportional resizing example

1.6.3 Resizing can be complex

Summary:

```
group = new Fl_Group(xg, yg, wg, hg, "Complex Resizing");
child1 = new Fl_Box(xb, yb, wb, hb, "B"); // or other widget type
. . .
group->resizable(child1); // complex resizing
group->end();
```

It is when the group's `resizable` attribute is set to one of the group's child widgets, that things become really interesting.

In the diagram below, imagine vertical lines extending from the left and right sides of the yellow widget marked "resizable", and horizontal lines extending from the top and bottom sides. Exactly which widgets resize, and by how much, is determined by which ones lie completely or partially within this cross.

The widgets marked B, C, J, K and M clearly lie completely or partially within the vertical part of the cross; the widgets marked E, F, G, H and N lie completely or partially within the horizontal part of the cross; and the widgets marked A, D, I and L do not overlap with the cross at all. The resizing behavior is as follows:

- the width and height of the `resizable` widget increase to match the change in the width and height of the group widget as it is stretched;
- the widths of those widgets that overlap with the vertical part of the cross increase proportionally as the width of the group widget increases, but their heights remain unchanged, i.e. the widgets marked B, C, J, K and M;
- the heights of those widgets that overlap with the horizontal part of the cross increase proportionally as the height of the group widget increases, but their widths remain unchanged, i.e. the widgets marked E, F, G, H and N;
- the widths and heights of the remaining widgets stay the same, i.e. the widgets marked A, D, I and L stay the same size.

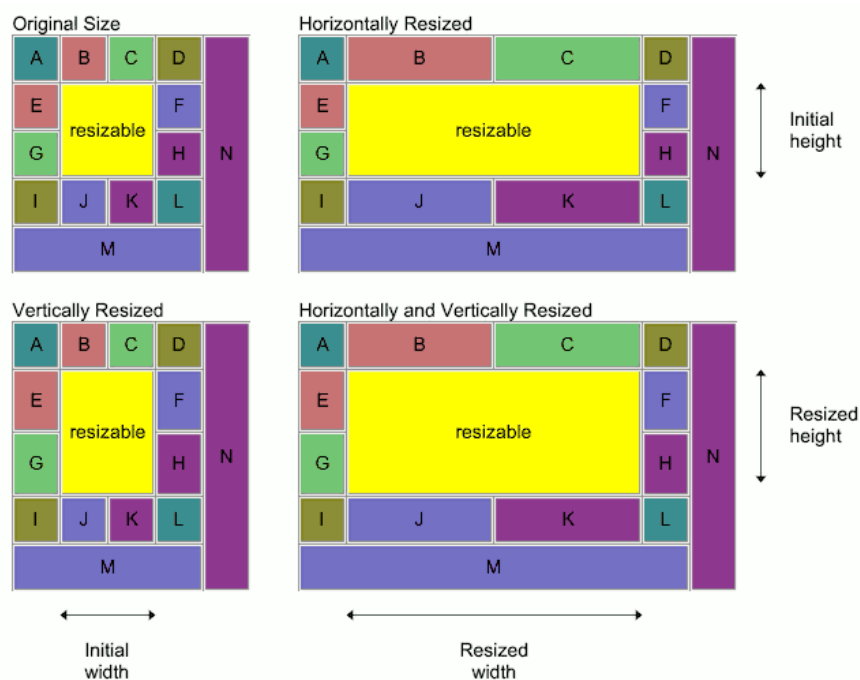


Figure 1.16 Complex resizing example

1.6.4 Practical examples

Why is this so powerful, you may ask. Well, every widget group can have a completely independent resizing strategy. By replacing one or more of the group's "normal" child widgets with another group widget where all of the above rules can be applied again, it is possible to create a hierarchy of group widgets with very complex layouts and resizing behavior.

Consider a simple dialog box, consisting of an icon box and a message area on the top and a button at the bottom right: which widget should be the `resizable` one?

Setting the `resizable` to be the icon box won't give us what we want:

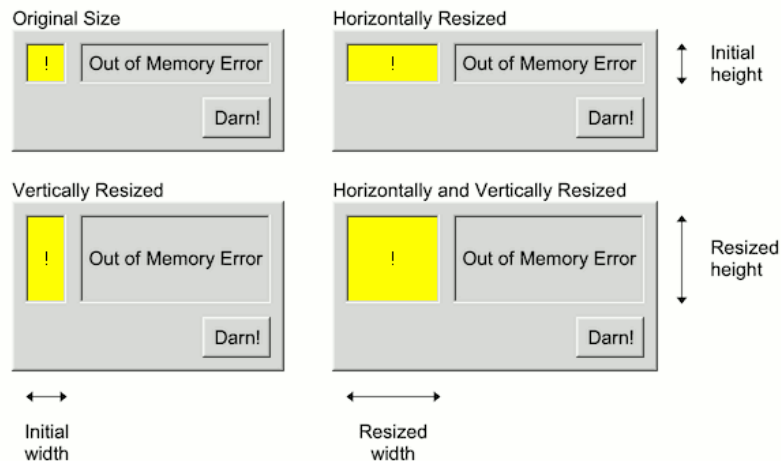


Figure 1.17 Resizing dialog example (a)

The message text area would be the logical choice so that the user can expand the dialog to see if there is more of an explanation below the short error message. This results in the behavior shown in the diagram below.

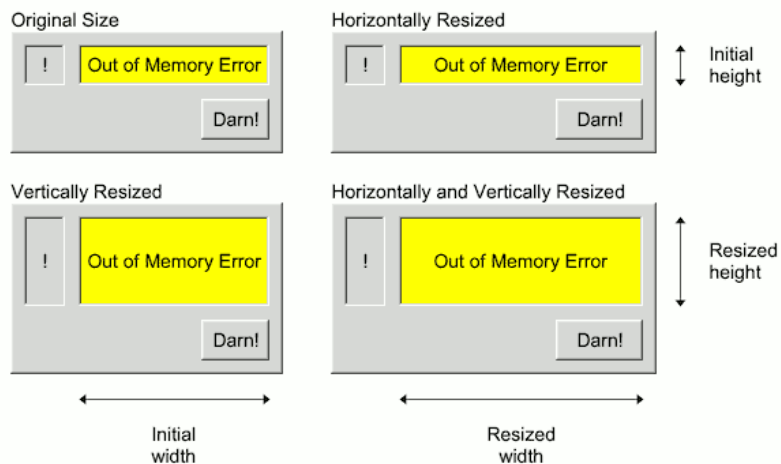


Figure 1.18 Resizing dialog example (b)

The result is close to what we want, but not quite: the text area will fully resize, the "!" icon box will resize vertically but not horizontally, which we can live with, but the "Darn!" button will - wait a minute - resize horizontally?

That's ugly. How do we stop that from happening? Simple: put it in its own group and set the `resizable` to an invisible box widget, as shown in the diagram below.

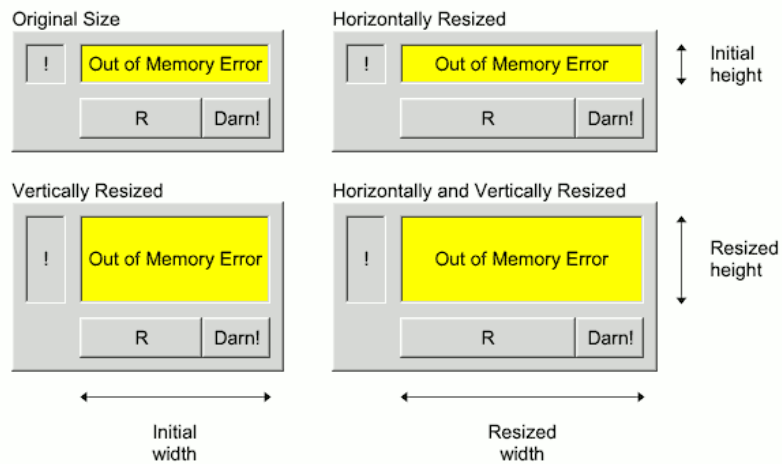


Figure 1.19 Resizing dialog example (c)

Now the invisible box, shown as "R", takes all of the horizontal resizing and the "Darn!" box will stay as it is. Here's the skeleton code:

```
dialog = new Fl_Window(300, 100);
icon = new Fl_Box(0, 0, 50, 50, "!");
text = new Fl_Box(50, 0, 250, 40, "Out of Memory Error");
btns = new Fl_Group(50, 50, 250, 50); // parent group
darn = new Fl_Button(200, 50, 100, 50, "Darn!");
R = new Fl_Box(50, 50, 150, 50); // "invisible" box "R"
R->hide(); // make sure it's invisible
btns->resizable(R); // make "R" parent group resizable
btns->end();
dialog->resizable(text);
dialog->end();
```

Imagine instead that you have a group that has a button, an input field, another button and a second input field, all next to each other, and you want the input fields to resize equally, but not the buttons. How could you achieve this?

Setting either of the input fields to be the `resizable` leaves the other one fixed, as shown below:

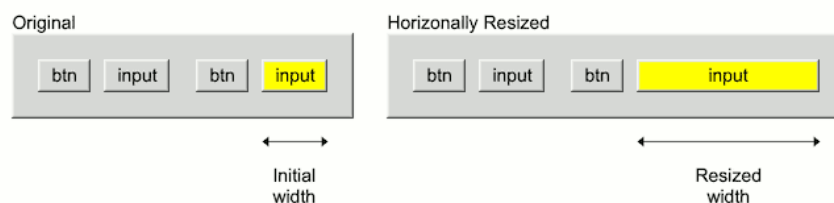


Figure 1.20 Resizing input fields example (b)

The answer is to leave the `resizable` of the group set to itself, and to create two equal size subgroups, each of which will resize equally. Add a button and input field to each subgroup, and set each subgroup's `resizable` to the input field, as shown below. Tada!

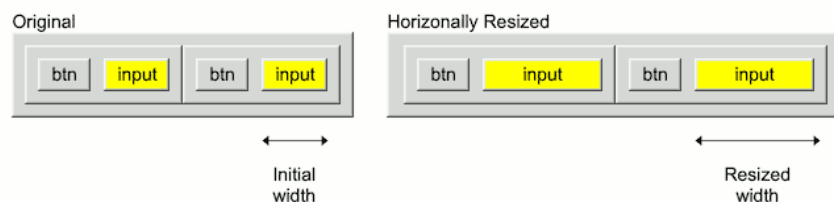


Figure 1.21 Resizing input fields example (b)

In FLTK it is possible to solve almost any layout and resizing problem by introducing an invisible box into a group, or an extra group into the widget hierarchy. It might take some thought to achieve exactly what you want and sometimes it is necessary to introduce parallel hierarchies in order to get widgets in different groups to resize together.

Imagine you have a group containing three widgets in a row, and you want the widget in the middle to stay the same size when the group is stretched and the ones on either side and the padding between them to resize symmetrically. As described earlier, the default resizing behavior for a group results in proportional resizing of the child widgets (and also of the margins and padding between them) as shown below, which is clearly not what you want.

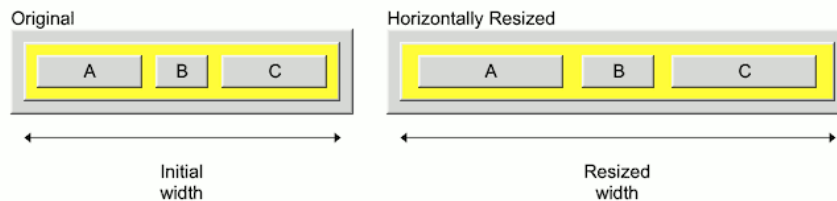


Figure 1.22 Resizing a row of widgets (a)

Simply adding a group around A and B and setting its `resizable` to A, as in the previous `btn-input` example, will mean that B stays the same size, but the other widgets won't resize symmetrically, so what else is needed? It isn't immediately obvious how to solve this problem, even for experienced FLTK users. This is possibly because users are generally advised to design widgets so that they don't overlap.

Albrecht Schlosser proposed an innovative technique that involves an invisible box that deliberately overlaps others to achieve the desired behavior. For the current example, this means inserting two new groups into the existing group and adding a hidden resizable widget.

The first group, shown in red below, extends from the left edge of the parent group to the middle of the gap between boxes B and C on the right. This first group contains boxes A and B, where A is the first group's `resizable` attribute.

The second group, shown in blue, extends from the right edge of the first group to the right edge of the parent group. This second group contains box C, where C is the second group's `resizable`.

The extra box widget is added to the parent group and is set as the group's `resizable`. The three `resizable` widgets are shown in yellow.

The clever bit is that this extra box widget is not horizontally aligned with any of the existing groups and widgets in the usual way, but instead overlaps the right and left parts of the two new groups by the same small amount, which means that its midpoint is aligned with the edge between the groups.

Note that, for clarity, the height of the original group has been increased to allow space for the additional annotation and to highlight the extra resizable box in the extra space at the bottom of the group. This is fine for the horizontal-only resizing shown here, but means that widgets A, B and C will never change height because the extra resizable box does not overlap them vertically. Only the padding below them will be resized.

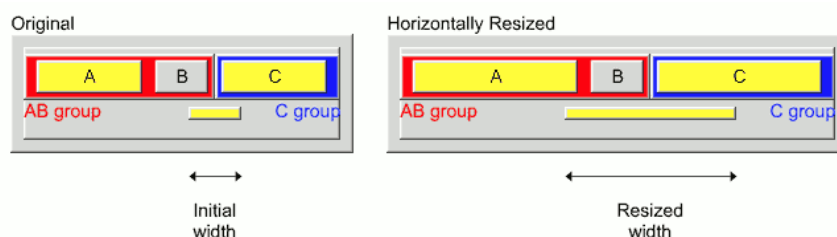


Figure 1.23 Resizing a row of widgets (b)

In a real application, you probably want to allow widgets A, B and C to resize vertically while the height of any padding or widgets above or below remains fixed, so the extra resizable box has to lie within the height of widgets A, B and C. Obviously after calling `hide()` on the box it is no longer visible, and may therefore be the same height as the other widgets, or a fraction of the height, as shown below.

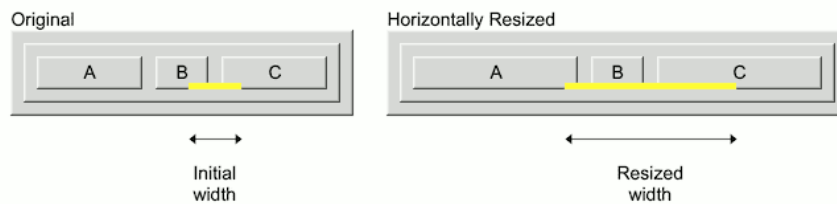


Figure 1.24 Resizing a row of widgets (c)

To summarize the key points of the new technique:

- The new resizable widget must overlap the widgets on each side by exactly the same amount.
- The width of the new resizable widget is not fixed, but should probably be a relatively small value to avoid potential problems.
- The total width of the two new groups must equal the width of the existing group and there can be no offsets or gaps between them because margins and gaps will affect the resizing behavior.
- The same principles apply to vertical resizing.

1.7 Designing a Simple Text Editor

This chapter guides you through the design of a simple FLTK-based text editor.

The complete source code for our text editor can be found in the `test/editor.cxx` file.

The tutorial comprises multiple chapters, and you can activate the relevant code by adjusting the `TUTORIAL_↔CHAPTER` macro at the top of the source file to match the chapter number.

Each chapter builds on the previous one. The documentation, as well as the source code, can be read sequentially, maintaining a consistent program structure while introducing additional features step by step.

Note

The tutorial uses several global variables for brevity. Additionally, the order of code blocks is rather uncommon but helps to keep related features within a chapter.

1.7.1 Determining the Goals of the Text Editor

As our first step, we define what we want our text editor to do:

1. Edit a single text document.
2. Provide a menubar/menus for all functions.
3. Load from a file.
4. Save to a file.
5. Keep track of when the file has been changed.
6. Cut/copy/delete/paste menus.
7. Search and replace functionality.
8. Multiple views of the same text.
9. "C" language syntax highlighting.

1.7.2 Chapter 1: A Minimal App

Let's ensure that we can set up our build process to compile and verify our code as we add features. We begin by writing a minimal program with no other purpose than opening a window.

The code for that is barely longer than a "Hello, world" program and is marked in the source code as `TUTORIAL`↔

```
__CHAPTER = 1.
#include <FL/Fl_Double_Window.H>
#include <FL/Fl.H>

Fl_Double_Window *app_window = NULL;

void tut1_build_app_window() {
    app_window = new Fl_Double_Window(640, 480, "FLTK Editor");
}

int main (int argc, char **argv) {
    tut1_build_app_window();
    app_window->show(argc, argv);
    return Fl::run();
}
```

Passing `argc` and `argv` to `Fl_Double_Window::show()` allows FLTK to parse command line options, providing the user with the ability to change the color or graphical scheme of the editor at launch time.

`Fl::run()` will return when no more windows in the app are visible. In other words, if all windows in an app are closed, hidden, or deleted. Pressing "Escape" or clicking the "Close" button in the window frame will close our only window, prompting `Fl::run()` to return, effectively ending the app.

When building FLTK from source, the CMake environment includes the necessary rules to build the editor. You can find more information on how to write your own CMake files in the `README.CMake.txt` text in the top FLTK directory.

For Linux and macOS, FLTK comes with the `fltk-config` script that generates the compiler commands for you:
`fltk-config --compile editor.cxx`

If the code compiles and links correctly, running the app will pop up an empty application window on the desktop screen. You can close the window and quit the app by pressing the 'Escape' key or by clicking the "Close" button in the window frame.

Congratulations, you've just built a minimal FLTK app.

1.7.3 Chapter 2: Adding a Menu Bar

In this chapter, we will handle the window title and add the main menu bar with a File menu and a Quit button.

We need to declare a variable to track track changes in the text, and a buffer for the current filename.

```
// remove `main()` from chapter 1, but keep the rest of the code, then add...
```

```
#include <FL/Fl_Menu_Bar.H>
#include <FL/fl_ask.H>
#include <FL/filename.H>

Fl_Menu_Bar *app_menu_bar = NULL;
bool text_changed = false;
char app_filename[FL_PATH_MAX] = "";
```

The window title is either "FLTK Editor" if the text is not saved in any file, or the filename, followed by an * if the text changed. Note that we have two ways to set the label of a widget. `label()` will link a static text, and `copy_label()` which will copy and manage the label text.

```
void update_title() {
    const char *fname = NULL;
    if (app_filename[0])
        fname = fl_filename_name(app_filename);
    if (fname) {
        char buf[FL_PATH_MAX + 3];
        if (text_changed) {
            snprintf(buf, FL_PATH_MAX+2, "%s *", fname);
        } else {
            snprintf(buf, FL_PATH_MAX+2, "%s", fname);
        }
        app_window->copy_label(buf);
    } else {
        app_window->label("FLTK Editor");
    }
}
```

Now instead of writing directly to `text_changed`, we write a function that can set and clear the flag, and update the title accordingly.

```
void set_changed(bool v) {
    if (v != text_changed) {
        text_changed = v;
        update_title();
    }
}
```

Let's do the same for changing the filename. If the new filename is NULL, the window title will revert to "FLTK Editor".

```
void set_filename(const char *new_filename) {
    if (new_filename) {
        strncpy(app_filename, new_filename, FL_PATH_MAX);
    } else {
        app_filename[0] = 0;
    }
    update_title();
}
```

But enough of managing window titles. The following code will add the first widget to our window. A menubar is created at the top and all across the main window.

```
void menu_quit_callback(Fl_Widget *, void *) { /* TODO */ }

void tut2_build_app_menu_bar() {
    app_window->begin();
    app_menu_bar = new Fl_Menu_Bar(0, 0, app_window->w(), 25);
    app_menu_bar->add("File/Quit Editor", FL_COMMAND+'q', menu_quit_callback);
    app_window->callback(menu_quit_callback);
    app_window->end();
}

int main (int argc, char **argv) {
    tut1_build_app_window();
    tut2_build_app_menu_bar();
    app_window->show(argc, argv);
    return Fl::run();
}
```

`begin()` tells FLTK to add all widgets created hereafter to our `app_window`. In this particular case, it is redundant because creating the window in the previous chapter already called `begin()` for us.

In the next line, we create the menu bar and add our first menu item to it. Menus can be constructed like file paths, with forward slashes '/' separating submenus from menu items.

Our basic callback is simple:

```
void menu_quit_callback(Fl_Widget *, void *) {
    Fl::hide_all_windows();
}
```

`Fl::hide_all_windows()` will make all windows invisible, causing `Fl::run()` to return and `main` to exit.

The next line, `app_window->callback(menu_quit_callback)` links the same `menu_quit_callback` to the `app_window` as well. Assigning the window callback removes the default "Escape" key handling and allows the `menu_quit_callback` to handle that keypress with a friendly dialog box instead of just quitting the app.

The `Fl_Widget*` parameter in the callback will either be `app_window` if called through the window callback, or `app_menu_bar` if called by one of the menu items.

One of our goals was to keep track of text changes. If we know the text changed and is unsaved, we should notify the user that she is about to lose her work. We achieve this by adding a dialog box in the Quit callback that queries if the user really wants to quit, even if text was changed:

```
void menu_quit_callback(Fl_Widget *, void *) {
    if (text_changed) {
        int c = fl_choice("Changes in your text have not been saved.\n"
                        "Do you want to quit the editor anyway?",
                        "Quit", "Cancel", NULL);
        if (c == 1) return;
    }
    Fl::hide_all_windows();
}
```

1.7.4 Chapter 3: Adding a Text Editor widget

FLTK comes with a pretty capable builtin text editing widget. We will use this `Fl_Text_Editor` widget here to allow users to edit their documents.

`Fl_Text_Editor` needs an `Fl_Text_Buffer` to do anything useful. What might seem like an unnecessary extra step is a great feature: we can assign one text buffer to multiple text editors. In a later chapter, we will use this feature to implement a split editor window.

```
#include <FL/Fl_Text_Buffer.H>
#include <FL/Fl_Text_Editor.H>

Fl_Text_Editor *app_editor = NULL;
Fl_Text_Editor *app_split_editor = NULL; // for later
Fl_Text_Buffer *app_text_buffer = NULL;

// ... callbacks go here

void tut3_build_main_editor() {
    app_window->begin();
    app_text_buffer = new Fl_Text_Buffer();
    app_text_buffer->add_modify_callback(text_changed_callback, NULL);
    app_editor = new Fl_Text_Editor(0, app_menu_bar->h(),
        app_window->w(), app_window->h() - app_menu_bar->h());
    app_editor->buffer(app_text_buffer);
    app_editor->textfont(FL_COURIER);
    app_window->resizable(app_editor);
    app_window->end();
}
```

By setting the `app_editor` to be the `resizable()` property of `app_window`, we make our application window resizable on the desktop, and we ensure that resizing the window will only resize the text editor vertically, but not our menu bar.

To keep track of changes to the document, we add a callback to the text editor that will be called whenever text is added or deleted. The text modify callback sets our `text_changed` flag if text was changed:

```
// insert before tut3_build_main_editor()
void text_changed_callback(int, int n_inserted, int n_deleted, int, const char*, void*) {
```

```

    if (n_inserted || n_deleted)
        set_changed(true);
}

```

To wrap this chapter up, we add a "File/New" menu and link it to a callback that clears the text buffer, clears the current filename, and marks the buffer as unchanged.

```

// insert before tut3_build_main_editor()
void menu_new_callback(Fl_Widget*, void*) {
    app_text_buffer->text("");
    set_changed(false);
}

// insert at the end of tut3_build_main_editor()
...
// find the Quit menu and insert the New menu there
int ix = app_menu_bar->find_index(menu_quit_callback);
app_menu_bar->insert(ix, "New", FL_COMMAND+'n', menu_new_callback);
...

```

1.7.5 Chapter 4: Reading and Writing Files

In this chapter, we will add support for loading and saving text files, so we need three more menu items in the File menu: Open, Save, and Save As.

```

#include <FL/Fl_Native_File_Chooser.H>
#include <FL/platform.H>
#include <errno.h>

// ... add callbacks here

void tut4_add_file_support() {
    int ix = app_menu_bar->find_index(menu_quit_callback);
    app_menu_bar->insert(ix, "Open", FL_COMMAND+'o', menu_open_callback, NULL, FL_MENU_DIVIDER);
    app_menu_bar->insert(ix+1, "Save", FL_COMMAND+'s', menu_save_callback);
    app_menu_bar->insert(ix+2, "Save as...", FL_COMMAND+'S', menu_save_as_callback, NULL, FL_MENU_DIVIDER);
}

```

Note

The menu shortcuts `FL_COMMAND+'s'` and `FL_COMMAND+'S'` look the same at a first glance, but the second shortcut is actually `Ctrl-Shift-S` due to the capital letter 'S'. Also, we use `FL_COMMAND` as our menu shortcut modifier key. `FL_COMMAND` translates to `FL_CTRL` on Windows and Linux, and to `FL_META` on macOS, better known as the cloverleaf, or simply "the Apple key".

We implement the Save As callback first, because we will want to call it from the Open callback later. The basic callback is only a few lines of code.

```

void menu_save_as_callback(Fl_Widget*, void*) {
    Fl_Native_File_Chooser file_chooser;
    file_chooser.title("Save File As...");
    file_chooser.type(Fl_Native_File_Chooser::BROWSE_SAVE_FILE);
    if (file_chooser.show() == 0) {
        app_text_buffer->savefile(file_chooser.filename());
        set_filename(file_chooser.filename());
        set_changed(false);
    }
}

```

However if the user has already set a file name including path information, it is the polite thing to preload the file chooser with that information. This little chunk of code will separate the file name from the path before we call `file_chooser.show()`:

```

// insert before `if (file_chooser.show()...`
if (app_filename[0]) {
    char temp_filename[FL_PATH_MAX];
    strncpy(temp_filename, app_filename, FL_PATH_MAX-1);
    const char *name = fl_filename_name(temp_filename);
    if (name) {
        file_chooser.preset_file(name);
        temp_filename[name - temp_filename] = 0;
        file_chooser.directory(temp_filename);
    }
}

```

Great. Now let's add code for our File/Save menu. If no filename was set yet, it falls back to our Save As callback. `Fl_Text_Editor::savefile()` writes the contents of our text widget into a UTF-8 encoded text file.

```
void menu_save_callback(Fl_Widget*, void*) {
    if (!app_filename[0]) {
        menu_save_as_callback(NULL, NULL);
    } else {
        app_text_buffer->savefile(file_chooser.filename());
        set_changed(false);
    }
}
```

Now that we have a save method available, we can improve the `menu_quit_callback` and offer the option to save the current modified text before quitting the app. Here is the new quit callback code that replaces the old callback:

```
void menu_quit_callback(Fl_Widget *, void *) {
    if (text_changed) {
        int r = fl_choice("The current file has not been saved.\n"
            "Would you like to save it now?",
            "Cancel", "Save", "Don't Save");

        if (r == 0) // cancel
            return;
        if (r == 1) { // save
            menu_save_callback(NULL, NULL);
            return;
        }
    }
    Fl::hide_all_windows();
}
```

On to loading a new file. Let's write the function to load a file from a given file name:

```
void load(const char *filename) {
    if (app_text_buffer->loadfile(filename) == 0) {
        set_filename(filename);
        set_changed(false);
    }
}
```

A friendly app should warn the user if file operations fail. This can be done in three lines of code, so let's add an alert dialog after every `loadfile` and `savefile` call. This is exemplary for `load()`, and the code is very similar for the two other locations.

```
void load(const char *filename) {
    if (app_text_buffer->loadfile(filename) == 0) {
        set_filename(filename);
        set_changed(false);
    } else {
        fl_alert("Failed to load file\n%s\n%s",
            filename,
            strerror(errno));
    }
}
```

If the user selects our pulldown "Load" menu, we first check if the current text was modified and provide a dialog box that offers to save the changes before loading a new text file:

```
void menu_open_callback(Fl_Widget*, void*) {
    if (text_changed) {
        int r = fl_choice("The current file has not been saved.\n"
            "Would you like to save it now?",
            "Cancel", "Save", "Don't Save");

        if (r == 2)
            return;
        if (r == 1)
            menu_save_callback();
    }
    ...
}
```

If the user did not cancel the operation, we pop up a file chooser for loading the file, using similar code as in Save As.

```
...
Fl_Native_File_Chooser file_chooser;
file_chooser.title("Open File...");
file_chooser.type(Fl_Native_File_Chooser::BROWSE_FILE);
...
```

Again, we preload the file chooser with the last used path and file name:

```
...
if (app_filename[0]) {
    char temp_filename[FL_PATH_MAX];
    strncpy(temp_filename, app_filename, FL_PATH_MAX-1);
}
```

```

const char *name = fl_filename_name(temp_filename);
if (name) {
    file_chooser.preset_file(name);
    temp_filename[name - temp_filename] = 0;
    file_chooser.directory(temp_filename);
}
}
...

```

And finally, we pop up the file chooser. If the user cancels the file dialog, we do nothing and keep the current file. Otherwise, we call the `load()` function that we already wrote:

```

if (file_chooser.show() == 0)
    load(file_chooser.filename());
}

```

We really should support two more ways to load documents from a file. Let's modify the "show and run" part of `main()` to handle command line parameters and desktop drag'n'drop operations. For that, we refactor the last two lines of `main()` into a new function:

```

// ... new function here

int main (int argc, char **argv) {
    tut1_build_app_window();
    tut2_build_app_menu_bar();
    tut3_build_main_editor();
    tut4_add_file_support();
    // ... refactor those into the new function
    // app_window->show(argc, argv);
    // return Fl::run();
    return tut4_handle_commandline_and_run(argc, argv);
}

```

Our function to show the window and run the app has a few lines of boilerplate code. `Fl::args_to_utf8()` converts the command line argument from whatever the host system provides into Unicode. `Fl::args()` goes through the list of arguments and gives `args_handler()` a chance to handle each argument. It also makes sure that FLTK specific args are still forwarded to FLTK, so `"-scheme plastic"` and `"-background #aaccff"` will draw beautiful blue buttons in a plastic look.

`fl_open_callback()` lets FLTK know what to do if a user drops a text file onto our editor icon (Apple macOS). Here, we ask it to call the `load()` function that we wrote earlier.

```

// ... args_handler here

int tut4_handle_commandline_and_run(int &argc, char **argv) {
    int i = 0;
    Fl::args_to_utf8(argc, argv);
    Fl::args(argc, argv, i, args_handler);
    fl_open_callback(load);
    app_window->show(argc, argv);
    return Fl::run();
}

```

Last work item for this long chapter: what should our `args_handler` do? We could handle additional command line options here, but for now, all we want to handle is file names and paths. Let's make this easy: if the current arg does not start with a '-', we assume it is a file name, and we call `load()`:

```

int args_handler(int argc, char **argv, int &i) {
    if (argv[i] && argv[i][0] != '-') {
        load(argv[i]);
        i++;
        return 1;
    }
    return 0;
}

```

So this is our basic but quite functional text editor app in about 100 lines of code. The following chapters add some user convenience functions and show off some FLTK features including split editors and syntax highlighting.

1.7.6 Chapter 5: Cut, Copy, and Paste

The FLTK Text Editor widget comes with builtin cut, copy, and paste functionality, but as a courtesy, we should also offer these as menu items in the main menu.

In our feature list, we noted that we want to implement a split text editor. This requires that the callbacks know which text editor has the keyboard focus. Calling `Fl::focus()` may return `NULL` or other unknown widgets, so we add a little test in our callbacks:

```
void menu_cut_callback(Fl_Widget*, void* v) {
    Fl_Widget *e = Fl::focus();
    if (e && (e == app_editor || e == app_split_editor))
        Fl_Text_Editor::kf_cut(0, (Fl_Text_Editor*)e);
}
```

We can write very similar callbacks for undo, redo, copy, paste, and delete. Adding a new menu and the six menu items follows the same pattern as before. Using the Menu/Item notation will create an Edit menu for us:

```
void tut5_cut_copy_paste() {
    app_menu_bar->add("Edit/Undo",    FL_COMMAND+'z', menu_undo_callback);
    app_menu_bar->add("Edit/Redo",    FL_COMMAND+'Z', menu_redo_callback, NULL, FL_MENU_DIVIDER);
    app_menu_bar->add("Edit/Cut",     FL_COMMAND+'x', menu_cut_callback);
    app_menu_bar->add("Edit/Copy",    FL_COMMAND+'c', menu_copy_callback);
    app_menu_bar->add("Edit/Paste",   FL_COMMAND+'v', menu_paste_callback);
    app_menu_bar->add("Edit/Delete",  0,          menu_delete_callback);
}
```

1.7.7 Chapter 6: Find and Find Next

Corporate called. They want a dialog box for their users that can search for some word in the text file. We can add this functionality using a callback and a standard FLTK dialog box.

Here is some code to find a string in a text editor. The first four lines make sure that we start our search at the cursor position of the current editor window. The rest of the code searches the string and marks it if found.

```
void find_next(const char *needle) {
    Fl_Text_Editor *editor = app_editor;
    Fl_Widget *e = Fl::focus();
    if (e && e == app_split_editor)
        editor = app_split_editor;
    int pos = editor->insert_position();
    int found = app_text_buffer->search_forward(pos, needle, &pos);
    if (found) {
        app_text_buffer->select(pos, pos + (int)strlen(needle));
        editor->insert_position(pos + (int)strlen(needle));
        editor->show_insert_position();
    } else {
        fl_alert("No further occurrences of '%s' found!", needle);
    }
}
```

The callbacks are short, using the FLTK text field dialog box and the `find_next` function that we already implemented. The last searched text is saved in `last_find_text` to be reused by `menu_find_next_callback`. If no search text was set yet, or it was set to an empty text, "Find Next" will forward to `menu_find_callback` and pop up our "Find Text" dialog.

```
char last_find_text[1024] = "";

void menu_find_callback(Fl_Widget*, void* v) {
    const char *find_text = fl_input("Find in text:", last_find_text);
    if (find_text) {
        strncpy(last_find_text, find_text, sizeof(last_find_text)-1);
        find_next(find_text);
    }
}

void menu_find_next_callback(Fl_Widget*, void* v) {
    if (last_find_text[0]) {
        find_next(last_find_text);
    } else {
        menu_find_callback(NULL, NULL);
    }
}
```

And of course we need to add two menu items to our main application menu.

```
...
app_menu_bar->add("Find/Find...",    FL_COMMAND+'f', menu_find_callback);
app_menu_bar->add("Find/Find Next",  FL_COMMAND+'g', menu_find_next_callback, NULL, FL_MENU_DIVIDER);
...
```

1.7.8 Chapter 7: Replace and Replace Next

To implement the next feature, we will need to implement our own "Find and Replace" dialog box. To make this dialog box useful, it needs the following elements:

- a text input field for the text that we want to find
- a text input field for the replacement text
- a button to find the next occurrence
- a button to replace the current text and find the next occurrence
- a button to close the dialog

This is rather complex functionality, so instead of adding more global variables, we will pack this dialog into a class, derived from `Fl_Window`.

Note

The tutorial uses `Fl_Double_Window` instead of `Fl_Window` throughout. Historically, on some platforms, `Fl_Window` renders faster, but has a tendency to flicker. In today's world, this has very little relevance and FLTK optimizes both window types. `Fl_Double_Window` is recommended unless there is a specific reason to use `Fl_Window`.

Let's implement the text replacement code first:

```
char last_replace_text[1024] = "";

void replace_selection(const char *new_text) {
    Fl_Text_Editor *editor = app_editor;
    Fl_Widget *e = Fl::focus();
    if (e && e == app_split_editor)
        editor = app_split_editor;
    int start, end;
    if (app_text_buffer->selection_position(&start, &end)) {
        app_text_buffer->remove_selection();
        app_text_buffer->insert(start, new_text);
        app_text_buffer->select(start, start + (int)strlen(new_text));
        editor->insert_position(start + (int)strlen(new_text));
        editor->show_insert_position();
    }
}
```

As before, the first four lines anticipate a split editor and find the editor that has focus. The code then deletes the currently selected text, replaces it with the new text, selects the new text, and finally sets the text cursor to the end of the new text.

The Replace_Dialog class

The `Replace_Dialog` class holds pointers to our active UI elements as well as all the callbacks for the dialog buttons.

```
class Replace_Dialog : public Fl_Double_Window {
    Fl_Input *find_text_input;
    Fl_Input *replace_text_input;
    Fl_Button *find_next_button;
    Fl_Button *replace_and_find_button;
    Fl_Button *close_button;
public:
    Replace_Dialog(const char *label);
    void show() FL_OVERRIDE;
private:
    static void find_next_callback(Fl_Widget*, void*);
    static void replace_and_find_callback(Fl_Widget*, void*);
    static void close_callback(Fl_Widget*, void*);
};

Replace_Dialog *replace_dialog = NULL;
```

The constructor creates the dialog and marks it as "non modal". This will make the dialog hover over the application window like a toolbox window until the user closes it, allowing multiple "find and replace" operations. So here is our constructor:

```
Replace_Dialog::Replace_Dialog(const char *label)
: Fl_Double_Window(430, 110, label)
{
    find_text_input = new Fl_Input(100, 10, 320, 25, "Find:");
    replace_text_input = new Fl_Input(100, 40, 320, 25, "Replace:");
    Fl_Flex* button_field = new Fl_Flex(100, 70, w()-100, 40);
    button_field->type(Fl_Flex::HORIZONTAL);
    button_field->margin(0, 5, 10, 10);
    button_field->gap(10);
    find_next_button = new Fl_Button(0, 0, 0, 0, "Next");
    find_next_button->callback(find_next_callback, this);
    replace_and_find_button = new Fl_Button(0, 0, 0, 0, "Replace");
    replace_and_find_button->callback(replace_and_find_callback, this);
    close_button = new Fl_Button(0, 0, 0, 0, "Close");
    close_button->callback(close_callback, this);
    button_field->end();
    set_non_modal();
}
```

All buttons are created inside an `Fl_Flex` group. They will be arranged automatically by `Fl_Flex`, so there is no need to set x and y coordinates or a width or height. `button_field` will lay out the buttons for us.

Note

There is no need to write a destructor or delete individual widgets. When we delete an instance of `Replace_Dialog`, all children are deleted for us.

The `show()` method overrides the window's `show` method. It adds some code to preload the values of the text fields for added convenience. It then pops up the dialog box by calling the original `Fl_Double_Window::show()`.

```
void Replace_Dialog::show() {
    find_text_input->value(last_find_text);
    replace_text_input->value(last_replace_text);
    Fl_Double_Window::show();
}
```

The buttons in the dialog need callbacks to be useful. If callbacks are defined within a class, they must be defined `static`, but a pointer to the class can be provided through the `user_data` field. We have done that in the constructor by adding `this` as the last argument when setting the callback, for example in `close_button->callback(close_callback, this);`.

The callback itself can then extract the `this` pointer with a static cast:

```
void Replace_Dialog::close_callback(Fl_Widget*, void* my_dialog) {
    Replace_Dialog *dlg = static_cast<Replace_Dialog*>(my_dialog);
    dlg->hide();
}
```

The callback for the Find button uses our already implemented `find_next` function:

```
void Replace_Dialog::find_next_callback(Fl_Widget*, void* my_dialog) {
    Replace_Dialog *dlg = static_cast<Replace_Dialog*>(my_dialog);
    strncpy(last_find_text, dlg->find_text_input->value(), sizeof(last_find_text)-1);
    strncpy(last_replace_text, dlg->replace_text_input->value(), sizeof(last_replace_text)-1);
    if (last_find_text[0])
        find_next(last_find_text);
}
```

The Replace button callback calls our newly implemented `replace_selection` function and then continues on to the `find_next_callback`:

```
void Replace_Dialog::replace_and_find_callback(Fl_Widget*, void* my_dialog) {
    Replace_Dialog *dlg = static_cast<Replace_Dialog*>(my_dialog);
    replace_selection(dlg->replace_text_input->value());
    find_next_callback(NULL, my_dialog);
}
```

This long chapter comes close to its end. We are missing menu items that pop up our dialog and that allow a quick "Replace and Find Next" functionality without popping up the dialog. The code is quite similar to the "Find" and "Find Next" code in the previous chapter:

```
void menu_replace_callback(Fl_Widget*, void*) {
    if (!replace_dialog)
        replace_dialog = new Replace_Dialog("Find and Replace");
}
```



```

    replace_dialog->show();
}

void menu_replace_next_callback(Fl_Widget*, void*) {
    if (!last_find_text[0]) {
        menu_replace_callback(NULL, NULL);
    } else {
        replace_selection(last_replace_text);
        find_next(last_find_text);
    }
}

void tut7_implement_replace() {
    app_menu_bar->add("Find/Replace...", FL_COMMAND+'r', menu_replace_callback);
    app_menu_bar->add("Find/Replace Next", FL_COMMAND+'t', menu_replace_next_callback);
}

```

1.7.9 Chapter 8: Editor Features

Chapter 7 was long an intense. Let's relax and implement something simple here. We want menus with check boxes that can toggle some text editor features on and off:

```

void tut8_editor_features() {
    app_menu_bar->add("Window/Line Numbers", FL_COMMAND+'l', menu_linenumbers_callback, NULL, FL_MENU_TOGGLE);
    app_menu_bar->add("Window/Word Wrap", 0, menu_wordwrap_callback, NULL, FL_MENU_TOGGLE);
}

```

The `Fl_Widget` parameter in callbacks always points to the widget that causes the callback. Menu items are not derived from widgets, so to find out which menu item caused a callback, we can do this:

```

void menu_linenumbers_callback(Fl_Widget* w, void*) {
    Fl_Menu_Bar* menu = static_cast<Fl_Menu_Bar*>(w);
    const Fl_Menu_Item* linenum_item = menu->mvalue();
    if (linenum_item->value()) {
        app_editor->linenumber_width(40);
    } else {
        app_editor->linenumber_width(0);
    }
    app_editor->redraw();
}

```

Setting the width enables the line numbers, setting it to 0 disables the line number display. When changing the value of a widget, FLTK will make sure that the widget is redrawn to reflect the new value. When changing other attributes such as colors or fonts, FLTK assumes that many attributes are changed at the same time and leaves it to the user to call `Fl_Widget::redraw()` when done. Here we call `app_editor->redraw()` to make sure that the change in the line number setting is also drawn on screen.

Let's not forget to update the line number display for a potential split editor widget as well:

```

// add before the end of menu_linenumbers_callback
if (app_split_editor) {
    if (linenum_item->value()) {
        app_split_editor->linenumber_width(40);
    } else {
        app_split_editor->linenumber_width(0);
    }
    app_split_editor->redraw();
}

```

The word wrap feature is activated by calling `Fl_Text_Editor::wrap_mode()` with the parameters `Fl_Text_Display::WRAP_AT_BOUNDS` and 0. It's deactivated with `Fl_Text_Display::WRAP_NONE`. The implementation of the callback is the same as `menu_linenumbers_callback`.

1.7.10 Chapter 9: Split Editor

When editing long source code files, it can be really helpful to split the editor to view statements at the top of the text while adding features at the bottom of the text in a split text view.

FLTK can link multiple text editors to a single text buffer. Let's implement this now. This chapter will show you how to rearrange widgets in an existing widget tree.

Our initializer removes the main text editor from the widget tree and replaces it with an `Fl_Tile`. A tile can hold multiple widgets that can then be resized interactively by the user by clicking and dragging the divider between those widgets.

We start by replacing the editor widget with a tile group of the same size.

```
#include <FL/Fl_Tile.H>

Fl_Tile *app_tile = NULL;

void tut9_split_editor() {
    app_window->begin();
    app_tile = new Fl_Tile(app_editor->x(), app_editor->y(),
                          app_editor->w(), app_editor->h());
    app_window->remove(app_editor);
}
```

Next we add our existing editor as the first child of the tile and create another text editor `app_split_editor` as the second child of the tile, but it's hidden for now with a height of zero pixels.

Note

Creating the new `Fl_Tile` also calls `Fl_Tile::begin()`.

Adding `app_editor` to the tile would have also removed it from `app_window`, so `app_window->remove(app_editor)` in the code above is not really needed, but illustrates what we are doing.

```
app_tile->add(app_editor);
app_split_editor = new Fl_Text_Editor(app_tile->x(), app_tile->y()+app_tile->h(),
                                     app_tile->w(), 0);
app_split_editor->buffer(app_text_buffer);
app_split_editor->textfont(FL_COURIER);
app_split_editor->hide();
```

Now we clean up after ourselves and make sure that the resizables are all set correctly. Lastly, we add a menu item with a callback.

```
app_tile->end();
app_tile->size_range(0, 25, 25);
app_tile->size_range(1, 25, 25);
app_window->end();
app_window->resizable(app_tile);
app_tile->resizable(app_editor);
app_menu_bar->add("Window/Split", FL_COMMAND+'2', menu_split_callback, NULL, FL_MENU_TOGGLE);
}
```

Now with all widgets in place, the callback's job is to show and resize, or hide and resize the split editor. We can implement that like here:

```
void menu_split_callback(Fl_Widget* w, void*) {
    Fl_Menu_Bar* menu = static_cast<Fl_Menu_Bar*>(w);
    const Fl_Menu_Item* splitview_item = menu->mvalue();
    if (splitview_item->value()) {
        int h_split = app_tile->h()/2;
        app_editor->size(app_tile->w(), h_split);
        app_split_editor->resize(app_tile->x(), app_tile->y() + h_split,
                               app_tile->w(), app_tile->h() - h_split);
        app_split_editor->show();
    } else {
        app_editor->size(app_tile->w(), app_tile->h());
        app_split_editor->resize(app_tile->x(), app_tile->y()+app_tile->h(),
                               app_tile->w(), 0);
        app_split_editor->hide();
    }
    app_tile->resizable(app_editor);
    app_tile->init_sizes();
    app_tile->redraw();
}
```

1.7.11 Chapter 10: Syntax Highlighting

Chapter 10 adds a lot of code to implement "C" language syntax highlighting. Not all code is duplicated here in the documentation. Please check out `test/editor.cxx` for all the details.

The `Fl_Text_Editor` widget supports highlighting of text with different fonts, colors, and sizes. The implementation is based on the excellent `NEdit` text editor core, from <https://sourceforge.net/projects/nedit/>, which uses a parallel "style" buffer which tracks the font, color, and size of the text that is drawn.

Styles are defined using the `Fl_Text_Display::Style_Table_Entry` structure defined in `<FL/Fl_Text_Display.H>`←

```
:
struct Style_Table_Entry {
    Fl_Color color;
    Fl_Font font;
    int size;
    unsigned attr;
};
```

The `color` member sets the color for the text, the `font` member sets the FLTK font index to use, and the `size` member sets the pixel size of the text. The `attr` member is currently not used.

For our text editor we'll define 7 styles for plain code, comments, keywords, and preprocessor directives:

```
Fl_Text_Display::Style_Table_Entry styletable[] = { // Style table
    { FL_BLACK, FL_COURIER, FL_NORMAL_SIZE }, // A - Plain
    { FL_DARK_GREEN, FL_COURIER_ITALIC, FL_NORMAL_SIZE }, // B - Line comments
    { FL_DARK_GREEN, FL_COURIER_ITALIC, FL_NORMAL_SIZE }, // C - Block comments
    { FL_BLUE, FL_COURIER, FL_NORMAL_SIZE }, // D - Strings
    { FL_DARK_RED, FL_COURIER, FL_NORMAL_SIZE }, // E - Directives
    { FL_DARK_RED, FL_COURIER_BOLD, FL_NORMAL_SIZE }, // F - Types
    { FL_BLUE, FL_COURIER_BOLD, FL_NORMAL_SIZE } // G - Keywords
};
```

You'll notice that the comments show a letter next to each style - each style in the style buffer is referenced using a character starting with the letter 'A'.

You call the `highlight_data()` method to associate the style data and buffer with the text editor widget:

```
Fl_Text_Buffer *app_style_buffer;

app_editor->highlight_data(app_style_buffer, styletable,
    sizeof(styletable) / sizeof(styletable[0]),
    'A', style_unfinished_cb, 0);
```

Finally, you need to add a callback to the main text buffer so that changes to the text buffer are mirrored in the style buffer:

```
app_text_buffer->add_modify_callback(style_update, app_editor);
```

The `style_update()` function, like the `change_cb()` function described earlier, is called whenever text is added or removed from the text buffer. It mirrors the changes in the style buffer and then updates the style data as necessary:

```
//
// 'style_update()' - Update the style buffer...
//

void
style_update(int pos, // I - Position of update
            int nInserted, // I - Number of inserted chars
            int nDeleted, // I - Number of deleted chars
            int nRestyled, // I - Number of restyled chars
            const char *deletedText, // I - Text that was deleted
            void *cbArg) { // I - Callback data

    int start, // Start of text
        end; // End of text
    char last, // Last style on line
        *style, // Style data
        *text; // Text data

    // If this is just a selection change, just unselect the style buffer...
    if (nInserted == 0 && nDeleted == 0) {
        app_style_buffer->unselect();
        return;
    }

    // Track changes in the text buffer...
    if (nInserted > 0) {
        // Insert characters into the style buffer...
        style = new char[nInserted + 1];
        memset(style, 'A', nInserted);
        style[nInserted] = '\0';

        app_style_buffer->replace(pos, pos + nDeleted, style);
        delete[] style;
    }
}
```

```

} else {
    // Just delete characters in the style buffer...
    app_style_buffer->remove(pos, pos + nDeleted);
}

// Select the area that was just updated to avoid unnecessary
// callbacks...
app_style_buffer->select(pos, pos + nInserted - nDeleted);

// Re-parse the changed region; we do this by parsing from the
// beginning of the line of the changed region to the end of
// the line of the changed region... Then we check the last
// style character and keep updating if we have a multi-line
// comment character...
start = app_text_buffer->line_start(pos);
end   = app_text_buffer->line_end(pos + nInserted - nDeleted);
text  = app_text_buffer->text_range(start, end);
style = app_style_buffer->text_range(start, end);
last  = style[end - start - 1];

style_parse(text, style, end - start);

app_style_buffer->replace(start, end, style);
((Fl_Text_Editor *)cbArg)->redisplay_range(start, end);

if (last != style[end - start - 1]) {
    // The last character on the line changed styles, so reparse the
    // remainder of the buffer...
    free(text);
    free(style);

    end   = app_text_buffer->length();
    text  = app_text_buffer->text_range(start, end);
    style = app_style_buffer->text_range(start, end);

    style_parse(text, style, end - start);

    app_style_buffer->replace(start, end, style);
    ((Fl_Text_Editor *)cbArg)->redisplay_range(start, end);
}

free(text);
free(style);
}

```

The `style_parse()` function scans a copy of the text in the buffer and generates the necessary style characters for display. It assumes that parsing begins at the start of a line:

```

//
// 'style_parse()' - Parse text and produce style data.
//
void
style_parse(const char *text,
            char *style,
            int length) {
    char current;
    int col;
    int last;
    char buf[255],
        *bufptr;
    const char *temp;

    for (current = *style, col = 0, last = 0; length > 0; length --, text ++) {
        if (current == 'A') {
            // Check for directives, comments, strings, and keywords...
            if (col == 0 && *text == '#') {
                // Set style to directive
                current = 'E';
            } else if (strncmp(text, "//", 2) == 0) {
                current = 'B';
            } else if (strncmp(text, "/*", 2) == 0) {
                current = 'C';
            } else if (strncmp(text, "\\\"", 2) == 0) {
                // Quoted quote...
                *style++ = current;
                *style++ = current;
                text ++;
                length --;
                col += 2;
                continue;
            } else if (*text == '\\') {
                current = 'D';
            } else if (!last && islower(*text)) {
                // Might be a keyword...
                for (temp = text, bufptr = buf;
                     islower(*temp) && bufptr < (buf + sizeof(buf) - 1);

```

```

        *bufptr++ = *temp++;
    if (!islower(*temp)) {
        *bufptr = '\\0';

        bufptr = buf;

        if (bsearch(&bufptr, code_types,
                    sizeof(code_types) / sizeof(code_types[0]),
                    sizeof(code_types[0]), compare_keywords)) {
            while (text < temp) {
                *style++ = 'F';
                text ++;
                length --;
                col ++;
            }

            text --;
            length ++;
            last = 1;
            continue;
        } else if (bsearch(&bufptr, code_keywords,
                          sizeof(code_keywords) / sizeof(code_keywords[0]),
                          sizeof(code_keywords[0]), compare_keywords)) {
            while (text < temp) {
                *style++ = 'G';
                text ++;
                length --;
                col ++;
            }

            text --;
            length ++;
            last = 1;
            continue;
        }
    }
} else if (current == 'C' && strncmp(text, "*/", 2) == 0) {
    // Close a C comment...
    *style++ = current;
    *style++ = current;
    text ++;
    length --;
    current = 'A';
    col += 2;
    continue;
} else if (current == 'D') {
    // Continuing in string...
    if (strncmp(text, "\\\"", 2) == 0) {
        // Quoted end quote...
        *style++ = current;
        *style++ = current;
        text ++;
        length --;
        col += 2;
        continue;
    } else if (*text == '\\') {
        // End quote...
        *style++ = current;
        col ++;
        current = 'A';
        continue;
    }
}

// Copy style info...
if (current == 'A' && (*text == '{' || *text == '}')) *style++ = 'G';
else *style++ = current;
col ++;

last = isalnum(*text) || *text == '.';

if (*text == '\\n') {
    // Reset column and possibly reset the style
    col = 0;
    if (current == 'B' || current == 'E') current = 'A';
}
}
}

```

1.8 Drawing Things in FLTK

This chapter covers the drawing functions that are provided with FLTK.

1.8.1 When Can You Draw Things in FLTK?

There are only certain places you can execute FLTK code that draws to the computer's display. Calling these functions at other places will result in undefined behavior!

- The most common place is inside the virtual `Fl_Widget::draw()` method. To write code here, you must subclass one of the existing `Fl_Widget` classes and implement your own version of `draw()`.
- You can also create custom `boxtypes` and `labeltypes`. These involve writing small procedures that can be called by existing `Fl_Widget::draw()` methods. These "types" are identified by an 8-bit index that is stored in the widget's `box()`, `labeltype()`, and possibly other properties.
- You can call `Fl_Window::make_current()` to do incremental update of a widget. Use `Fl_Widget::window()` to find the window.

In contrast, code that draws to other drawing surfaces than the display (i.e., instances of derived classes of the `Fl_Surface_Device` class, except `Fl_Display_Device`, such as `Fl_Printer` and `Fl_Copy_Surface`) can be executed at any time as follows:

1. Make your surface the new current drawing surface calling the `Fl_Surface_Device::push_current(Fl_Surface_Device*)` function.
2. Make a series of calls to any of the drawing functions described below; these will operate on the new current drawing surface;
3. Set the current drawing surface back to its previous state calling `Fl_Surface_Device::pop_current()`.

1.8.2 What Units Do FLTK Functions Use?

Before version 1.4 all graphical quantities used by FLTK were in pixel units: a window of width 500 units was 500 pixels wide, a line of length 10 units was 10 pixels long, lines of text written using a 14-point font were 14 pixels below each other. This organization is not sufficient to support GUI apps that can be drawn on screens of varying pixel density, especially on High-DPI screens, because widgets become very small and text becomes unreadable.

FLTK version 1.4 introduces a new feature, a screen-specific **scale factor** which is a float number with a typical value in the 1-2.5 range and is used as follows: any graphical element with an FLTK value of v units is drawn on the screen with $v * scale$ units. Thus, a window with width 500 units is $500 * scale$ pixels wide, a line of length 10 units is $10 * scale$ pixels long, lines of text written using a 14-point font are $14 * scale$ pixels below each other. Consider a system with two screens, one with regular DPI and one with a twice higher DPI. If the first screen's scale factor is set to 1 and that of the second screen to 2, the GUI of any FLTK app appears equally sized on the two screens.

FLTK uses several units to measure graphical elements:

- All quantities used by the public FLTK API to measure graphical elements (e.g., window widths, line lengths, font sizes, clipping regions, image widths and heights) are in **FLTK units** except if it's explicitly documented another unit is used. FLTK units are both platform- and DPI-independent. An example of FLTK API using another unit is `Fl_Gl_Window::pixel_w()`.

- Just before drawing to a screen, the library internally multiplies all quantities expressed in FLTK units by the current value of the scale factor for the screen in use and obtains quantities in **drawing units**. The current scale factor value, for an `Fl_Window` named *window*, is given by


```
int nscreen = window->screen_num(); // the screen where window is mapped
float s = Fl::screen_scale(nscreen); // this screen's scale factor
```

 One drawing unit generally corresponds to one screen pixel ...
- ... but not on macOS and for retina displays, where one drawing unit corresponds to two pixels.
- ... and not with the Wayland platform, where one drawing unit may correspond to 1, 2, or 3 pixels according to the current value of the Wayland-defined, integer-valued scale factor.

At application start time, FLTK attempts to detect the adequate scale factor value for each screen of the system. Here is how that's done under the [X11](#), [Windows](#), and [Wayland](#) platforms. If the resulting scale factor is not satisfactory, and also under the macOS platform, it's possible to set the `FLTK_SCALING_FACTOR` environmental variable to the desired numerical value (e.g., 1.75) and any FLTK app will start scaled with that value. Furthermore, it's possible to change the scale factor value of any screen at run time with `ctrl/+/-/0/` keystrokes which enlarge, shrink, and reset, respectively, all FLTK windows on a screen and their content. Under macOS, the corresponding GUI scaling shortcuts are `cmd/+/-/0/`.

GUI rescaling involves also image drawing: the screen area covered by the drawn image contains a number of pixels that grows with the scale factor. When FLTK draws images, it maps the image data (the size of these data is given by `Fl_Image::data_w()` and `Fl_Image::data_h()`) to the screen area whose size (in FLTK units) is given by `Fl_Image::w()` and `Fl_Image::h()`. How exactly such mapping is performed depends on the image type, the platform and some hardware features. The most common case for `Fl_RGB_Image`'s is that FLTK uses a scaled drawing system feature that directly maps image data to screen pixels. An important feature of FLTK for image drawing is the `Fl_Image::scale()` member function, new in FLTK version 1.4. This function controls the image drawing size (in FLTK units, given by `Fl_Image::w()` and `Fl_Image::h()`) independently from the size of the image data (given by `Fl_Image::data_w()` and `Fl_Image::data_h()`). An image with large enough data size can thus be drawn at the full resolution of the screen even when the screen area covered by the image grows following the GUI scale factor.

The `Fl_Image_Surface` class is intended to create an `Fl_RGB_Image` from a series of FLTK drawing operations. The `Fl_Image_Surface` constructor allows to control whether the size in pixels of the resulting image matches the FLTK units used when performing drawing operations, or matches the number of pixels corresponding to these FLTK units given the current value of the scale factor. The first result is obtained with `new Fl_Image_Surface(w, h)`, the second with `new Fl_Image_Surface(w, h, 1)`.

When drawing to `Fl_Printer` or `Fl_PostScript_File_Device`, the drawing unit is initially one point, that is, 1/72 of an inch. This unit is changed by calls to `Fl_Paged_Device::scale()`.

1.8.3 Drawing Functions

To use the drawing functions you must first include the `<FL/fl_draw.H>` header file. FLTK provides the following types of drawing functions:

- [Boxes](#)
- [Clipping](#)
- [Colors](#)
- [Line Dashes and Thickness](#)
- [Drawing Fast Shapes](#)
- [Drawing Complex Shapes](#)
- [Drawing Text](#)

- [Fonts](#)
- [Character Encoding](#)
- [Drawing Overlays](#)
- [Drawing Images](#)
- [Direct Image Drawing](#)
- [Direct Image Reading](#)
- [Image Classes](#)
- [Offscreen Drawing](#)

1.8.3.1 Boxes

FLTK provides three functions that can be used to draw boxes for buttons and other UI controls. Each function uses the supplied upper-lefthand corner and width and height to determine where to draw the box.

```
void fl_draw_box(Fl_Boxtype b, int x, int y, int w, int h, Fl_Color c)
```

The `fl_draw_box()` function draws a standard boxtype `b` in the specified color `c`.

```
void fl_frame(const char *s, int x, int y, int w, int h)
void fl_frame2(const char *s, int x, int y, int w, int h)
```

The `fl_frame()` and `fl_frame2()` functions draw a series of line segments around the given box. The string `s` must contain groups of 4 letters which specify one of 24 standard grayscale values, where 'A' is black and 'X' is white. The results of calling these functions with a string that is not a multiple of 4 characters in length are undefined.

The only difference between `fl_frame()` and `fl_frame2()` is the order of the line segments:

- For `fl_frame()` the order of each set of 4 characters is: top, left, bottom, right.
- For `fl_frame2()` the order of each set of 4 characters is: bottom, right, top, left.

Note that `fl_frame(Fl_Boxtype b)` is described in the [Box Types](#) section.

1.8.3.2 Clipping

You can limit all your drawing to a rectangular region by calling `fl_push_clip()`, and put the drawings back by using `fl_pop_clip()`. This rectangle is measured in [FLTK units](#) and is unaffected by the current transformation matrix.

In addition, the system may provide clipping when updating windows which may be more complex than a simple rectangle.

```
void fl_push_clip(int x, int y, int w, int h)
void fl_clip(int x, int y, int w, int h)
```

Intersect the current clip region with a rectangle and push this new region onto the stack.

The `fl_clip()` version is deprecated and will be removed from future releases.

```
void fl_push_no_clip()
```

Pushes an empty clip region on the stack so nothing will be clipped.

```
void fl_pop_clip()
```

Restore the previous clip region.

Note: You must call `fl_pop_clip()` once for every time you call `fl_push_clip()`. If you return to FLTK with the clip stack not empty unpredictable results occur.

```
int fl_not_clipped(int x, int y, int w, int h)
```

Returns non-zero if any of the rectangle intersects the current clip region. If this returns 0 you don't have to draw the object.

Note: Under X this returns 2 if the rectangle is partially clipped, and 1 if it is entirely inside the clip region.

```
int fl_clip_box(int x, int y, int w, int h, int &X, int &Y, int &W, int &H)
```

Intersect the rectangle `x, y, w, h` with the current clip region and returns the bounding box of the result in `X, Y, W, H`. Returns non-zero if the resulting rectangle is different than the original. This can be used to limit the necessary drawing to a rectangle. `W` and `H` are set to zero if the rectangle is completely outside the region.

```
void fl_clip_region(FL_Region r)
FL_Region fl_clip_region()
```

Replace the top of the clip stack with a clipping region of any shape. `FL_Region` is an operating system specific type. The second form returns the current clipping region.

1.8.3.3 Colors

FLTK manages colors as 32-bit unsigned integers, encoded as RGBA. When the "RGB" bytes are non-zero, the value is treated as RGB. If these bytes are zero, the "A" byte will be used as an index into the colormap. Colors with both "RGB" set and an "A" > 0 are reserved for special use.

Values from 0 to 255, i.e. the "A" index value, represent colors from the FLTK standard colormap and are allocated as needed on screens without TrueColor support. The `Fl_Color` enumeration type defines the standard colors and color cube for the first 256 colors. All of these are named with symbols in [<FL/Enumerations.H>](#). Example:

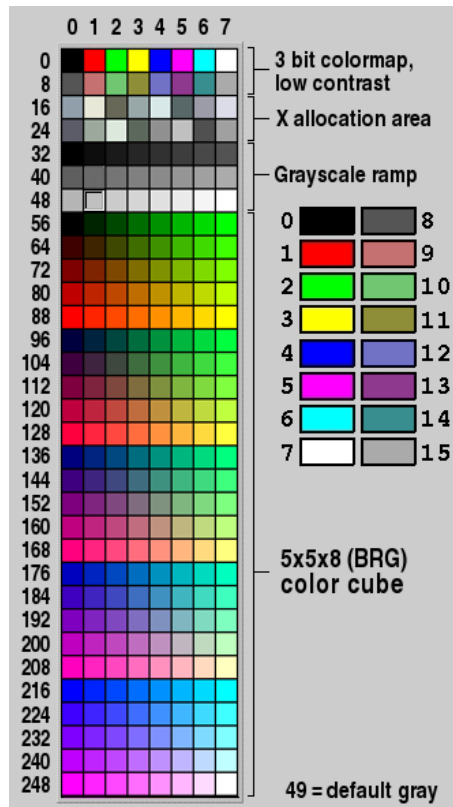


Figure 1.25 FLTK default colormap (`Fl_Color 0x00 - 0xff`)

Color values greater than 255 are treated as 24-bit RGB values. These are mapped to the closest color supported by the screen, either from one of the 256 colors in the FLTK colormap or a direct RGB value on TrueColor screens.

`Fl_Color fl_rgb_color(uchar r, uchar g, uchar b)`

`Fl_Color fl_rgb_color(uchar grayscale)`

Generate `Fl_Color` out of specified 8-bit RGB values or one 8-bit grayscale value.

`void fl_color(Fl_Color c)`

`void fl_color(int c)`

Sets the color for all subsequent drawing operations. Please use the first form: the second form is only provided for back compatibility.

For colormapped displays, a color cell will be allocated out of `fl_colormap` the first time you use a color. If the colormap fills up then a least-squares algorithm is used to find the closest color.

`Fl_Color fl_color()`

Returns the last color that was set using `fl_color()`. This can be used for state save/restore.

`void fl_color(uchar r, uchar g, uchar b)`

Set the color for all subsequent drawing operations. The closest possible match to the RGB color is used. The RGB color is used directly on TrueColor displays. For colormap visuals the nearest index in the gray ramp or color cube is used.

`unsigned Fl::get_color(Fl_Color i)`

`void Fl::get_color(Fl_Color i, uchar &red, uchar &green, uchar &blue)`

Generate RGB values from a colormap index value `i`. The first returns the RGB as a 32-bit unsigned integer, and the second decomposes the RGB into three 8-bit values.

`Fl::get_system_colors()`

`Fl::foreground()`

`Fl::background()`

`Fl::background2()`

The first gets color values from the user preferences or the system, and the other routines are used to apply those values.

`Fl::own_colormap()`

`Fl::free_color(Fl_Color i, int overlay)`

`Fl::set_color(Fl_Color i, unsigned c)`

`Fl::own_colormap()` is used to install a local colormap [X11 only].

`Fl::free_color()` and `Fl::set_color()` are used to remove and replace entries from the colormap.

There are two predefined graphical interfaces for choosing colors. The function `fl_show_colormap()` shows a table of colors and returns an `Fl_Color` index value. The `Fl_Color_Chooser` widget provides a standard RGB color chooser.

As the `Fl_Color` encoding maps to a 32-bit unsigned integer representing RGBI, it is also possible to specify a color using a hex constant as a color map index:

```
// COLOR MAP INDEX
color(0x000000II)
    ----- |
    | |
    | | Color map index (8 bits)
    | | Must be zero

button->color(0x000000ff);           // colormap index #255 (FL_WHITE)
```

or specify a color using a hex constant for the RGB components:

```
// RGB COLOR ASSIGNMENTS
color(0xRRGGBB00)
    | | | |
    | | | Must be zero
    | | Blue (8 bits)
    | Green (8 bits)
    Red (8 bits)

button->color(0xff000000);           // RGB: red
button->color(0x00ff0000);           // RGB: green
button->color(0x0000ff00);           // RGB: blue
button->color(0xffffff00);           // RGB: white
```

Note

If TrueColor is not available, any RGB colors will be set to the nearest entry in the colormap.

1.8.3.4 Line Dashes and Thickness

FLTK supports drawing of lines with different styles and widths. Full functionality is not available under Windows 95, 98, and Me due to the reduced drawing functionality these operating systems provide.

void `fl_line_style(int style, int width, char* dashes)`

Set how to draw lines (the "pen"). If you change this it is your responsibility to set it back to the default with `fl_line_style(0)`.

Note: Because of how line styles are implemented on MS Windows systems, you *must* set the line style *after* setting the drawing color. If you set the color after the line style you will lose the line style settings!

`style` is a bitmask which is a bitwise-OR of the following values. If you don't specify a dash type you will get a solid line. If you don't specify a cap or join type you will get a system-defined default of whatever value is fastest.

- FL_SOLID -----
- FL_DASH - - - - -
- FL_DOT
- FL_DASHDOT - . - .
- FL_DASHDOTDOT - . . -
- FL_CAP_FLAT
- FL_CAP_ROUND
- FL_CAP_SQUARE (extends past end point 1/2 line width)
- FL_JOIN_MITER (pointed)
- FL_JOIN_ROUND
- FL_JOIN_BEVEL (flat)

`width` is the number of [FLTK units](#) thick to draw the lines. Zero results in the system-defined default, which on both X and Windows is somewhat different and nicer than 1.

`dashes` is a pointer to an array of dash lengths, measured in [FLTK units](#). The first location is how long to draw a solid portion, the next is how long to draw the gap, then the solid, etc. It is terminated with a zero-length entry. A NULL pointer or a zero-length array results in a solid line. Odd array sizes are not supported and result in undefined behavior.

Note: The dashes array does not work under Windows 95, 98, or Me, since those operating systems do not support complex line styles.

1.8.3.5 Drawing Fast Shapes

These functions are used to draw almost all the FLTK widgets. They draw on exact pixel boundaries and are as fast as possible. Their behavior is duplicated exactly on all platforms FLTK is ported. It is undefined whether these are affected by the [transformation matrix](#), so you should only call these while the matrix is set to the identity matrix (the default).

```
void fl_point(int x, int y)
```

Draw a single pixel at the given coordinates.

```
void fl_rectf(int x, int y, int w, int h)
void fl_rectf(int x, int y, int w, int h, FL_Color c)
```

Color a rectangle that exactly fills the given bounding box.

```
void fl_rectf(int x, int y, int w, int h, uchar r, uchar g, uchar b)
```

Color a rectangle with "exactly" the passed r, g, b color. On screens with less than 24 bits of color this is done by drawing a solid-colored block using `fl_draw_image()` so that the correct color shade is produced.

```
void fl_rect(int x, int y, int w, int h)
void fl_rect(int x, int y, int w, int h, Fl_Color c)
```

Draw a 1-pixel border *inside* this bounding box.

```
void fl_rounded_rect(int x, int y, int w, int h, int radius) void fl_rounded_rectf(int x, int y, int w, int h, int radius)
```

Draw an outlined or filled rectangle with rounded corners.

```
void fl_line(int x, int y, int x1, int y1)
void fl_line(int x, int y, int x1, int y1, int x2, int y2)
```

Draw one or two lines between the given points.

```
void fl_loop(int x, int y, int x1, int y1, int x2, int y2)
void fl_loop(int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
```

Outline a 3 or 4-sided polygon with lines.

```
void fl_polygon(int x, int y, int x1, int y1, int x2, int y2)
void fl_polygon(int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
```

Fill a 3 or 4-sided polygon. The polygon must be convex.

```
void fl_xyline(int x, int y, int x1)
void fl_xyline(int x, int y, int x1, int y2)
void fl_xyline(int x, int y, int x1, int y2, int x3)
```

Draw horizontal and vertical lines. A horizontal line is drawn first, then a vertical, then a horizontal.

```
void fl_yxline(int x, int y, int y1)
void fl_yxline(int x, int y, int y1, int x2)
void fl_yxline(int x, int y, int y1, int x2, int y3)
```

Draw vertical and horizontal lines. A vertical line is drawn first, then a horizontal, then a vertical.

```
void fl_arc(int x, int y, int w, int h, double a1, double a2)
void fl_pie(int x, int y, int w, int h, double a1, double a2)
```

Draw ellipse sections using integer coordinates. These functions match the rather limited circle drawing code provided by X and MS Windows. The advantage over using `fl_arc()` with floating point coordinates is that they are faster because they often use the hardware, and they draw much nicer small circles, since the small sizes are often hard-coded bitmaps.

If a complete circle is drawn it will fit inside the passed bounding box. The two angles are measured in degrees counter-clockwise from 3'o'clock and are the starting and ending angle of the arc, `a2` must be greater or equal to `a1`.

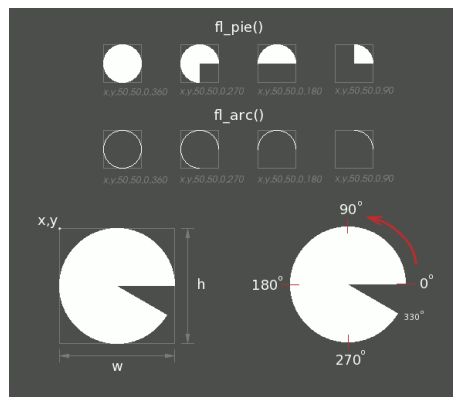


Figure 1.26 `fl_pie()` and `fl_arc()`

`fl_arc()` draws a series of lines to approximate the arc. Notice that the integer version of `fl_arc()` has a different number of arguments to the other `fl_arc()` function described later in this chapter.

`fl_pie()` draws a filled-in pie slice. This slice may extend outside the line drawn by `fl_arc()`; to avoid this use `w-1` and `h-1`.

void `fl_scroll`(int X, int Y, int W, int H, int dx, int dy, void (*draw_area*)(void, int,int,int,int), void* data)

Scroll a rectangle and draw the newly exposed portions. The contents of the rectangular area is first shifted by `dx` and `dy` FLTK units. The callback is then called for every newly exposed rectangular area,

1.8.3.6 Drawing Complex Shapes

The complex drawing functions let you draw arbitrary shapes with 2-D linear transformations. The functionality matches that found in the Adobe® PostScript™ language. The exact pixels that are filled are less defined than for the fast drawing functions so that FLTK can take advantage of drawing hardware. On both X and MS Windows the transformed vertices are rounded to integers before drawing the line segments: this severely limits the accuracy of these functions for complex graphics, so use OpenGL when greater accuracy and/or performance is required.

```
void fl_load_matrix(double a,double b,double c,double d,double x,double y) void fl_load_identity()
```

Set the current transformation.

```
void fl_push_matrix()  
void fl_pop_matrix()
```

Save and restore the current transformation. The maximum depth of the stack is 32 entries.

```
void fl_scale(double x,double y)  
void fl_scale(double x)  
void fl_translate(double x,double y)  
void fl_rotate(double d)  
void fl_mult_matrix(double a,double b,double c,double d,double x,double y)
```

Concatenate another transformation onto the current one. The rotation angle is in degrees (not radians) and is counter-clockwise.

```
double fl_transform_x(double x, double y)  
double fl_transform_y(double x, double y)  
double fl_transform_dx(double x, double y)  
double fl_transform_dy(double x, double y)  
void fl_transformed_vertex(double xf, double yf)
```

Transform a coordinate or a distance using the current transformation matrix. After transforming a coordinate pair, it can be added to the vertex list without any further translations using `fl_transformed_vertex()`.

```
void fl_begin_points()  
void fl_end_points()
```

Start and end drawing a list of points. Points are added to the list with `fl_vertex()`.

```
void fl_begin_line()  
void fl_end_line()
```


Start and end drawing lines.

```
void fl_begin_loop()
void fl_end_loop()
```

Start and end drawing a closed sequence of lines.

```
void fl_begin_polygon()
void fl_end_polygon()
```

Start and end drawing a convex filled polygon.

```
void fl_begin_complex_polygon()
void fl_gap()
void fl_end_complex_polygon()
```

Start and end drawing a complex filled polygon. This polygon may be concave, may have holes in it, or may be several disconnected pieces. Call `fl_gap()` to separate loops of the path. It is unnecessary but harmless to call `fl_gap()` before the first vertex, after the last one, or several times in a row.

`fl_gap()` should only be called between `fl_begin_complex_polygon()` and `fl_end_complex_polygon()`. To outline the polygon, use `fl_begin_loop()` and replace each `fl_gap()` with a `fl_end_loop();fl_begin_loop()` pair.

Note: For portability, you should only draw polygons that appear the same whether "even/odd" or "non-zero" winding rules are used to fill them. Holes should be drawn in the opposite direction of the outside loop.

```
void fl_vertex(double x,double y)
```

Add a single vertex to the current path.

```
void fl_curve(double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)
```

Add a series of points on a Bézier curve to the path. The curve ends (and two of the points are) at `X0, Y0` and `X3, Y3`.

```
void fl_arc(double x, double y, double r, double start, double end)
```

Add a series of points to the current path on the arc of a circle; you can get elliptical paths by using scale and rotate before calling `fl_arc()`. The center of the circle is given by `x` and `y`, and `r` is its radius. `fl_arc()` takes `start` and `end` angles that are measured in degrees counter-clockwise from 3 o'clock. If `end` is less than `start` then it draws the arc in a clockwise direction.

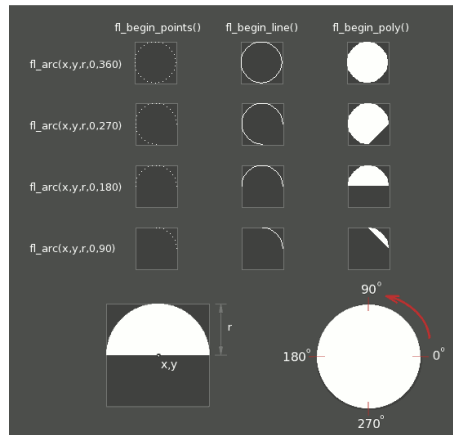


Figure 1.27 `fl_arc(x,y,r,a1,a2)`

```
void fl_circle(double x, double y, double r)
```

`fl_circle(x, y, r)` is equivalent to `fl_arc(x, y, r, 0, 360)` but may be faster. It must be the *only* thing in the path: if you want a circle as part of a complex polygon you must use `fl_arc()`.

Note: `fl_circle()` draws incorrectly if the transformation is both rotated and non-square scaled.

1.8.3.7 Drawing Text

All text is drawn in the [current font](#). It is undefined whether this location or the characters are modified by the current transformation.

```
void fl_draw(const char *, int x, int y)
void fl_draw(const char *, int n, int x, int y)
```

Draw a nul-terminated string or an array of `n` bytes starting at the given location. In both cases, the text must be UTF-8 encoded. Text is aligned to the left and to the baseline of the font. To align to the bottom, subtract `fl_descent()` from `y`. To align to the top, subtract `fl_descent()` and add `fl_height()`. This version of `fl_draw()` provides direct access to the text drawing function of the underlying OS. It does not apply any special handling to control characters.

```
void fl_rtl_draw(const char *str, int n, int x, int y)
```

Draw a UTF-8 string of length `n` bytes right to left starting at the given `x`, `y` location.

```
void fl_draw(const char* str, int x, int y, int w, int h, FL_Align align, FL_Image* img, int draw_symbols)
```

Fancy string drawing function which is used to draw all the labels. The string is formatted and aligned inside the passed box. Handles `\t` and `\n`, expands all other control characters to `^X`, and aligns inside or against the edges of the box described by `x`, `y`, `w` and `h`. See [FL_Widget::align\(\)](#) for values for `align`. The value `FL_ALIGN_INSIDE` is ignored, as this function always prints inside the box.

If `img` is provided and is not `NULL`, the image is drawn above or below the text as specified by the `align` value.

The `draw_symbols` argument specifies whether or not to look for symbol names starting with the "@" character.

```
void fl_measure(const char *str, int& w, int& h, int draw_symbols)
```

Measure how wide and tall the string will be when printed by the `fl_draw(...align)` function. This includes leading/trailing white space in the string, kerning, etc.

If the incoming `w` is non-zero it will wrap to that width.

This will probably give unexpected values unless you have called `fl_font()` explicitly in your own code. Refer to the full documentation for [fl_measure\(\)](#) for details on usage and how to avoid common pitfalls.

See also

- [fl_text_extents\(\)](#) – measure the 'inked' area of a string
- [fl_width\(\)](#) – measure the width of a string or single character
- [fl_height\(\)](#) – measure the height of the [current font](#)
- [fl_descent\(\)](#) – the height of the descender for the [current font](#)

```
int fl_height()
```

Recommended minimum line spacing for the [current font](#). You can also just use the value of `size` passed to [fl_font\(\)](#).

See also

[fl_text_extents\(\)](#), [fl_measure\(\)](#), [fl_width\(\)](#), [fl_descent\(\)](#)

int [fl_descent\(\)](#)

Recommended distance above the bottom of a [fl_height\(\)](#) tall box to draw the text at so it looks centered vertically in that box.

double [fl_width\(const char* txt\)](#)
double [fl_width\(const char* txt, int n\)](#)
double [fl_width\(unsigned int unicode_char\)](#)

Return the width of a nul-terminated string, a sequence of `n` characters, or a single character in the [current font](#).

See also

[fl_measure\(\)](#), [fl_text_extents\(\)](#), [fl_height\(\)](#), [fl_descent\(\)](#)

void [fl_text_extents\(const char* txt, int& dx, int& dy, int& w, int& h\)](#)

Determines the minimum dimensions of a nul-terminated string, ie. the 'inked area'.

Given a string "txt" drawn using [fl_draw\(txt, x, y\)](#) you would determine its extents in [FLTK units](#) on the display using [fl_text_extents\(txt, dx, dy, wo, ho\)](#) such that a bounding box that exactly fits around the inked area of the text could be drawn with [fl_rect\(x+dx, y+dy, wo, ho\)](#).

Refer to the full documentation for [fl_text_extents\(\)](#) for details on usage.

See also

[fl_measure\(\)](#), [fl_width\(\)](#), [fl_height\(\)](#), [fl_descent\(\)](#)

const char* [fl_shortcut_label\(int shortcut\)](#)

Unparse a shortcut value as used by [Fl_Button](#) or [Fl_Menu_Item](#) into a human-readable string like "Alt+N". This only works if the shortcut is a character key or a numbered function key. If the shortcut is zero an empty string is returned. The return value points at a static buffer that is overwritten with each call.

1.8.3.8 Fonts

FLTK supports a set of standard fonts based on the Times, Helvetica/Arial, Courier, and Symbol typefaces, as well as custom fonts that your application may load. Each font is accessed by an index into a font table.

Initially only the first 16 faces are filled in. There are symbolic names for them: `FL_HELVETICA`, `FL_TIMES`, `FL_COURIER`, and modifier values `FL_BOLD` and `FL_ITALIC` which can be added to these, and `FL_SYMBOL` and `FL_ZAPF_DINGBATS`. Faces greater than 255 cannot be used in `Fl_Widget` labels, since `Fl_Widget` stores the index as a byte.

One important thing to note about 'current font' is that there are so many paths through the GUI event handling code as widgets are partially or completely hidden, exposed and then re-drawn and therefore you can not guarantee that 'current font' contains the same value that you set on the other side of the event loop. Your value may have been superseded when a widget was redrawn. You are strongly advised to set the font explicitly before you draw any text or query the width and height of text strings, etc.

```
void fl_font(int face, int size)
```

Set the current font, which is then used by the routines described above. You may call this outside a draw context if necessary to call `fl_width()`, but on X this will open the display.

The font is identified by a *face* and a *size*. The size of the font is measured in **FLTK units** and not "points". Lines should be spaced *size* FLTK units apart or more.

```
int fl_font()
int fl_size()
```

Returns the face and size set by the most recent call to `fl_font(a, b)`. This can be used to save/restore the font.

1.8.3.9 Character Encoding

FLTK 1.3 and later versions expect all text in Unicode UTF-8 encoding. UTF-8 is ASCII compatible for the first 128 characters. International characters are encoded in multibyte sequences.

FLTK expects individual characters, characters that are not part of a string, in UCS-4 encoding, which is also ASCII compatible, but requires 4 bytes to store a Unicode character.

FLTK can draw accurately any Unicode-supported script for which the system contains relevant fonts. Under X11 platforms, this requires to build the library with the `FLTK_USE_PANGO` CMake option turned On (or with configure `--enable-pango`).

Plain text drawing starting at a user-given coordinate is well supported by FLTK, including for right-to-left scripts. Further text-related operations (i.e., selection, formatting, input, and editing) are functional with left-to-right scripts only.

For more information about character encodings, see the chapter on [Unicode and UTF-8 Support](#).

1.8.3.10 Drawing Overlays

These functions allow you to draw interactive selection rectangles without using the overlay hardware. FLTK will XOR a single rectangle outline over a window.

```
void fl_overlay_rect(int x, int y, int w, int h)
void fl_overlay_clear()
```

`fl_overlay_rect()` draws a selection rectangle, erasing any previous rectangle by XOR'ing it first. `fl_overlay_clear()` will erase the rectangle without drawing a new one.

Using these functions is tricky. You should make a widget with both a `handle()` and `draw()` method. `draw()` should call `fl_overlay_clear()` before doing anything else. Your `handle()` method should call `window()->make_current()` and then `fl_overlay_rect()` after `FL_DRAG` events, and should call `fl_overlay_clear()` after a `FL_RELEASE` event.

1.8.4 Drawing Images

To draw images, you can either do it directly from data in your memory, or you can create a [Fl_Image](#) object. The advantage of drawing directly is that it is more intuitive, and it is faster if the image data changes more often than it is redrawn. The advantage of using the object is that FLTK will cache translated forms of the image (on X it uses a server pixmap) and thus redrawing is *much* faster.

1.8.4.1 Direct Image Drawing

The behavior when drawing images when the current transformation matrix is not the identity is not defined, so you should only draw images when the matrix is set to the identity.

```
void fl_draw_image(const uchar *buf,int X,int Y,int W,int H,int D,int L)
void fl_draw_image_mono(const uchar *buf,int X,int Y,int W,int H,int D,int L)
```

Draw an 8-bit per color RGB or luminance image. The pointer points at the "r" data of the top-left pixel. Color data must be in `r, g, b` order. The top left corner is given by `X` and `Y` and the size of the image is given by `W` and `H`. `D` is the delta to add to the pointer between pixels, it may be any value greater or equal to 3, or it can be negative to flip the image horizontally. `L` is the delta to add to the pointer between lines (if 0 is passed it uses `W*D`). and may be larger than `W*D` to crop data, or negative to flip the image vertically.

It is highly recommended that you put the following code before the first `show()` of *any* window in your program to get rid of the dithering if possible:

```
Fl::visual(FL_RGB);
```

Gray scale (1-channel) images may be drawn. This is done if `abs(D)` is less than 3, or by calling `fl_draw_image_mono()`. Only one 8-bit sample is used for each pixel, and on screens with different numbers of bits for red, green, and blue only gray colors are used. Setting `D` greater than 1 will let you display one channel of a color image.

Note: The X version does not support all possible visuals. If FLTK cannot draw the image in the current visual it will abort. FLTK supports any visual of 8 bits or less, and all common TrueColor visuals up to 32 bits.

```
typedef void (*Fl_Draw_Image_Cb)(void *data,int x,int y,int w,uchar *buf)
void fl_draw_image(Fl_Draw_Image_Cb cb,void *data,int X,int Y,int W,int H,int D)
void fl_draw_image_mono(Fl_Draw_Image_Cb cb,void *data,int X,int Y,int W,int H,int D)
```

Call the passed function to provide each scan line of the image. This lets you generate the image as it is being drawn, or do arbitrary decompression of stored data, provided it can be decompressed to individual scan lines easily.

The callback is called with the `void*` user data pointer which can be used to point at a structure of information about the image, and the `x`, `y`, and `w` of the scan line desired from the image. 0,0 is the upper-left corner of the image, *not* `X`, `Y`. A pointer to a buffer to put the data into is passed. You must copy `w` pixels from scanline `y`, starting at pixel `x`, to this buffer.

Due to cropping, less than the whole image may be requested. So `x` may be greater than zero, the first `y` may be greater than zero, and `w` may be less than `W`. The buffer is long enough to store the entire `W*D` pixels, this is for convenience with some decompression schemes where you must decompress the entire line at once: decompress it into the buffer, and then if `x` is not zero, copy the data over so the `x`'th pixel is at the start of the buffer.

You can assume the `y`'s will be consecutive, except the first one may be greater than zero.

If `D` is 4 or more, you must fill in the unused bytes with zero.

```
int fl_draw_pixmap(char* const* data, int x, int y, Fl_Color bg)
int fl_draw_pixmap(const char* const* cdata, int x, int y, Fl_Color bg)
```

Draws XPM image data, with the top-left corner at the given position. The image is dithered on 8-bit displays so you won't lose color space for programs displaying both images and pixmaps. This function returns zero if there was any error decoding the XPM data.

To use an XPM, do:

```
#include "foo.xpm"
...
fl_draw_pixmap(foo, X, Y);
```

Transparent colors are replaced by the optional `Fl_Color` argument. To draw with true transparency you must use the `Fl_Pixmap` class.

```
int fl_measure_pixmap(char* const* data, int &w, int &h)
int fl_measure_pixmap(const char* const* cdata, int &w, int &h)
```

An XPM image contains the dimensions in its data. This function finds and returns the width and height. The return value is non-zero if the dimensions were parsed ok and zero if there was any problem.

1.8.4.2 Direct Image Reading

FLTK provides a single function for reading from the current window or off-screen buffer into a RGB(A) image buffer.

```
uchar* fl_read_image(uchar *p, int X, int Y, int W, int H, int alpha)
```

Read a RGB(A) image from the current window or off-screen buffer. The `p` argument points to a buffer that can hold the image and must be at least $W*H*3$ bytes when reading RGB images and $W*H*4$ bytes when reading RGBA images. If `NULL`, `fl_read_image()` will create an array of the proper size which can be freed using `delete[]`.

The `alpha` parameter controls whether an alpha channel is created and the value that is placed in the alpha channel. If 0, no alpha channel is generated.

1.8.4.3 Image Classes

FLTK provides a base image class called `Fl_Image` which supports creating, copying, and drawing images of various kinds, along with some basic color operations. Images can be used as labels for widgets using the `image()` and `deimage()` methods or drawn directly. Images can be drawn scaled to any size, independently from the size of the image's data (see `Fl_Image::scale()`).

The `Fl_Image` class does almost nothing by itself, but is instead supported by three basic image types:

- `Fl_Bitmap`
- `Fl_Pixmap`
- `Fl_RGB_Image`

The `Fl_Bitmap` class encapsulates a mono-color bitmap image. The `draw()` method draws the image using the current drawing color.

The `Fl_Pixmap` class encapsulates a colormapped image. The `draw()` method draws the image using the colors in the file, and masks off any transparent colors automatically.

The `Fl_RGB_Image` class encapsulates a full-color (or grayscale) image with 1 to 4 color components. Images with an even number of components are assumed to contain an alpha channel that is used for transparency. The transparency provided by the `draw()` method is either a 24-bit blend against the existing window contents or a "screen door" transparency mask, depending on the platform and screen color depth.

```
char fl_can_do_alpha_blending()
```


`fl_can_do_alpha_blending()` will return 1, if your platform supports true alpha blending for RGBA images, or 0, if FLTK will use screen door transparency.

FLTK also provides several image classes based on the three standard image types for common file formats:

- [FI_GIF_Image](#)
- [FI_Anim_GIF_Image](#)
- [FI_JPEG_Image](#)
- [FI_PNG_Image](#)
- [FI_PNM_Image](#)
- [FI_XBM_Image](#)
- [FI_XPM_Image](#)
- [FI_SVG_Image](#)
- [FI_BMP_Image](#)
- [FI_ICO_Image](#)

Each of these image classes loads a named file of the corresponding format. The [FI_Shared_Image](#) class can be used to load any type of image file - the class examines the file and constructs an image of the appropriate type.

Finally, FLTK provides a special image class called [FI_Tiled_Image](#) to tile another image object in the specified area. This class can be used to tile a background image in a [FI_Group](#) widget, for example.

```
virtual FI_Image* FI_Image::copy()
virtual FI_Image* FI_Image::copy(int W, int H) const
```

The `copy()` method creates a copy of the image. The second form specifies the new size of the image - the image is resized using the nearest-neighbor algorithm (this is the default).

Note

As of FLTK 1.3.3 the image resizing algorithm can be changed. See [FI_Image::RGB_scaling\(FI_RGB_Scaling method\)](#)

```
virtual void FI_Image::draw(int x, int y, int w, int h, int ox, int oy)
```

The `draw()` method draws the image object. `x, y, w, h` indicates the destination rectangle. `ox, oy, w, h` is the source rectangle. This source rectangle is copied to the destination. The source rectangle may extend outside the image, i.e. `ox` and `oy` may be negative and `w` and `h` may be bigger than the image, and this area is left unchanged.

Note

See exceptions for [FI_Tiled_Image::draw\(\)](#) regarding arguments `ox`, `oy`, `w`, and `h`.

```
virtual void FI_Image::draw(int x, int y)
```

Draws the image with the upper-left corner at `x, y`. This is the same as doing `img->draw(x, y, img->w(), img->h(), 0, 0)` where `img` is a pointer to any [FI_Image](#) type.

1.8.5 Offscreen Drawing

Sometimes it can be very useful to generate a complex drawing in memory first and copy it to the screen at a later point in time. This technique can significantly reduce the amount of repeated drawing. Offscreen drawing functions are declared in `<FL/fl_draw.H>`.

`Fl_Double_Window` uses offscreen rendering to avoid flickering on systems that don't support double-buffering natively.

FLTK can draw into an offscreen buffer at any time. There is no need to wait for an `Fl_Widget::draw()` to occur.

Note

In FLTK 1.3.x and earlier versions all offscreen drawing functions described below were implemented as macros and created certain temporary variables to save context information. You needed to create local scope blocks with curly braces `{ ... }` if you used offscreen functions more than once in a function or method. This is no longer necessary since offscreen drawing is now implemented in real functions (no macros).

Example:

```
Fl_Offscreen oscr = fl_create_offscreen(120, 120);
fl_begin_offscreen(oscr);
fl_color(FL_WHITE);
fl_rectf(0, 0, 120, 120);
fl_end_offscreen();
// other code here
fl_begin_offscreen(oscr);
fl_color(FL_BLACK);
fl_rectf(10, 10, 100, 100);
fl_end_offscreen();
// other code here
fl_delete_offscreen(oscr);
```

Fl_Offscreen `fl_create_offscreen(int w, int h)`

Create an RGB offscreen buffer containing as many pixels as in a screen area of size `w,h` FLTK units.

void `fl_delete_offscreen(Fl_Offscreen)`

Delete a previously created offscreen buffer. All drawings are lost.

void `fl_begin_offscreen(Fl_Offscreen)`

Send all subsequent drawing commands to this offscreen buffer.

void `fl_end_offscreen()`

Quit sending drawing commands to this offscreen buffer.

void `fl_copy_offscreen(int x, int y, int w, int h, Fl_Offscreen osrc, int srcx, int srcy)`

Copy a rectangular area of the size `w*h` from `srcx,srcy` in the offscreen buffer into the current drawing surface at `x,y`.

void `fl_rescale_offscreen(Fl_Offscreen &osrc)`

Adapts the offscreen's size in pixels to a changed value of the scale factor while keeping the offscreen's graphical content.

1.9 Handling Events

This chapter discusses the FLTK event model and how to handle events in your program or widget.

1.9.1 The FLTK Event Model

Every time a user moves the mouse pointer, clicks a button, or presses a key, an event is generated and sent to your application. Events can also come from other programs like the window manager.

Events are identified by the integer argument passed to a `handle()` method that overrides the `Fl_Widget::handle()` virtual method. Other information about the most recent event is stored in static locations and acquired by calling the `Fl::event_*` methods. This static information remains valid until the next event is read from the window system, so it is ok to look at it outside of the `handle()` method.

Event numbers can be converted to their actual names using the `fl_eventnames[]` array defined in `#include <FL/names.h>`; see next chapter for details.

In the next chapter, the `MyClass::handle()` example shows how to override the `Fl_Widget::handle()` method to accept and process specific events.

1.9.2 Mouse Events

1.9.2.1 FL_PUSH

A mouse button has gone down with the mouse pointing at this widget. You can find out what button by calling `Fl::event_button()`. You find out the mouse position by calling `Fl::event_x()` and `Fl::event_y()`.

A widget indicates that it "wants" the mouse click by returning non-zero from its `handle()` method, as in the `MyClass::handle()` example. It will then become the `Fl::pushed()` widget and will get `FL_DRAG` and the matching `FL_RELEASE` events. If `handle()` returns zero then FLTK will try sending the `FL_PUSH` to another widget.

1.9.2.2 FL_DRAG

The mouse has moved with a button held down. The current button state is in `Fl::event_state()`. The mouse position is in `Fl::event_x()` and `Fl::event_y()`.

In order to receive `FL_DRAG` events, the widget must return non-zero when handling `FL_PUSH`.

1.9.2.3 FL_RELEASE

A mouse button has been released. You can find out what button by calling `Fl::event_button()`.

In order to receive the `FL_RELEASE` event, the widget must return non-zero when handling `FL_PUSH`.

1.9.2.4 FL_MOVE

The mouse has moved without any mouse buttons held down. This event is sent to the `Fl::belowmouse()` widget.

In order to receive `FL_MOVE` events, the widget must return non-zero when handling `FL_ENTER`.

1.9.2.5 FL_MOUSEWHEEL

The user has moved the mouse wheel. The `Fl::event_dx()` and `Fl::event_dy()` methods can be used to find the amount to scroll horizontally and vertically.

1.9.3 Focus Events

1.9.3.1 FL_ENTER

The mouse has been moved to point at this widget. This can be used for highlighting feedback. If a widget wants to highlight or otherwise track the mouse, it indicates this by returning non-zero from its `handle()` method. It then becomes the `Fl::belowmouse()` widget and will receive `FL_MOVE` and `FL_LEAVE` events.

1.9.3.2 FL_LEAVE

The mouse has moved out of the widget.

In order to receive the `FL_LEAVE` event, the widget must return non-zero when handling `FL_ENTER`.

1.9.3.3 FL_FOCUS

This indicates an *attempt* to give a widget the keyboard focus.

If a widget wants the focus, it should change itself to display the fact that it has the focus, and return non-zero from its `handle()` method. It then becomes the `Fl::focus()` widget and gets `FL_KEYDOWN`, `FL_KEYUP`, and `FL_UNFOCUS` events.

The focus will change either because the window manager changed which window gets the focus, or because the user tried to navigate using tab, arrows, or other keys. You can check `Fl::event_key()` to figure out why it moved. For navigation it will be the key pressed and for interaction with the window manager it will be zero.

1.9.3.4 FL_UNFOCUS

This event is sent to the previous `Fl::focus()` widget when another widget gets the focus or the window loses focus.

1.9.4 Keyboard Events

1.9.4.1 FL_KEYBOARD, FL_KEYDOWN, FL_KEYUP

A key was pressed (`FL_KEYDOWN`) or released (`FL_KEYUP`). `FL_KEYBOARD` is a synonym for `FL_KEYDOWN`, and both names are used interchangeably in this documentation.

The key can be found in `Fl::event_key()`. The text that the key should insert can be found with `Fl::event_text()` and its length is in `Fl::event_length()`.

If you use the key, then `handle()` should return 1. If you return zero then FLTK assumes you ignored the key and will then attempt to send it to a parent widget. If none of them want it, it will change the event into a `FL_SHORTCUT` event. `FL_KEYBOARD` events are also generated by the character palette/map.

To receive `FL_KEYBOARD` events you must also respond to the `FL_FOCUS` and `FL_UNFOCUS` events by returning 1. This way FLTK knows whether to bother sending your widget keyboard events. (Some widgets don't need them, e.g. `Fl_Box`.)

If you are writing a text-editing widget you may also want to call the `Fl::compose()` function to translate individual keystrokes into characters.

`FL_KEYUP` events are sent to the widget that currently has focus. This is not necessarily the same widget that received the corresponding `FL_KEYDOWN` event because focus may have changed between events.

Todo Add details on how to detect repeating keys, since on some X servers a repeating key will generate both `FL_KEYUP` and `FL_KEYDOWN`, such that to tell if a key is held, you need `Fl::event_key(int)` to detect if the key is being held down during `FL_KEYUP` or not.

1.9.4.2 FL_SHORTCUT

If the `Fl::focus()` widget is zero or ignores an `FL_KEYBOARD` event then FLTK tries sending this event to every widget it can, until one of them returns non-zero. `FL_SHORTCUT` is first sent to the `Fl::belowmouse()` widget, then its parents and siblings, and eventually to every widget in the window, trying to find an object that returns non-zero. FLTK tries really hard to not to ignore any keystrokes!

You can also make "global" shortcuts by using `Fl::add_handler()`. A global shortcut will work no matter what windows are displayed or which one has the focus.

1.9.5 Widget Events

1.9.5.1 FL_DEACTIVATE

This widget is no longer active, due to `deactivate()` being called on it or one of its parents. Please note that although `active()` may still return true for this widget after receiving this event, it is only truly active if `active()` is true for both it and all of its parents. (You can use `active_r()` to check this).

1.9.5.2 FL_ACTIVATE

This widget is now active, due to `activate()` being called on it or one of its parents.

1.9.5.3 FL_HIDE

This widget is no longer visible, due to `hide()` being called on it or one of its parents, or due to a parent window being minimized. Please note that although `visible()` may still return true for this widget after receiving this event, it is only truly visible if `visible()` is true for both it and all of its parents. (You can use `visible_r()` to check this).

1.9.5.4 FL_SHOW

This widget is visible again, due to `show()` being called on it or one of its parents, or due to a parent window being restored. *A child `Fl_Window` will respond to this by actually creating the window if not done already, so if you subclass a window, be sure to pass `FL_SHOW` to the base class `handle()` method!*

Note

The events in this chapter ("Widget Events"), i.e. `FL_ACTIVATE`, `FL_DEACTIVATE`, `FL_SHOW`, and `FL_HIDE`, are the only events deactivated and invisible widgets can usually get, depending on their states. Under certain circumstances, there may also be `FL_LEAVE` or `FL_UNFOCUS` events delivered to deactivated or hidden widgets.

1.9.6 Clipboard Events

1.9.6.1 FL_PASTE

You should get this event some time after you call `Fl::paste()`. The contents of `Fl::event_text()` is the text to insert and the number of characters is in `Fl::event_length()`.

1.9.6.2 FL_SELECTIONCLEAR

The `Fl::selection_owner()` will get this event before the selection is moved to another widget. This indicates that some other widget or program has claimed the selection. Motif programs used this to clear the selection indication. Most modern programs ignore this.

1.9.7 Drag and Drop Events

FLTK supports drag and drop of text and files from any application on the desktop to an FLTK widget. Text is transferred using UTF-8 encoding.

See `Fl::dnd()` for drag and drop from an FLTK widget.

The drag and drop data is available in `Fl::event_text()` at the concluding `FL_PASTE`. On some platforms, the event text is also available for the `FL_DND_*` events, however application must not depend on that behavior because it depends on the protocol used on each platform.

`FL_DND_*` events cannot be used in widgets derived from `Fl_Group` or `Fl_Window`.

1.9.7.1 Dropped filenames

Files are received as a list of full path and file names.

- On some X11 platforms, files are received as a URL-encoded UTF-8 string, that is, non-ASCII bytes (and a few others such as space and %) are replaced by the 3 bytes "%XY" where XY are the byte's hexadecimal value. The `fl_decode_uri()` function can be used to transform in-place the received string into a proper UTF-8 string. On these platforms, strings corresponding to dropped files are further prepended by `file://` (or other prefixes such as `computer://`).
- Other X11 situations put all dropped filenames in a single line, separated by spaces.
- On non-X11 platforms, including Wayland, files dropped are received one pathname per line, with no `'\n'` after the last pathname.

1.9.7.2 FL_DND_ENTER

The mouse has been moved to point at this widget. A widget that is interested in receiving drag'n'drop data must return 1 to receive `FL_DND_DRAG`, `FL_DND_LEAVE` and `FL_DND_RELEASE` events.

1.9.7.3 FL_DND_DRAG

The mouse has been moved inside a widget while dragging data. A widget that is interested in receiving drag'n'drop data should indicate the possible drop position.

1.9.7.4 FL_DND_LEAVE

The mouse has moved out of the widget.

1.9.7.5 FL_DND_RELEASE

The user has released the mouse button dropping data into the widget. If the widget returns 1, it will receive the data in the immediately following `FL_PASTE` event.

1.9.8 Other events

1.9.8.1 FL_SCREEN_CONFIGURATION_CHANGED

Sent whenever the screen configuration changes (a screen is added/removed, a screen resolution is changed, screens are moved). Use `Fl::add_handler()` to be notified of this event.

1.9.8.2 FL_FULLSCREEN

The application window has been changed from normal to fullscreen, or from fullscreen to normal. If you are using a X window manager which supports Extended Window Manager Hints, this event will not be delivered until the change has actually happened.

1.9.9 Fl::event_*(()) methods

FLTK keeps the information about the most recent event in static storage. This information is good until the next event is processed. Thus it is valid inside `handle()` and `callback()` methods.

These are all trivial inline functions and thus very fast and small:

- [Fl::event_button\(\)](#)
- [Fl::event_clicks\(\)](#)
- [Fl::event_dx\(\)](#)
- [Fl::event_dy\(\)](#)
- [Fl::event_inside\(\)](#)
- [Fl::event_is_click\(\)](#)
- [Fl::event_key\(\)](#)
- [Fl::event_length\(\)](#)
- [Fl::event_state\(\)](#)
- [Fl::event_text\(\)](#)
- [Fl::event_x\(\)](#)
- [Fl::event_x_root\(\)](#)
- [Fl::event_y\(\)](#)
- [Fl::event_y_root\(\)](#)
- [Fl::get_key\(\)](#)
- [Fl::get_mouse\(\)](#)
- [Fl::test_shortcut\(\)](#)

1.9.10 Event Propagation

Widgets receive events via the virtual `handle()` function. The argument indicates the type of event that can be handled. The widget must indicate if it handled the event by returning 1. FLTK will then remove the event and wait for further events from the host. If the widget's handle function returns 0, FLTK may redistribute the event based on a few rules.

Most events are sent directly to the `handle()` method of the [Fl_Window](#) that the window system says they belong to. The window (actually the [Fl_Group](#) that [Fl_Window](#) is a subclass of) is responsible for sending the events on to any child widgets. To make the [Fl_Group](#) code somewhat easier, FLTK sends some events (`FL_DRAG`, `FL↔_RELEASE`, `FL_KEYBOARD`, `FL_SHORTCUT`, `FL_UNFOCUS`, and `FL_LEAVE`) directly to leaf widgets. These procedures control those leaf widgets:

- [Fl::add_handler\(\)](#)
- [Fl::belowmouse\(\)](#)
- [Fl::focus\(\)](#)
- [Fl::grab\(\)](#)

- [Fl::modal\(\)](#)
- [Fl::pushed\(\)](#)
- [Fl::release\(\)](#) (deprecated, see [Fl::grab\(0\)](#))
- [Fl_Widget::take_focus\(\)](#)

FLTK propagates events along the widget hierarchy depending on the kind of event and the status of the UI. Some events are injected directly into the widgets, others may be resent as new events to a different group of receivers.

Mouse click events are first sent to the window that caused them. The window then forwards the event down the hierarchy until it reaches the widget that is below the click position. If that widget uses the given event, the widget is marked "pushed" and will receive all following mouse motion ([FL_DRAG](#)) events until the mouse button is released.

Mouse motion ([FL_MOVE](#)) events are sent to the [Fl::belowmouse\(\)](#) widget, i.e. the widget that returned 1 on the last [FL_ENTER](#) event.

Mouse wheel events are sent to the window that caused the event. The window propagates the event down the tree, first to the widget that is below the mouse pointer, and if that does not succeed, to all other widgets in the group. This ensures that scroll widgets work as expected with the widget furthest down in the hierarchy getting the first opportunity to use the wheel event, but also giving scroll bars, that are not directly below the mouse a chance.

Keyboard events are sent directly to the widget that has keyboard focus. If the focused widget rejects the event, it is resent as a shortcut event, first to the top-most window, then to the widget below the mouse pointer, propagating up the hierarchy to all its parents. Those send the event also to all widgets that are not below the mouse pointer. Now if that did not work out, the shortcut is sent to all registered shortcut handlers.

If we are still unsuccessful, the event handler flips the case of the shortcut letter and starts over. Finally, if the key is "escape", FLTK sends a close event to the top-most window.

All other events are pretty much sent right away to the window that created the event.

Widgets can "grab" events. The grabbing window gets all events exclusively, but usually by the same rules as described above.

Windows can also request exclusivity in event handling by making the window modal.

1.9.11 FLTK Compose-Character Sequences

The character composition done by [Fl_Input](#) widget requires that you call the [Fl::compose\(\)](#) function if you are writing your own text editor widget.

Currently, all characters made by single key strokes with or without modifier keys, or by system-defined character compose sequences (that can involve dead keys or a compose key) can be input. You should call [Fl::compose\(\)](#) in case any enhancements to this processing are done in the future. The interface has been designed to handle arbitrary UTF-8 encoded text.

The following methods are provided for character composition:

- [Fl::compose\(\)](#)
- [Fl::compose_reset\(\)](#)

Under Mac OS X, FLTK "previews" partially composed sequences.

1.10 Adding and Extending Widgets

This chapter describes how to add your own widgets or extend existing widgets in FLTK.

1.10.1 Subclassing

New widgets are created by *subclassing* an existing FLTK widget, typically `Fl_Widget` for controls and `Fl_Group` for composite widgets.

A control widget typically interacts with the user to receive and/or display a value of some sort.

A composite widget holds a list of child widgets and handles moving, sizing, showing, or hiding them as needed. `Fl_Group` is the main composite widget class in FLTK, and all of the other composite widgets (`Fl_Pack`, `Fl_Scroll`, `Fl_Tabs`, `Fl_Tile`, `Fl_Window`, `Fl_Flex`, `Fl_Grid`, etc.) are subclasses of it.

You can also subclass other existing widgets to provide a different look or user-interface. For example, the button widgets are all subclasses of `Fl_Button` since they all interact with the user via a mouse button click. The only difference is the code that draws the face of the button.

1.10.2 Making a Subclass of Fl_Widget

Your subclasses can directly descend from `Fl_Widget` or any subclass of `Fl_Widget`. `Fl_Widget` has only four virtual methods, and overriding some or all of these may be necessary.

1.10.3 The Constructor

The constructor should have the following arguments:

```
MyClass(int x, int y, int w, int h, const char *label = 0);
```

This will allow the class to be used in `FLUID` without problems.

The constructor must call the constructor for the base class and pass the same arguments:

```
MyClass::MyClass(int x, int y, int w, int h, const char *label)
: Fl_Widget(x, y, w, h, label) {
    // do initialization stuff...
}
```

`Fl_Widget`'s protected constructor sets `x()`, `y()`, `w()`, `h()`, and `label()` to the passed values and initializes the other instance variables to:

```
type(0);
box(FL_NO_BOX);
color(FL_BACKGROUND_COLOR);
selection_color(FL_BACKGROUND_COLOR);
labeltype(FL_NORMAL_LABEL);
labelstyle(FL_NORMAL_STYLE);
labelsize(FL_NORMAL_SIZE);
labelcolor(FL_FOREGROUND_COLOR);
align(FL_ALIGN_CENTER);
callback(default_callback,0);
flags(ACTIVE|VISIBLE);
image(0);
deimage(0);
```

1.10.4 Protected Methods of `Fl_Widget`

The following methods are provided for subclasses to use:

- `clear_visible()`
- `damage()`
- `draw_box()`
- `draw_focus()`
- `draw_label()`
- `set_flag()`
- `set_visible()`
- `test_shortcut()`
- `type()`

```
void Fl_Widget::damage(uchar mask)
void Fl_Widget::damage(uchar mask, int x, int y, int w, int h)
uchar Fl_Widget::damage()
```

The first form indicates that a partial update of the object is needed. The bits in mask are OR'd into `damage()`. Your `draw()` routine can examine these bits to limit what it is drawing. The public method `Fl_Widget::redraw()` simply does `Fl_Widget::damage(FL_DAMAGE_ALL)`, but the implementation of your widget can call the public `damage(n)`.

The second form indicates that a region is damaged. If only these calls are done in a window (no calls to `damage(n)`) then FLTK will clip to the union of all these calls before drawing anything. This can greatly speed up incremental displays. The mask bits are OR'd into `damage()` unless this is a `Fl_Window` widget.

The third form returns the bitwise-OR of all `damage(n)` calls done since the last `draw()`.

When redrawing your widgets you should look at the damage bits to see what parts of your widget need redrawing. The `handle()` method can then set individual damage bits to limit the amount of drawing that needs to be done:

```
MyClass::handle(int event) {
    ...
    if (change_to_part1) damage(1);
    if (change_to_part2) damage(2);
    if (change_to_part3) damage(4);
}

MyClass::draw() {
    if (damage() & FL_DAMAGE_ALL) {
        ... draw frame/box and other static stuff ...
    }

    if (damage() & (FL_DAMAGE_ALL | 1)) draw_part1();
    if (damage() & (FL_DAMAGE_ALL | 2)) draw_part2();
    if (damage() & (FL_DAMAGE_ALL | 4)) draw_part3();
}
```

Todo Clarify `Fl_Window::damage(uchar)` handling - seems confused/wrong? ORing value doesn't match setting behavior in `Fl_Widget.H!`

```
void Fl_Widget::draw_box() const
void Fl_Widget::draw_box(Fl_Boxtype t, Fl_Color c) const
```

The first form draws this widget's `box()`, using the dimensions of the widget. The second form uses `t` as the box type and `c` as the color for the box.

```
void Fl_Widget::draw_focus()
void Fl_Widget::draw_focus(Fl_Boxtype t, int x, int y, int w, int h) const
```

Draws a focus box inside the widget's bounding box. The second form allows you to specify a different bounding box.

```
void Fl_Widget::draw_label() const
void Fl_Widget::draw_label(int x, int y, int w, int h) const
void Fl_Widget::draw_label(int x, int y, int w, int h, Fl_Align align) const
```

The first form is the usual function for a `draw()` method to call to draw the widget's label. It does not draw the label if it is supposed to be outside the box (on the assumption that the enclosing group will draw those labels).

The second form uses the passed bounding box instead of the widget's bounding box. This is useful so "centered" labels are aligned with some feature, like a moving slider.

The third form draws the label anywhere. It acts as though `FL_ALIGN_INSIDE` has been forced on so the label will appear inside the passed bounding box. This is designed for parent groups to draw labels with.

```
void Fl_Widget::set_flag(int c)
```

Calling `set_flag(SHORTCUT_LABEL)` modifies the behavior of `draw_label()` so that '&' characters cause an underscore to be printed under the next letter.

```
void Fl_Widget::set_visible()
void Fl_Widget::clear_visible()
```

Fast inline versions of `Fl_Widget::hide()` and `Fl_Widget::show()`. These do not send the `FL_HIDE` and `FL_SHOW` events to the widget.

```
int Fl_Widget::test_shortcut()
static int Fl_Widget::test_shortcut(const char *s)
```

The first version tests `Fl_Widget::label()` against the current event (which should be a `FL_SHORTCUT` event). If the label contains a '&' character and the character after it matches the keypress, this returns true. This returns false if the `SHORTCUT_LABEL` flag is off, if the label is `NULL`, or does not have a '&' character in it, or if the keypress does not match the character.

The second version lets you do this test against an arbitrary string.

```
uchar FI_Widget::type() const
void FI_Widget::type(uchar t)
```

The property `FI_Widget::type()` can return an arbitrary 8-bit identifier, and can be set with the protected method `type(uchar t)`. This value had to be provided for Forms compatibility, but you can use it for any purpose you want. Try to keep the value less than 100 to not interfere with reserved values.

FLTK does not use RTTI (Run Time Typing Information) to enhance portability. But this may change in the near future if RTTI becomes standard everywhere.

If you don't have RTTI you can use the clumsy FLTK mechanism, by having `type()` use a unique value. These unique values must be greater than the symbol `FL_RESERVED_TYPE` (which is 100) and less than `FL_WINDOW` (unless you make a subclass of `FI_Window`). Look through the header files for `FL_↔RESERVED_TYPE` to find an unused number. If you make a subclass of `FI_Window` you must use `FL_↔WINDOW + n` (where `n` must be in the range 1 to 7).

1.10.5 Handling Events

The virtual method `FI_Widget::handle(int event)` is called to handle each event passed to the widget. It can:

- Change the state of the widget.
- Call `FI_Widget::redraw()` if the widget needs to be redisplayed.
- Call `FI_Widget::damage(uchar c)` if the widget needs a partial-update (assuming you provide support for this in your `draw()` method).
- Call `FI_Widget::do_callback()` if a callback should be generated.
- Call `FI_Widget::handle()` on child widgets.

Events are identified by the integer argument. Other information about the most recent event is stored in static locations and acquired by calling the `Fl::event_*` methods. This information remains valid until another event is handled.

Here is a sample `handle()` method for a widget that acts as a pushbutton and also accepts the keystroke 'x' to cause the callback:

```
int MyClass::handle(int event) {
    switch(event) {
        case FL_PUSH:
            highlight = 1;
            redraw();
            return 1;
        case FL_DRAG: {
            int t = Fl::event_inside(this);
            if (t != highlight) {
                highlight = t;
                redraw();
            }
        }
        return 1;
        case FL_RELEASE:
```

```

    if (highlight) {
        highlight = 0;
        redraw();
        do_callback();
        // never do anything after a callback, as the callback
        // may delete the widget!
    }
    return 1;
case FL_SHORTCUT:
    if (Fl::event_key() == 'x') {
        do_callback();
        return 1;
    }
    return 0;
default:
    return Fl_Widget::handle(event);
}
}

```

You must return non-zero if your `handle()` method uses the event. If you return zero, the parent widget will try sending the event to another widget.

For debugging purposes, event numbers can be printed as their actual event names using the `fl_eventnames[]` array, e.g.:

```

#include <FL/names.h>           // defines fl_eventnames[]
[...
int MyClass::handle(int e) {
    printf("Event was %s (%d)\n", fl_eventnames[e], e);    // e.g. "Event was FL_PUSH (1)"
    [...]
}

```

1.10.6 Drawing the Widget

The `draw()` virtual method is called when FLTK wants you to redraw your widget. It will be called if and only if `damage()` is non-zero, and `damage()` will be cleared to zero after it returns. The `draw()` method should be declared protected so that it can't be called from non-drawing code.

The `damage()` value contains the bitwise-OR of all the `damage(n)` calls to this widget since it was last drawn. This can be used for minimal update, by only redrawing the parts whose bits are set. FLTK will turn on the `FL_DAMAGE_ALL` bit if it thinks the entire widget must be redrawn, e.g. for an expose event.

Expose events (and the `damage(mask,x,y,w,h)` function described above) will cause `draw()` to be called with FLTK's `clipping` turned on. You can greatly speed up redrawing in some cases by testing `fl_not_clipped(x,y,w,h)` or `fl_clip_box()` and skipping invisible parts.

Besides the protected methods described above, FLTK provides a large number of basic drawing functions, which are described in the chapter [Drawing Things in FLTK](#).

1.10.7 Resizing the Widget

The `resize(x,y,w,h)` method is called when the widget is being resized or moved. The arguments are the new position, width, and height. `x()`, `y()`, `w()`, and `h()` still remain the old size. You must call `resize()` on your base class with the same arguments to get the widget size to actually change.

This should *not* call `redraw()`, at least if only the `x()` and `y()` change. This is because composite widgets like `Fl_Scroll` may have a more efficient way of drawing the new position.

1.10.8 Making a Composite Widget

A "composite" widget contains one or more "child" widgets. To make a composite widget you should subclass `Fl_Group`. It is possible to make a composite object that is not a subclass of `Fl_Group`, but you'll have to duplicate the code in `Fl_Group` anyways.

Instances of the child widgets may be included in the parent:

```
class MyClass : public Fl_Group {
    Fl_Button the_button;
    Fl_Slider the_slider;
    ...
};
```

The constructor has to initialize these instances. They are automatically added to the group, since the `Fl_Group` constructor does `Fl_Group::begin()`. *Don't forget to call `Fl_Group::end()` or use the `Fl_End` pseudo-class:*

```
MyClass::MyClass(int x, int y, int w, int h) :
    Fl_Group(x, y, w, h),
    the_button(x + 5, y + 5, 100, 20),
    the_slider(x, y + 50, w, 20)
{
    ... (you could add dynamically created child widgets here) ...
    end(); // don't forget to do this!
}
```

The child widgets need callbacks. These will be called with a pointer to the children, but the widget itself may be found in the `parent()` pointer of the child. Usually these callbacks can be static private methods, with a matching private method:

```
void MyClass::static_slider_cb(Fl_Widget* v, void *) { // static method
    (MyClass*)(v->parent())->slider_cb();
}
void MyClass::slider_cb() { // normal method
    use(the_slider->value());
}
```

If you make the `handle()` method, you can quickly pass all the events to the children using the `Fl_Group::handle()` method. You don't need to override `handle()` if your composite widget does nothing other than pass events to the children:

```
int MyClass::handle(int event) {
    if (Fl_Group::handle(event)) return 1;
    ... handle events that children don't want ...
}
```

If you override `draw()` you need to draw all the children. If `redraw()` or `damage()` is called on a child, `damage(FL_DAMAGE_CHILD)` is done to the group, so this bit of `damage()` can be used to indicate that a child needs to be drawn. It is fastest if you avoid drawing anything else in this case:

```
int MyClass::draw() {
    Fl_Widget *const*a = array();
    if (damage() == FL_DAMAGE_CHILD) { // only redraw some children
        for (int i = children(); i --; a++) update_child(**a);
    } else { // total redraw
        ... draw background graphics ...
        // now draw all the children atop the background:
        for (int i = children_; i --; a++) {
            draw_child(**a);
            draw_outside_label(**a); // you may not need to do this
        }
    }
}
```

`Fl_Group` provides some protected methods to make drawing easier:

- `draw_child()`
- `draw_children()`
- `draw_outside_label()`
- `update_child()`

void `Fl_Group::draw_child(Fl_Widget &widget) const`

This will force the child's `damage()` bits all to one and call `draw()` on it, then clear the `damage()`. You should call this on all children if a total redraw of your widget is requested, or if you draw something (like a background box) that damages the child. Nothing is done if the child is not `visible()` or if it is clipped.

void [Fl_Group::draw_children\(\)](#)

A convenience function that draws all children of the group. This is useful if you derived a widget from [Fl_Group](#) and want to draw a special border or background. You can call `draw_children()` from the derived `draw()` method after drawing the box, border, or background.

void [Fl_Group::draw_outside_label\(const Fl_Widget &widget\) const](#)

Draw the labels that are *not* drawn by [draw_label\(\)](#). If you want more control over the label positions you might want to call `child->draw_label(x, y, w, h, a)`.

void [Fl_Group::update_child\(Fl_Widget& widget\) const](#)

Draws the child only if its `damage()` is non-zero. You should call this on all the children if your own damage is equal to `FL_DAMAGE_CHILD`. Nothing is done if the child is not `visible()` or if it is clipped.

1.10.9 Cut and Paste Support

FLTK provides routines to cut and paste UTF-8 encoded text between applications:

- [Fl::copy\(\)](#)
- [Fl::paste\(\)](#)
- [Fl::selection\(\)](#)
- [Fl::selection_owner\(\)](#)

It is also possible to copy and paste image data between applications:

- [Fl_Copy_Surface](#)
- [Fl::clipboard_contains\(\)](#)
- [Fl::paste\(\)](#)

It may be possible to cut/paste other kinds of data by using [Fl::add_handler\(\)](#). Note that handling events beyond those provided by FLTK may be operating system specific. See [Operating System Issues](#) for more details.

1.10.10 Drag And Drop Support

FLTK provides routines to drag and drop UTF-8 encoded text between applications:

Drag'n'drop operations are initiated by copying data to the clipboard and calling the function `Fl::dnd()`.

Drop attempts are handled via the following events, already described under [Drag and Drop Events](#) in a previous chapter:

- `FL_DND_ENTER`
- `FL_DND_DRAG`
- `FL_DND_LEAVE`
- `FL_DND_RELEASE`
- `FL_PASTE`

1.10.11 Making a subclass of `Fl_Window`

You may want your widget to be a subclass of `Fl_Window`, `Fl_Double_Window`, or `Fl_Gl_Window`. This can be useful if your widget wants to occupy an entire window, and can also be used to take advantage of system-provided clipping, or to work with a library that expects a system window ID to indicate where to draw.

Subclassing `Fl_Window` is almost exactly like subclassing `Fl_Group`, and in fact you can easily switch a subclass back and forth. Watch out for the following differences:

1. `Fl_Window` is a subclass of `Fl_Group` so *make sure your constructor calls* `end()` unless you actually want children added to your window.
2. When handling events and drawing, the upper-left corner is at 0,0, not `x()`, `y()` as in other `Fl_Widget`'s. For instance, to draw a box around the widget, call `draw_box(0,0,w(),h())`, rather than `draw_box(x(),y(),w(),h())`.

You may also want to subclass `Fl_Window` in order to get access to different visuals or to change other attributes of the windows. See the [Operating System Issues](#) chapter for more information.

1.11 Using OpenGL

This chapter discusses using FLTK for your OpenGL applications.

1.11.1 Using OpenGL in FLTK

The easiest way to make an OpenGL display is to subclass `Fl_Gl_Window`. Your subclass must implement a `draw()` method which uses OpenGL calls to draw the display. Your main program should call `redraw()` when the display needs to change, and (somewhat later) FLTK will call `draw()`.

With a bit of care you can also use OpenGL to draw into normal FLTK windows (see [Using OpenGL in Normal FLTK Windows](#) below). This allows you to use Gouraud shading for drawing your widgets. To do this you use the `gl_start()` and `gl_finish()` functions around your OpenGL code.

You must include FLTK's `<FL/gl.h>` header file. It will include the file `<GL/gl.h>` (on macOS: `<OpenGL/gl.h>`), define some extra drawing functions provided by FLTK, and include the `<windows.h>` header file needed by Windows applications.

Some simple coding rules (see [OpenGL and support of HighDPI displays](#)) allow to write cross-platform code that will support OpenGL run on HighDPI displays (including the 'retina' displays of Apple hardware).

1.11.2 Making a Subclass of `Fl_Gl_Window`

To make a subclass of `Fl_Gl_Window`, you must provide:

- A class definition.
- A `draw()` method.
- A `handle()` method if you need to receive input from the user.

If your subclass provides static controls in the window, they must be redrawn whenever the `FL_DAMAGE_ALL` bit is set in the value returned by `damage()`. For double-buffered windows you will need to surround the drawing code with the following code to make sure that both buffers are redrawn:

```
#ifndef MESA
glDrawBuffer(GL_FRONT_AND_BACK);
#endif // !MESA
... draw stuff here ...
#ifndef MESA
glDrawBuffer(GL_BACK);
#endif // !MESA
```

Note:

If you are using the Mesa graphics library, the call to `glDrawBuffer()` is not required and will slow down drawing considerably. The preprocessor instructions shown above will optimize your code based upon the graphics library used.

1.11.2.1 Defining the Subclass

To define the subclass you just subclass the `Fl_Gl_Window` class:

```
class MyWindow : public Fl_Gl_Window {
    void draw();
    int handle(int);

public:
    MyWindow(int X, int Y, int W, int H, const char *L)
        : Fl_Gl_Window(X, Y, W, H, L) {}
};
```

The `draw()` and `handle()` methods are described below. Like any widget, you can include additional private and public data in your class (such as scene graph information, etc.)

1.11.2.2 The `draw()` Method

The `draw()` method is where you actually do your OpenGL drawing:

```
void MyWindow::draw() {
    if (!valid()) {
        ... set up projection, viewport, etc ...
        ... window size is in w() and h().
        ... valid() is turned on by FLTK after draw() returns
    }
    ... draw ...
}
```

1.11.2.3 The handle() Method

The `handle()` method handles mouse and keyboard events for the window:

```
int MyWindow::handle(int event) {
    switch(event) {
    case FL_PUSH:
        ... mouse down event ...
        ... position in Fl::event_x() and Fl::event_y()
        return 1;
    case FL_DRAG:
        ... mouse moved while down event ...
        return 1;
    case FL_RELEASE:
        ... mouse up event ...
        return 1;
    case FL_FOCUS :
    case FL_UNFOCUS :
        ... Return 1 if you want keyboard events, 0 otherwise
        return 1;
    case FL_KEYBOARD:
        ... keypress, key is in Fl::event_key(), ascii in Fl::event_text()
        ... Return 1 if you understand/use the keyboard event, 0 otherwise...
        return 1;
    case FL_SHORTCUT:
        ... shortcut, key is in Fl::event_key(), ascii in Fl::event_text()
        ... Return 1 if you understand/use the shortcut event, 0 otherwise...
        return 1;
    default:
        // pass other events to the base class...
        return Fl_Gl_Window::handle(event);
    }
}
```

When `handle()` is called, the OpenGL context is not set up! If your display changes, you should call `redraw()` and let `draw()` do the work. Don't call any OpenGL drawing functions from inside `handle()`!

You can call *some* OpenGL stuff like hit detection and texture loading functions by doing:

```
case FL_PUSH:
    make_current(); // make OpenGL context current
    if (!valid()) {

        ... set up projection exactly the same as draw ...

        valid(1); // stop it from doing this next time
    }
    ... ok to call NON-DRAWING OpenGL code here, such as hit
    detection, loading textures, etc...
```

Your main program can now create one of your windows by doing `new MyWindow(...)`.

You can also use your new window class in FLUID by:

1. Putting your class definition in a `MyWindow.H` file.
2. Creating a `Fl_Box` widget in FLUID.
3. In the widget panel fill in the "class" field with `MyWindow`. This will make FLUID produce constructors for your new class.
4. In the "Extra Code" field put `#include "MyWindow.H"`, so that the FLUID output file will compile.

You must put `glwindow->show()` in your main code after calling `show()` on the window containing the OpenGL window.

1.11.3 OpenGL and support of HighDPI displays

HighDPI displays (including the so-called 'retina' displays of Apple hardware) are supported by FLTK in such a way that 1 unit of an FLTK quantity (say, the value given by `Fl_Gl_Window::w()`) corresponds to more than 1 pixel on the display. Conversely, when a program specifies the width and height of the OpenGL viewport, it is necessary to use an API that returns quantities expressed in pixels. That can be done as follows:

```
Fl_Gl_Window *glw = ...;
glViewport(0, 0, glw->pixel_w(), glw->pixel_h());
```

which makes use of the `Fl_Gl_Window::pixel_w()` and `Fl_Gl_Window::pixel_h()` methods giving the size in pixels of an `Fl_Gl_Window` that is potentially mapped to a HighDPI display. Method `Fl_Gl_Window::pixels_per_unit()` can also be useful in this context.

Note

A further coding rule is necessary to properly support retina displays and OpenGL under macOS (see [OpenGL and 'retina' displays](#))

1.11.4 Using OpenGL in Normal FLTK Windows

Note

Drawing both with OpenGL and Quartz in a normal FLTK window is not possible with the macOS platform. This technique is therefore not useful under macOS because it permits nothing more than what is possible with class `Fl_Gl_Window`.

You can put OpenGL code into the `draw()` method, as described in [Drawing the Widget](#) in the previous chapter, or into the code for a `boxtype` or other places with some care.

Most importantly, before you show *any* windows, including those that don't have OpenGL drawing, you **must** initialize FLTK so that it knows it is going to use OpenGL. You may use any of the symbols described for `Fl_Gl_Window` ←
: `mode()` to describe how you intend to use OpenGL:

```
Fl::gl_visual(FL_RGB);
```

You can then put OpenGL drawing code anywhere you can draw normally by surrounding it with `gl_start()` and `gl_finish()` to set up, and later release, an OpenGL context with an orthographic projection so that 0,0 is the lower-left corner of the window and each pixel is one unit. The current clipping is reproduced with OpenGL `glScissor()` commands. These functions also synchronize the OpenGL graphics stream with the drawing done by other X, Windows, or FLTK functions.

```
gl_start();
... put your OpenGL code here ...
gl_finish();
```

The same context is reused each time. If your code changes the projection transformation or anything else you should use `glPushMatrix()` and `glPopMatrix()` functions to put the state back before calling `gl_finish()`.

You may want to use `Fl_Window::current()->h()` to get the drawable height so that you can flip the Y coordinates.

Unfortunately, there are a bunch of limitations you must adhere to for maximum portability:

- You must choose a default visual with `Fl::gl_visual()`.
- You cannot pass `FL_DOUBLE` to `Fl::gl_visual()`.
- You cannot use `Fl_Double_Window` or `Fl_Overlay_Window`.

Do *not* call `gl_start()` or `gl_finish()` when drawing into an `Fl_Gl_Window` !

1.11.5 Using FLTK widgets in OpenGL Windows

FLTK widgets can be added to `Fl_Gl_Window`s just as they would be added to `Fl_Window`s. They are rendered as an overlay over the user defined OpenGL graphics using 'fl_.' graphics calls that are implemented in GL.

`Fl_Gl_Window` does not add subsequent widgets as children by default as `Fl_Window` does. Call `myGlWindow->begin()` after creating the GL window to automatically add following widgets. Remember to call `myGlWindow->end()`.

```
class My_Gl_Window : public Fl_Gl_Window {
...
    void draw();
...
};

...
myGlWindow = new My_Gl_Window(0, 0, 500, 500);
myGlWindow->begin();
myButton = new Fl_Button(10, 10, 120, 24, "Hello!");
myGlWindow->end();
...

void My_Gl_Window::draw() {
    // ... user GL drawing code
    Fl_Gl_Window::draw(); // Draw FLTK child widgets.
}
```

Users can draw into the overlay by using GL graphics calls as well as all `fl_...` graphics calls from the "Drawing Fast Shapes" section.

```
void My_Gl_Window::draw() {
    // ... user GL drawing code
    Fl_Gl_Window::draw_begin(); // Set up 1:1 projection
    Fl_Window::draw(); // Draw FLTK children
    fl_color(FL_RED);
    fl_rect(10, 10, 100, 100);
    Fl_Gl_Window::draw_end(); // Restore GL state
}
```

Widgets can be drawn with transparencies by assigning an alpha value to a colormap entry and using that color in the widget.

```
Fl::set_color(FL_FREE_COLOR, 255, 255, 0, 127); // 50% transparent yellow
myGlWindow = new My_Gl_Window(0, 0, 500, 500);
myGlWindow->begin();
myButton = new Fl_Button(10, 10, 120, 24, "Hello!");
myButton->box(FL_BORDER_BOX);
myButton->color(FL_FREE_COLOR);
myGlWindow->end();
```

Transparencies can also be set directly when drawing. This can be used to create custom box types and RGB overlay drawings with an alpha channel.

```
fl_color(0, 255, 0, 127); // 50% transparent green
fl_rectf(10, 10, 100, 100);
fl_color(FL_RED); // back to opaque red
fl_rect(20, 20, 80, 80);
```

1.11.6 OpenGL Drawing Functions

FLTK provides some useful OpenGL drawing functions. They can be freely mixed with any OpenGL calls, and are defined by including `<FL/gl.h>` which you should include instead of the OpenGL header `<GL/gl.h>`.

void `gl_color(Fl_Color)`

Sets the current OpenGL color to a FLTK color. *For color-index modes it will use `fl_xpixel(c)`, which is only right if this window uses the default colormap!*

void `gl_rect(int x, int y, int w, int h)`

void `gl_rectf(int x, int y, int w, int h)`

Outlines or fills a rectangle with the current color. If `Fl_Gl_Window::ortho()` has been called, then the rectangle will exactly fill the pixel rectangle passed.

void `gl_font(Fl_Font fontid, int size)`

Sets the current OpenGL font to the same font you get by calling `fl_font()`.

int `gl_height()`
 int `gl_descent()`
 float `gl_width(const char *s)`
 float `gl_width(const char *s, int n)`
 float `gl_width(uchar c)`

Returns information about the current OpenGL font.

void `gl_draw(const char *s)`
 void `gl_draw(const char *s, int n)`

Draws a nul-terminated string or an array of `n` characters in the current OpenGL font at the current raster position.

void `gl_draw(const char *s, int x, int y)`
 void `gl_draw(const char *s, int n, int x, int y)`
 void `gl_draw(const char *s, float x, float y)`
 void `gl_draw(const char *s, int n, float x, float y)`

Draws a nul-terminated string or an array of `n` characters in the current OpenGL font at the given position.

void `gl_draw(const char *s, int x, int y, int w, int h, Fl_Align)`

Draws a string formatted into a box, with newlines and tabs expanded, other control characters changed to `^X`, and aligned with the edges or center. Exactly the same output as `fl_draw()`.

1.11.7 Speeding up OpenGL

Performance of `Fl_Gl_Window` may be improved on some types of OpenGL implementations, in particular MESA and other software emulators, by setting the `GL_SWAP_TYPE` environment variable. This variable declares what is in the backbuffer after you do a swapbuffers.

- `setenv GL_SWAP_TYPE COPY`

This indicates that the back buffer is copied to the front buffer, and still contains its old data. This is true of many hardware implementations. Setting this will speed up emulation of overlays, and widgets that can do partial update can take advantage of this as `damage()` will not be cleared to -1.

- `setenv GL_SWAP_TYPE NODAMAGE`

This indicates that nothing changes the back buffer except drawing into it. This is true of MESA and Win32 software emulation and perhaps some hardware emulation on systems with lots of memory.

- All other values for `GL_SWAP_TYPE`, and not setting the variable, cause FLTK to assume that the back buffer must be completely redrawn after a swap.

This is easily tested by running the `gl_overlay` demo program and seeing if the display is correct when you drag another window over it or if you drag the window off the screen and back on. You have to exit and run the program again for it to see any changes to the environment variable.

1.11.8 Using OpenGL Optimizer with FLTK

OpenGL Optimizer is a scene graph toolkit for OpenGL available from Silicon Graphics for IRIX and Microsoft Windows. It allows you to view large scenes without writing a lot of OpenGL code.

OptimizerWindow Class Definition

To use **OpenGL Optimizer** with FLTK you'll need to create a subclass of `Fl_Gl_Widget` that includes several state variables:

```
class OptimizerWindow : public Fl_Gl_Widget {
  csContext *context_; // Initialized to 0 and set by draw()...
  csDrawAction *draw_action_; // Draw action...
  csGroup *scene_; // Scene to draw...
  csCamera *camera_; // Viewport for scene...

  void draw();

public:
  OptimizerWindow(int X, int Y, int W, int H, const char *L)
    : Fl_Gl_Widget(X, Y, W, H, L) {
    context_ = (csContext *)0;
    draw_action_ = (csDrawAction *)0;
    scene_ = (csGroup *)0;
    camera_ = (csCamera *)0;
  }

  void scene(csGroup *g) { scene_ = g; redraw(); }

  void camera(csCamera *c) {
    camera_ = c;
    if (context_) {
      draw_action_>setCamera(camera_);
      camera_>draw(draw_action_);
      redraw();
    }
  }
};
```

The camera() Method

The `camera()` method sets the camera (projection and viewpoint) to use when drawing the scene. The scene is redrawn after this call.

The draw() Method

The `draw()` method performs the needed initialization and does the actual drawing:

```
void OptimizerWindow::draw() {
    if (!context_) {
        // This is the first time we've been asked to draw; create the
        // Optimizer context for the scene...

#ifdef _WIN32
        context_ = new csContext((HDC)fl_getHDC());
        context_->ref();
        context_->makeCurrent((HDC)fl_getHDC());
#else
        context_ = new csContext(fl_display, fl_visual);
        context_->ref();
        context_->makeCurrent(fl_display, fl_window);
#endif // _WIN32

        ... perform other context setup as desired ...

        // Then create the draw action to handle drawing things...

        draw_action_ = new csDrawAction;
        if (camera_) {
            draw_action_->setCamera(camera_);
            camera_->draw(draw_action_);
        }
        else {
#ifdef _WIN32
            context_->makeCurrent((HDC)fl_getHDC());
#else
            context_->makeCurrent(fl_display, fl_window);
#endif // _WIN32
        }

        if (!valid()) {
            // Update the viewport for this context...
            context_->setViewport(0, 0, w(), h());
        }

        // Clear the window...
        context_->clear(csContext::COLOR_CLEAR | csContext::DEPTH_CLEAR,
            0.0f, // Red
            0.0f, // Green
            0.0f, // Blue
            1.0f); // Alpha

        // Then draw the scene (if any)...
        if (scene_)
            draw_action_->apply(scene_);
    }
}
```

The scene() Method

The `scene()` method sets the scene to be drawn. The scene is a collection of 3D objects in a `csGroup`. The scene is redrawn after this call.

1.11.9 Using OpenGL 3.0 (or higher versions)

The examples subdirectory contains `OpenGL3test.cxx`, a toy program showing how to use OpenGL 3.0 (or higher versions) with FLTK in a cross-platform fashion. It contains also `OpenGL3-glut-test.cxx` which shows how to use FLTK's GLUT compatibility and OpenGL 3.

To access OpenGL 3.0 (or higher versions), use the `FL_OPENGL3` flag when calling `FL_Gl_Window::mode(int a)` or `glutInitDisplayMode()`.

On the Windows and Linux platforms, FLTK creates contexts implementing the highest OpenGL version supported by the hardware. Such contexts may also be compatible with lower OpenGL versions. Access to functions from OpenGL versions above 1.1 requires to load function pointers at runtime on these platforms. FLTK recommends to use the GLEW library to perform this. It is therefore necessary to install the GLEW library (see below).

On the macOS platform, MacOS 10.7 or above is required; GLEW is possible but not necessary. FLTK creates contexts for OpenGL versions 1 and 2 without the `FL_OPENGL3` flag and for OpenGL versions 3.2 and above (**but not below**) with it.

GLEW installation (Linux and Windows platforms)

FLTK needs a header file, `GL/glew.h`, and a library, `libGLEW.*` or equivalent, to support OpenGL 3 and above.

These can be obtained for most Linux distributions by installing package `libglew-dev`.

For the Windows platform :

- the header and a Visual Studio static library (`glew32.lib`) can be downloaded from <http://glew.sourceforge.net/> ;
- a MinGW-style static library (`libglew32.a`) can be built from source (same web site) with the `make` command. Alternatively, pre-built files are available for these architectures :
 - x86: download files `glew.h` and `libglew32.a`;
 - x86_64: install GLEW as an MSYS2 package with command :
`pacman -S mingw-w64-x86_64-glew`

Source-level changes for OpenGL 3:

- Put this in all OpenGL-using source files (instead of, or before if needed, `#include <FL/gl.h>`, and before `#include <FL/glut.h>` if you use GLUT):

```
#if defined(__APPLE__)
# include <OpenGL/gl3.h> // defines OpenGL 3.0+ functions
#else
# if defined(_WIN32)
#   define GLEW_STATIC 1
# endif
# include <GL/glew.h>
#endif
```

- Add the `FL_OPENGL3` flag when calling `Fl_Gl_Window::mode(int a)` or `glutInitDisplayMode()`.
- Put this in the `handle(int event)` member function of the first to be created among your `Fl_Gl_Window`-derived classes:

```
#ifndef __APPLE__
static int first = 1;
if (first && event == FL_SHOW && shown()) {
first = 0;
make_current();
glewInit(); // defines pters to functions of OpenGL V 1.2 and above
}
#endif
```

- Alternatively, if you use GLUT, put

```
#ifndef __APPLE__
glewInit(); // defines pters to functions of OpenGL V 1.2 and above
#endif
```

after the first `glutCreateWindow()` call.

If GLEW is installed on the Mac OS development platform, it is possible to use the same code for all platforms, with one exception: put

```
#ifdef __APPLE__
glewExperimental = GL_TRUE;
#endif
```

before the `glewInit()` call.

Testing for success of the `glewInit()` call

Testing whether the `glewInit()` call is successful is to be done as follows:

```
#include <FL/platform.H> // defines FLTK_USE_WAYLAND under the Wayland platform
#include <FL/Fl.H> // for Fl::warning()
#ifdef __APPLE__
# if defined(_WIN32)
#   define GLEW_STATIC 1
# endif
# include <GL/glew.h>

GLenum err = glewInit(); // defines pters to functions of OpenGL V 1.2 and above
# ifdef FLTK_USE_WAYLAND
// glewInit returns GLEW_ERROR_NO_GLX_DISPLAY with Wayland
if (fl_wl_display() && err == GLEW_ERROR_NO_GLX_DISPLAY) err = GLEW_OK;
# endif
if (err != GLEW_OK) Fl::warning("glewInit() failed returning %u", err);
#endif // ! __APPLE__
```

Changes in the build process

Link with libGLEW.so (with X11 or Wayland), libglew32.a (with MinGW) or glew32.lib (with MS Visual Studio); no change is needed on the Mac OS platform.

1.12 Programming with FLUID

This chapter shows how to use the Fast Light User-Interface Designer ("FLUID") to create your GUIs.

Subchapters:

- [What is FLUID?](#)
- [Running FLUID Under UNIX](#)
- [Running FLUID Under Microsoft Windows](#)
- [Compiling .fl Files](#)
- [A Short Tutorial](#)
- [FLUID Reference](#)
- [FLUID Templates](#)
- [Internationalization with FLUID](#)
- [Known Limitations](#)
- [Keyboard Shortcuts](#)
- [Licenses](#)

1.12.1 What is FLUID?

The Fast Light User Interface Designer, or FLUID, is a graphical editor that is used to produce FLTK source code. FLUID edits and saves its state in `.fl` files. These files are text, and you can (with care) edit them in a text editor, perhaps to get some special effects. The `.fl` file format is explained in detail in `fluid/README_fl.txt`

FLUID can "compile" the `.fl` file into a `.cxx` and a `.h` file. The `.cxx` file defines all the objects from the `.fl` file and the `.h` file declares all the global ones. FLUID also supports localization ([Internationalization](#)) of label strings and tooltips using message files and the GNU gettext or POSIX catgets interfaces.

A simple program can be made by putting all your code (including a `main()` function) into the `.fl` file and thus making the `.cxx` file a single source file to compile. Most programs are more complex than this, so you write other `.cxx` files that call the FLUID functions. These `.cxx` files must `#include` the `.h` file or they can `#include` the `.cxx` file so it still appears to be a single source file.

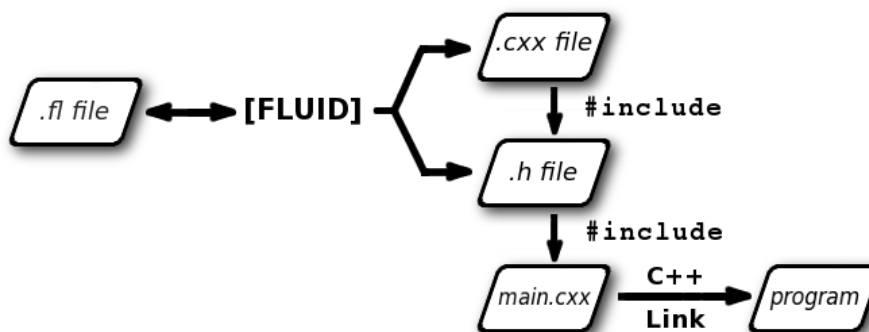


Figure 1.28 FLUID organization

Normally the FLUID file defines one or more functions or classes which output C++ code. Each function defines one or more FLTK windows and all the widgets that go inside those windows.

Widgets created by FLUID are either "named", "complex named" or "unnamed". A named widget has a legal C++ variable identifier as its name (i.e. only alphanumeric and underscore). In this case FLUID defines a global variable or class member that will point at the widget after the function defining it is called. A complex named object has punctuation such as ' .' or '->' or any other symbols in its name. In this case FLUID assigns a pointer to the widget to the name, but does not attempt to declare it. This can be used to get the widgets into structures. An unnamed widget has a blank name and no pointer is stored.

Widgets may either call a named callback function that you write in another source file, or you can supply a small piece of C++ source and FLUID will write a private callback function into the `.cxx` file.

1.12.2 Running FLUID Under UNIX

To run FLUID under UNIX, type:

```
fluid filename.fl &
```

to edit the `.fl` file `filename.fl`. If the file does not exist you will get an error pop-up, but if you dismiss it you will be editing a blank file of that name. You can run FLUID without any name, in which case you will be editing an unnamed blank setup (but you can use save-as to write it to a file).

You can provide any of the standard FLTK switches before the filename:

```
-display host:n.n
-geometry WxH+X+Y
-title windowtitle
-name classname
-iconic
-fg color
-bg color
-bg2 color
-scheme schemename
```

Changing the colors may be useful to see what your interface will look at if the user calls it with the same switches. Similarly, using "-scheme plastic" will show how the interface will look using the "plastic" scheme.

In the current version, if you don't put FLUID into the background with ' & ' then you will be able to abort FLUID by typing CTRL-C on the terminal. It will exit immediately, losing any changes.

1.12.3 Running FLUID Under Microsoft Windows

To run FLUID under Windows, double-click on the `FLUID.exe` file. You can also run FLUID from the Command Prompt window. FLUID always runs in the background under Windows.

1.12.4 Compiling .fl Files

FLUID can also be called as a command-line "compiler" to create the `.cxx` and `.h` file from a `.fl` file. To do this type:

```
fluid -c filename.fl
```

This is the same as the menu 'File/Write Code...'. It will read the `filename.fl` file and write `filename.cxx` and `filename.h`. Any leading directory on `filename.fl` will be stripped, so they are always written to the current directory. If there are any errors reading or writing the files, FLUID will print the error and exit with a non-zero code. You can use the following lines in a makefile to automate the creation of the source and header files:

```
my_panels.h my_panels.cxx: my_panels.fl
    fluid -c my_panels.fl
```

Most versions of make support rules that cause .fl files to be compiled:

```
.SUFFIXES: .fl .cxx .h
.fl.h .fl.cxx:
    fluid -c $<
```

If you use

```
fluid -cs filename.fl
```

FLUID will also write the "strings" for internationalization in file 'filename.txt' (menu: 'File/Write Strings...').

Finally there is another option which is useful for program developers who have many .fl files and want to upgrade them to the current FLUID version. FLUID will read the `filename.fl` file, save it, and exit immediately. This writes the file with current syntax and options and the current FLTK version in the header of the file. Use

```
fluid -u filename.fl
```

to 'upgrade' `filename.fl`. You may combine this with '-c' or '-cs'.

Note

All these commands overwrite existing files w/o warning. You should particularly take care when running 'fluid -u' since this overwrites the original .fl source file.

1.12.5 A Short Tutorial

FLUID is an amazingly powerful little program. However, this power comes at a price as it is not always obvious how to accomplish seemingly simple tasks with it. This tutorial will show you how to generate a complete user interface class with FLUID that is used for the CubeView program provided with FLTK.

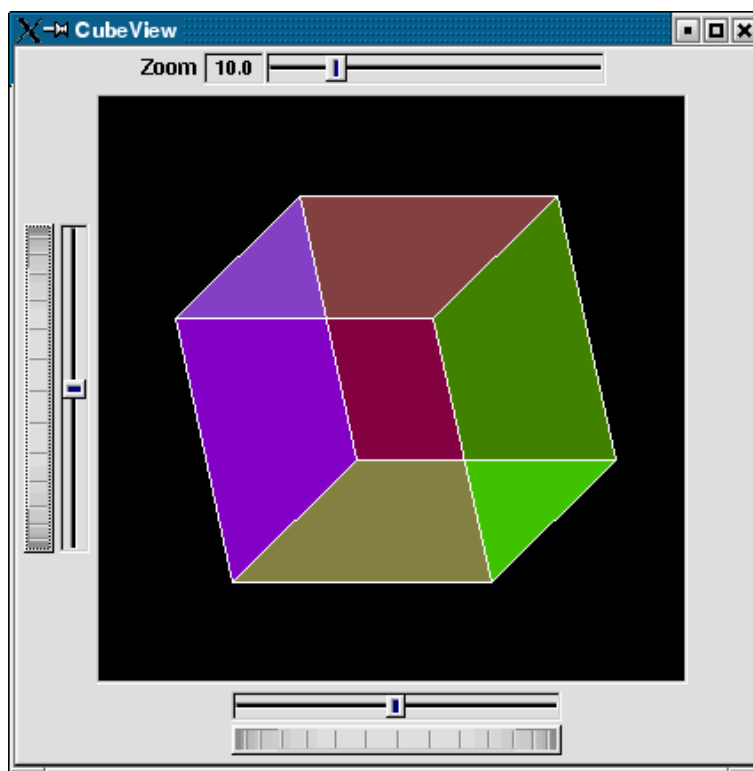


Figure 1.29 CubeView demo

The window is of class `CubeViewUI`, and is completely generated by FLUID, including class member functions. The central display of the cube is a separate subclass of `Fl_Gl_Window` called `CubeView`. `CubeViewUI` manages `CubeView` using callbacks from the various sliders and rollers to manipulate the viewing angle and zoom of `CubeView`.

At the completion of this tutorial you will (hopefully) understand how to:

1. Use FLUID to create a complete user interface class, including constructor and any member functions necessary.
2. Use FLUID to set callback member functions of custom widget classes.
3. Subclass an [Fl_Gl_Window](#) to suit your purposes.

1.12.5.1 The CubeView Class

The CubeView class is a subclass of [Fl_Gl_Window](#). It has methods for setting the zoom, the x and y pan, and the rotation angle about the x and y axes.

You can safely skip this section as long as you realize that CubeView is a subclass of [Fl_Gl_Window](#) and will respond to calls from CubeViewUI, generated by FLUID.

The CubeView Class Definition

Here is the CubeView class definition, as given by its header file "test/CubeView.h":

```
#include <FL/Fl.H>
#include <FL/Fl_Gl_Window.H>
#include <FL/gl.h>

class CubeView : public Fl_Gl_Window {
public:
    CubeView(int x, int y, int w, int h, const char *l = 0);

    // This value determines the scaling factor used to draw the cube.
    double size;

    /* Set the rotation about the vertical (y) axis.

       This function is called by the horizontal roller in
       CubeViewUI and the initialize button in CubeViewUI.
    */
    void v_angle(double angle) { vAng = angle; }

    // Return the rotation about the vertical (y) axis.
    double v_angle() const { return vAng; }

    /* Set the rotation about the horizontal (x) axis.

       This function is called by the vertical roller in
       CubeViewUI and the initialize button in CubeViewUI.
    */
    void h_angle(double angle) { hAng = angle; }

    // The rotation about the horizontal (x) axis.
    double h_angle() const { return hAng; }

    /* Sets the x shift of the cube view camera.

       This function is called by the slider in CubeViewUI
       and the initialize button in CubeViewUI.
    */
    void panx(double x) { xshift = x; }

    /* Sets the y shift of the cube view camera.

       This function is called by the slider in CubeViewUI
       and the initialize button in CubeViewUI.
    */
    void pany(double y) { yshift = y; }

    /* The widget class draw() override.

       The draw() function initializes Gl for another round of
       drawing, then calls specialized functions for drawing each
       of the entities displayed in the cube view.
    */
    void draw();
};
```

```
private:
    /* Draw the cube boundaries.

       Draw the faces of the cube using the boxv[] vertices,
       using GL_LINE_LOOP for the faces.
    */
    void drawCube();

    double vAng, hAng;
    double xshift, yshift;

    float boxv0[3]; float boxv1[3];
    float boxv2[3]; float boxv3[3];
    float boxv4[3]; float boxv5[3];
    float boxv6[3]; float boxv7[3];
};
```

The CubeView Class Implementation

Here is the CubeView implementation. It is very similar to the "CubeView" demo included with FLTK.

```
#include "CubeView.h"
#include <math.h>

CubeView::CubeView(int x, int y, int w, int h, const char *l)
    : Fl_Gl_Window(x, y, w, h, l)
{
    Fl::use_high_res_GL(1);
    vAng = 0.0;
    hAng = 0.0;
    size = 10.0;
    xshift = 0.0;
    yshift = 0.0;

    /* The cube definition. These are the vertices of a unit cube
       centered on the origin.*/

    boxv0[0] = -0.5; boxv0[1] = -0.5; boxv0[2] = -0.5;
    boxv1[0] = 0.5; boxv1[1] = -0.5; boxv1[2] = -0.5;
    boxv2[0] = 0.5; boxv2[1] = 0.5; boxv2[2] = -0.5;
    boxv3[0] = -0.5; boxv3[1] = 0.5; boxv3[2] = -0.5;
    boxv4[0] = -0.5; boxv4[1] = -0.5; boxv4[2] = 0.5;
    boxv5[0] = 0.5; boxv5[1] = -0.5; boxv5[2] = 0.5;
    boxv6[0] = 0.5; boxv6[1] = 0.5; boxv6[2] = 0.5;
    boxv7[0] = -0.5; boxv7[1] = 0.5; boxv7[2] = 0.5;
}

void CubeView::drawCube() {
    /* Draw a colored cube */
#define ALPHA 0.5
    glShadeModel(GL_FLAT);

    glBegin(GL_QUADS);
        glColor4f(0.0, 0.0, 1.0, ALPHA);
        glVertex3fv(boxv0);
        glVertex3fv(boxv1);
        glVertex3fv(boxv2);
        glVertex3fv(boxv3);

        glColor4f(1.0, 1.0, 0.0, ALPHA);
        glVertex3fv(boxv0);
        glVertex3fv(boxv4);
        glVertex3fv(boxv5);
        glVertex3fv(boxv1);

        glColor4f(0.0, 1.0, 1.0, ALPHA);
        glVertex3fv(boxv2);
        glVertex3fv(boxv6);
        glVertex3fv(boxv7);
        glVertex3fv(boxv3);

        glColor4f(1.0, 0.0, 0.0, ALPHA);
        glVertex3fv(boxv4);
        glVertex3fv(boxv5);
        glVertex3fv(boxv6);
        glVertex3fv(boxv7);

        glColor4f(1.0, 0.0, 1.0, ALPHA);
        glVertex3fv(boxv0);
```

```

    glVertex3fv(boxv3);
    glVertex3fv(boxv7);
    glVertex3fv(boxv4);

    glColor4f(0.0, 1.0, 0.0, ALPHA);
    glVertex3fv(boxv1);
    glVertex3fv(boxv5);
    glVertex3fv(boxv6);
    glVertex3fv(boxv2);
    glEnd();

    glColor3f(1.0, 1.0, 1.0);
    glBegin(GL_LINES);
    glVertex3fv(boxv0);
    glVertex3fv(boxv1);

    glVertex3fv(boxv1);
    glVertex3fv(boxv2);

    glVertex3fv(boxv2);
    glVertex3fv(boxv3);

    glVertex3fv(boxv3);
    glVertex3fv(boxv0);

    glVertex3fv(boxv4);
    glVertex3fv(boxv5);

    glVertex3fv(boxv5);
    glVertex3fv(boxv6);

    glVertex3fv(boxv6);
    glVertex3fv(boxv7);

    glVertex3fv(boxv7);
    glVertex3fv(boxv4);

    glVertex3fv(boxv0);
    glVertex3fv(boxv4);

    glVertex3fv(boxv1);
    glVertex3fv(boxv5);

    glVertex3fv(boxv2);
    glVertex3fv(boxv6);

    glVertex3fv(boxv3);
    glVertex3fv(boxv7);
    glEnd();
} // drawCube

void CubeView::draw() {
    if (!valid()) {
        glLoadIdentity();
        glViewport(0, 0, pixel_w(), pixel_h());
        glOrtho(-10, 10, -10, 10, -20050, 10000);
        glEnable(GL_BLEND);
        glBlendFunc(GL_SRC_ALPHA, GL_ONE_MINUS_SRC_ALPHA);
    }

    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);

    glPushMatrix();

    glTranslatef((GLfloat)xshift, (GLfloat)yshift, 0);
    glRotatef((GLfloat)hAng, 0, 1, 0);
    glRotatef((GLfloat)vAng, 1, 0, 0);
    glScalef(float(size), float(size), float(size));

    drawCube();

    glPopMatrix();
}

```

1.12.5.2 The CubeViewUI Class

We will completely construct a window to display and control the CubeView defined in the previous section using FLUID.

Defining the CubeViewUI Class

Once you have started FLUID, the first step in defining a class is to create a new class within FLUID using the **New->Code->Class** menu item. Name the class "CubeViewUI" and leave the subclass blank. We do not need any inheritance for this window. You should see the new class declaration in the FLUID browser window.

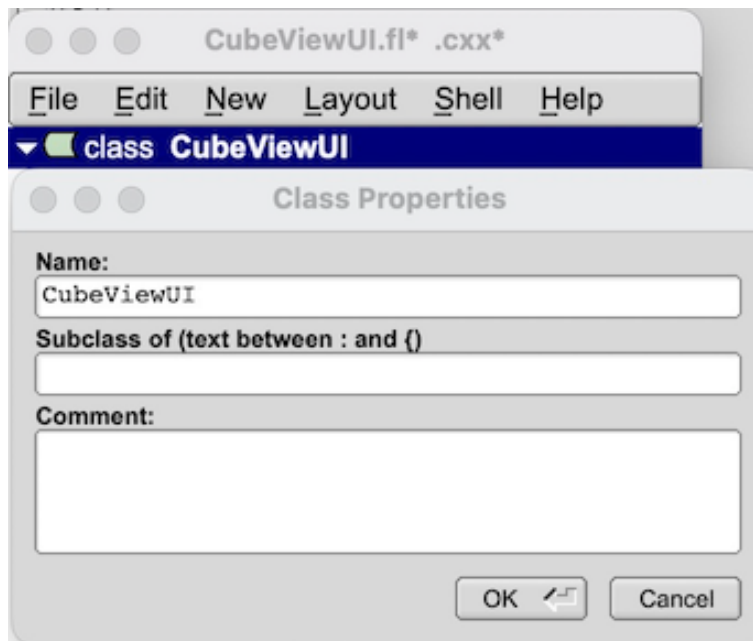


Figure 1.30 FLUID file for CubeView

Adding the Class Constructor

Click on the CubeViewUI class in the FLUID window and add a new method by selecting **New->Code->Function/Method**. The name of the function will also be CubeViewUI. FLUID will understand that this will be the constructor for the class and will generate the appropriate code. Make sure you declare the constructor public.

Then add a window to the CubeViewUI class. Highlight the name of the constructor in the FLUID browser window and click on **New->Group->Window**. In a similar manner add the following to the CubeViewUI constructor:

- A horizontal roller named `hrot`
- A vertical roller named `vrot`
- A horizontal slider named `xpan`
- A vertical slider named `ypan`
- A horizontal value slider named `zoom`

None of these additions need be public. And they shouldn't be unless you plan to expose them as part of the interface for CubeViewUI.

When you are finished you should have something like this:

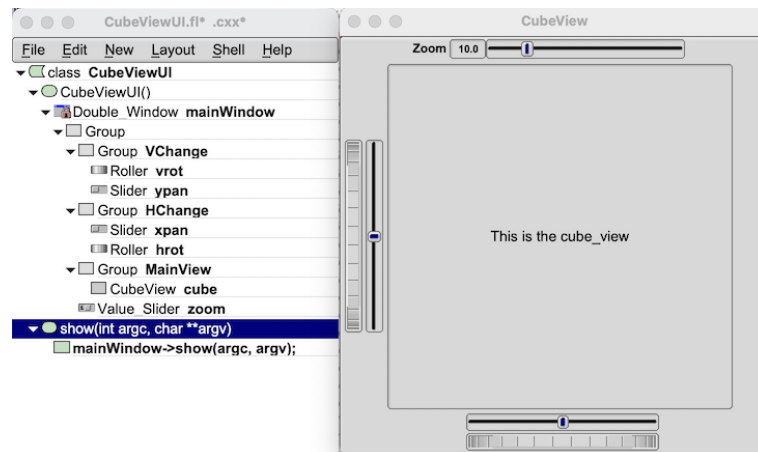


Figure 1.31 FLUID window containing CubeView demo

We will talk about the `show()` method that is highlighted shortly.

Adding the CubeView Widget

What we have is nice, but does little to show our cube. We have already defined the `CubeView` class and we would like to show it within the `CubeViewUI`.

The `Box` properties window will appear. The key to letting `CubeViewUI` display `CubeView` is to enter `CubeView` in the **Class:** text entry box. This tells FLUID that it is not an `FL_Box`, but a similar widget with the same constructor. Use **New->Other->Box** to add a square box to the main window. This will be no ordinary box, however.

The `Box` properties window will appear. The key to letting `CubeViewUI` display `CubeView` is to enter `CubeView` in the **Class:** text entry box. This tells FLUID that it is not an `FL_Box`, but a similar widget with the same constructor.

In the **Extra Code:** field enter `#include "CubeView.h"`

This `#include` is important, as we have just included `CubeView` as a member of `CubeViewUI`, so any public `CubeView` methods are now available to `CubeViewUI`.

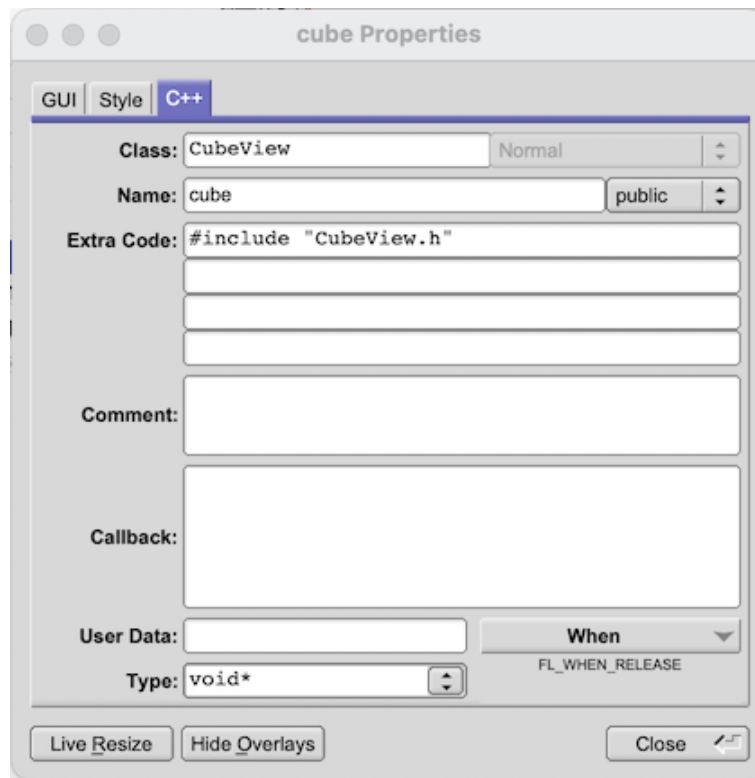


Figure 1.32 CubeView methods

Defining the Callbacks

Each of the widgets we defined before adding CubeView can have callbacks that call CubeView methods. You can call an external function or put a short amount of code in the **Callback** field of the widget panel. For example, the callback for the `ypan` slider is:

```
cube->pany(((Fl_Slider *)o)->value());
cube->redraw();
```

We call `cube->redraw()` after changing the value to update the CubeView window. CubeView could easily be modified to do this, but it is nice to keep this exposed. In the case where you may want to do more than one view change only redrawing once saves a lot of time.

There is no reason to wait until after you have added CubeView to enter these callbacks. FLUID assumes you are smart enough not to refer to members or functions that don't exist.

Adding a Class Method

You can add class methods within FLUID that have nothing to do with the GUI. As an example add a `show` function so that CubeViewUI can actually appear on the screen.

Make sure the top level CubeViewUI is selected and select **New->Code->Function/Method**. Just use the name `show()`. We don't need a return value here, and since we will not be adding any widgets to this method FLUID will assign it a return type of `void`.

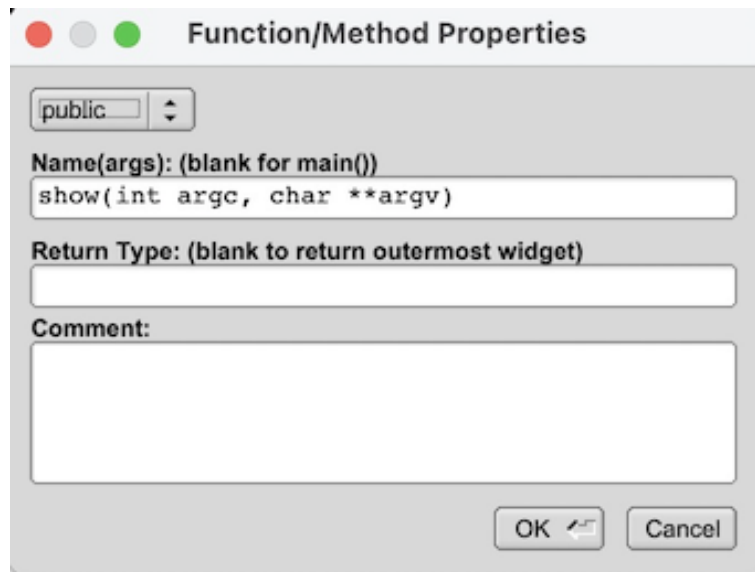


Figure 1.33 CubeView constructor

Once the new method has been added, highlight its name and select **New->Code->Code**. Enter the method's code in the code window.

1.12.5.3 Adding Constructor Initialization Code

If you need to add code to initialize a class, for example setting initial values of the horizontal and vertical angles in the CubeView, you can simply highlight the constructor and select **New->Code->Code**. Add any required code.

1.12.5.4 Generating the Code

Now that we have completely defined the CubeViewUI, we have to generate the code. There is one last trick to ensure this all works. Open the preferences dialog from **Edit->Preferences**.

At the bottom of the preferences dialog box is the key: **"Include Header from Code"**. Select that option and set your desired file extensions and you are in business. You can include the CubeViewUI.h (or whatever extension you prefer) as you would any other C++ class.

1.12.6 FLUID Reference

The following sections describe each of the windows in FLUID.

1.12.6.1 The Widget Browser

The main window shows a menu bar and a scrolling browser of all the defined widgets. The name of the `.fl` file being edited is shown in the window title.

The widgets are stored in a hierarchy. You can open and close a level by clicking the "triangle" at the left of a widget. The leftmost widgets are the *parents*, and all the widgets listed below them are their *children*. Parents don't have to have any children.

The top level of the hierarchy is composed of *functions* and *classes*. Each of these will produce a single C++ public function or class in the output `.cxx` file. Calling the function or instantiating the class will create all of the child widgets.

The second level of the hierarchy contains the *windows*. Each of these produces an instance of class `Fl_Window`.

Below that are either *widgets* (subclasses of `Fl_Widget`) or *groups* of widgets (including other groups). Plain groups are for layout, navigation, and resize purposes. *Tab groups* provide the well-known file-card tab interface.

Widgets are shown in the browser by either their *name* (such as "main_panel" in the example), or by their *type* and *label* (such as "Button "the green"").

You *select* widgets by clicking on their names, which highlights them (you can also select widgets from any displayed window). You can select many widgets by dragging the mouse across them, or by using Shift+Click to toggle them on and off. To select no widgets, click in the blank area under the last widget. Note that hidden children may be selected even when there is no visual indication of this.

You *open* widgets by double-clicking on them, or (to open several widgets you have picked) by typing the F1 key. A control panel will appear so you can change the widget(s).

1.12.6.2 Menu Items

The menu bar at the top is duplicated as a pop-up menu on any displayed window. The shortcuts for all the menu items work in any window. The menu items are:

File/Open... (Ctrl+o)

Discards the current editing session and reads in a different `.fl` file. You are asked for confirmation if you have changed the current file.

FLUID can also read `.fd` files produced by the Forms and XForms "fdesign" programs. It is best to File/↔ Merge them instead of opening them. FLUID does not understand everything in a `.fd` file, and will print a warning message on the controlling terminal for all data it does not understand. You will probably need to edit the resulting setup to fix these errors. Be careful not to save the file without changing the name, as FLUID will write over the `.fd` file with its own format, which fdesign cannot read!

File/Insert... (Ctrl+i)

Inserts the contents of another `.fl` file, without changing the name of the current `.fl` file. All the functions (even if they have the same names as the current ones) are added, and you will have to use cut/paste to put the widgets where you want.

File/Save (Ctrl+s)

Writes the current data to the `.fl` file. If the file is unnamed then FLUID will ask for a filename.

File/Save As... (Ctrl+Shift+S)

Asks for a new filename and saves the file.

File/Save A Copy...

Save a copy of the `.fl` data to a different file.

File/Revert...

Revert the `.fl` data to a previously saved state.

File/New From Template...

Create a new user interface design from a previously saved template. This can be useful for including a predefined enterprise copyright message for projects, or for managing boilerplate code for repeating project code.

File/Save As Template...

Save the current project as a starting point for future projects.

File/Print... (Ctrl-P)

Generate a printout containing all currently open windows within your project.

File/Write Code (Ctrl+Shift+C)

"Compiles" the data into a `.cxx` and `.h` file. These are exactly the same as the files you get when you run FLUID with the `-c` switch.

The output file names are the same as the `.fl` file, with the leading directory and trailing `.fl` stripped, and `.h` or `.cxx` appended.

File/Write Strings (Ctrl+Shift+W)

Writes a message file for all of the text labels defined in the current file.

The output file name is the same as the `.fl` file, with the leading directory and trailing `.fl` stripped, and `.txt`, `.po`, or `.msg` appended depending on the [Internationalization Mode](#).

File/Quit (Ctrl+q)

Exits FLUID. You are asked for confirmation if you have changed the current file.

Edit/Undo (Ctrl+z) and Redo (Shift+Ctrl+z)

FLUID saves the project state for undo and redo operations after every major change.

Edit/Cut (Ctrl+x)

Deletes the selected widgets and all of their children. These are saved to a "clipboard" file and can be pasted back into any FLUID window.

Edit/Copy (Ctrl+c)

Copies the selected widgets and all of their children to the "clipboard" file.

Edit/Paste (Ctrl+v)

Pastes the widgets from the clipboard file.

If the widget is a window, it is added to whatever function is selected, or contained in the current selection.

If the widget is a normal widget, it is added to whatever window or group is selected. If none is, it is added to the window or group that is the parent of the current selection.

To avoid confusion, it is best to select exactly one widget before doing a paste.

Cut/paste is the only way to change the parent of a widget.

Edit/Select All (Ctrl+a)

Selects all widgets in the same group as the current selection.

If they are all selected already then this selects all widgets in that group's parent. Repeatedly typing Ctrl+a will select larger and larger groups of widgets until everything is selected.

Edit/Properties... (F1 or double click)

Displays the current widget in the attributes panel. If the widget is a window and it is not visible then the window is shown instead.

Edit/Sort

Sorts the selected widgets into left to right, top to bottom order. You need to do this to make navigation keys in FLTK work correctly. You may then fine-tune the sorting with "Earlier" and "Later". This does not affect the positions of windows or functions.

Edit/Earlier (F2)

Moves all of the selected widgets one earlier in order among the children of their parent (if possible). This will affect navigation order, and if the widgets overlap it will affect how they draw, as the later widget is drawn on top of the earlier one. You can also use this to reorder functions, classes, and windows within functions.

Edit/Later (F3)

Moves all of the selected widgets one later in order among the children of their parent (if possible).

Edit/Group (F7)

Creates a new [FL_Group](#) and make all the currently selected widgets children of it.

Edit/Ungroup (F8)

Deletes the parent group if all the children of a group are selected.

Edit/Show or Hide Overlays (Ctrl+Shift+O)

Toggles the display of the red overlays off, without changing the selection. This makes it easier to see box borders and how the layout looks. The overlays will be forced back on if you change the selection.

Edit/Show or Hide Guides (Ctrl+Shift+G)

Guides can be used to arrange a widget layout easily and consistently. They indicating preferred widget positions and sizes with user definable margins, grids, and gap sizes. See the "Layout" tab in the "Settings" dialog.

This menu item enables and disable guides and the snapping action when dragging widgets and their borders.

Edit/Show or Hide Restricted (Ctrl+Shift+R)

It is recommended to ensure that user interface elements within FLTK do not exceed the size of their container group or overlap with each other. By activating this button, a hatch pattern is enabled, visually highlighting areas where restricted or undefined behavior may occur.

Edit/Show or Hide Widget Bin (Alt+B)

The widget bin provides quick access to all widget types supported by FLUID. Layouts can be created by clicking on elements in the widget bin, or by dragging them from the bin to their position within the layout. This button shows or hides the widget bin.

Edit/Show or Hide Source Code (Shift+Alt+S)

This button shows or hides the source code preview window. Any change to the layout or code in the layout editores can be previewed and verified immediatly in the Code View window.

Edit/Settings... (Alt+p)

Displays the FLUID settings panel. The settings panel contains tabs for general FLUID settings, project setting, layout preferences, custom shell commands, and the internationalisation settings for *GNU Gettext* and *POSIX catgets*.

Under the "Project" tab you control the extensions or names of the files that are generated by FLUID. If you check the "Include Header from Code" button the code file will include the header file automatically.

Under the "Locale" tab are the [internationalization](#) options, described later in this chapter.

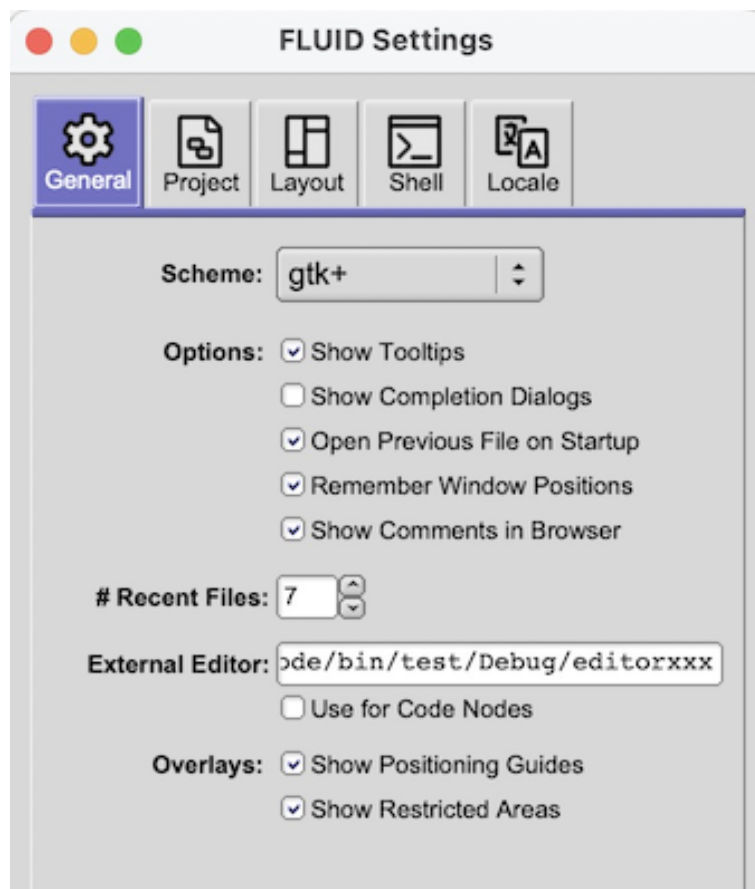


Figure 1.34 FLUID General Settings Tab

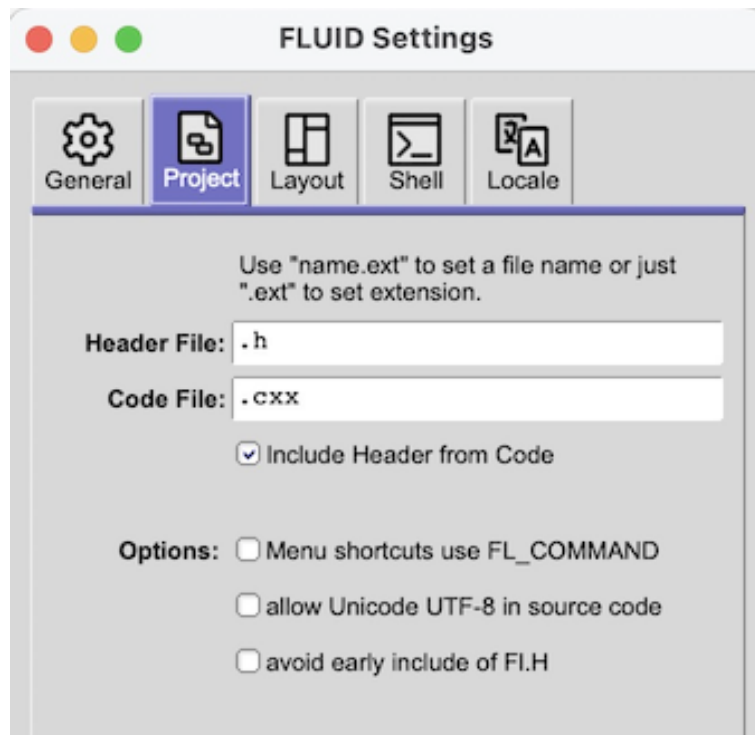


Figure 1.35 FLUID Project Settings Tab

New/Code/Function

Creates a new C function. You will be asked for a name for the function. This name should be a legal C++ function template, without the return type. You can pass arguments which can be referred to by code you type into the individual widgets.

If the function contains any unnamed windows, it will be declared as returning an [Fl_Window](#) pointer. The unnamed window will be returned from it (more than one unnamed window is useless). If the function contains only named windows, it will be declared as returning nothing (`void`).

It is possible to make the `.cxx` output be a self-contained program that can be compiled and executed. This is done by deleting the function name so `main(argc, argv)` is used. The function will call `show()` on all the windows it creates and then call `Fl::run()`. This can also be used to test resize behavior or other parts of the user interface.

You can change the function name by double-clicking on the function.

New/Window

Creates a new [FL_Window](#) widget. The window is added to the currently selected function, or to the function containing the currently selected item. The window will appear, sized to 100x100. You can resize it to whatever size you require.

The widget panel will also appear and is described later in this chapter.

New/...

All other items on the New menu are subclasses of [FL_Widget](#). Creating them will add them to the currently selected group or window, or the group or window containing the currently selected widget. The initial dimensions and position are chosen by copying the current widget, if possible.

When you create the widget you will get the widget's control panel, which is described later in this chapter.

Layout/Align/...

Align all selected widgets to the first widget in the selection.

Layout/Space Evenly/...

Space all selected widgets evenly inside the selected space. Widgets will be sorted from first to last.

Layout/Make Same Size/...

Make all selected widgets the same size as the first selected widget.

Layout/Center in Group/...

Center all selected widgets relative to their parent widget

Layout/Grid and Size Settings... (Ctrl+g)

Displays the grid settings panel.

This panel controls dimensions that all widgets snap to when you move and resize them, and for the "snap" which is how far a widget has to be dragged from its original position to actually change.

Layout preferences are defined using margins to parent groups and window, gaps between widget, and /orr by overlaying a grid over a group or window. A layout comes as a suite of three presets, one for the main application window, one for dialog boxes, and one for toolboxes.

FLUID comes with two include layout suites. `FLTK` was used to design FLUID and other included apps, and `Grid` is a more ridgid grid layout. Users can add more suites, import and export them, and include them into their `.fl` project files.

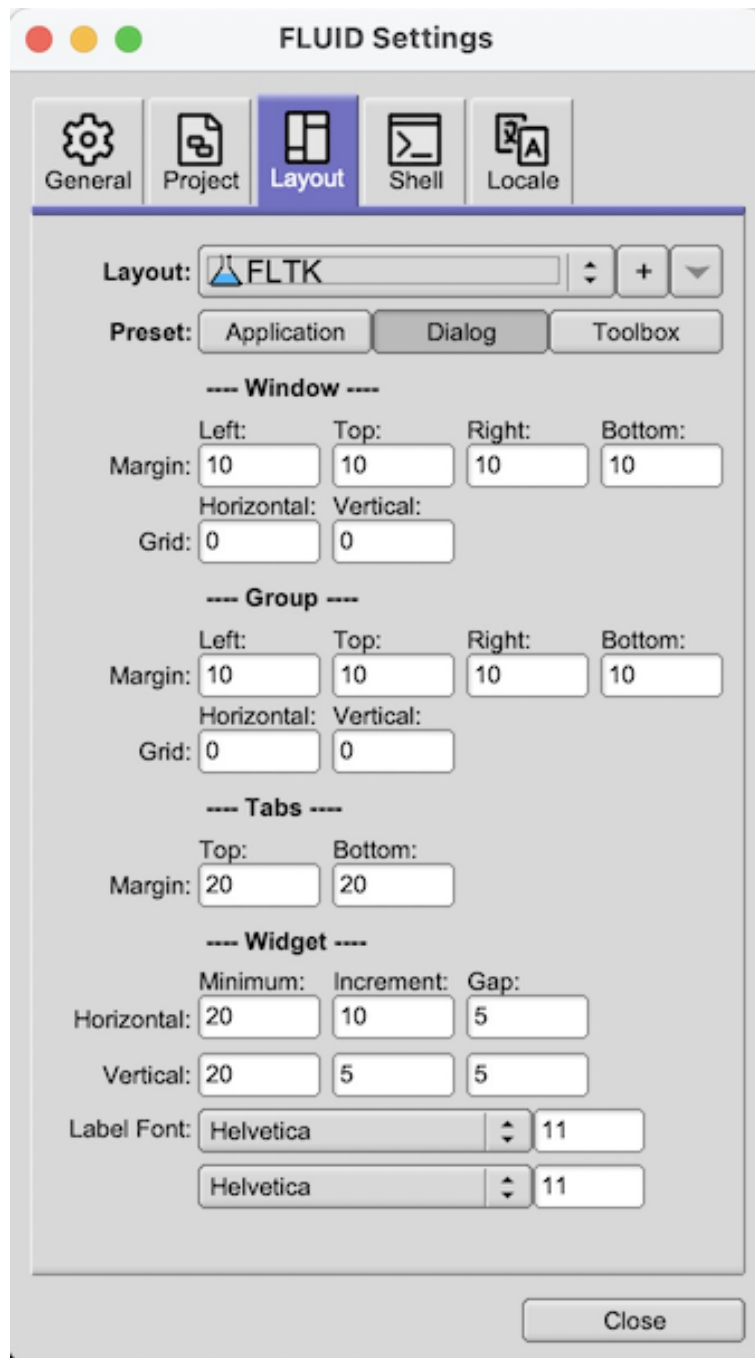


Figure 1.36 FLUID Layout/Grid Settings Window

Shell/Execute Command... (Alt+x)

Displays the shell command panel. The shell command is commonly used to run a 'make' script to compile the FLTK output.

Shell/Execute Again (Alt+g)

Run the shell command again.

Help/Repid development with FLUID

Shows this chapter of the manual.

Help/FLTK Programmers Manual

Shows the contents page of the manual

Help/About FLUID

Pops up a panel showing the version of FLUID.

1.12.6.3 The Widget Panel

When you double-click on a widget or a set of widgets you will get the "widget attribute panel".

When you change attributes using this panel, the changes are reflected immediately in the window. It is useful to hit the "Hide Overlays" button (or type Ctrl+Shift+O) to hide the red overlay so you can see the widgets more accurately, especially when setting the box type.

If you have several widgets selected, they may have different values for the fields. In this case the value for *one* of the widgets is shown. But if you change this value, *all* of the selected widgets are changed to the new value.

Hitting "OK" makes the changes permanent. Selecting a different widget also makes the changes permanent. FLUID checks for simple syntax errors such as mismatched parenthesis in any code before saving any text.

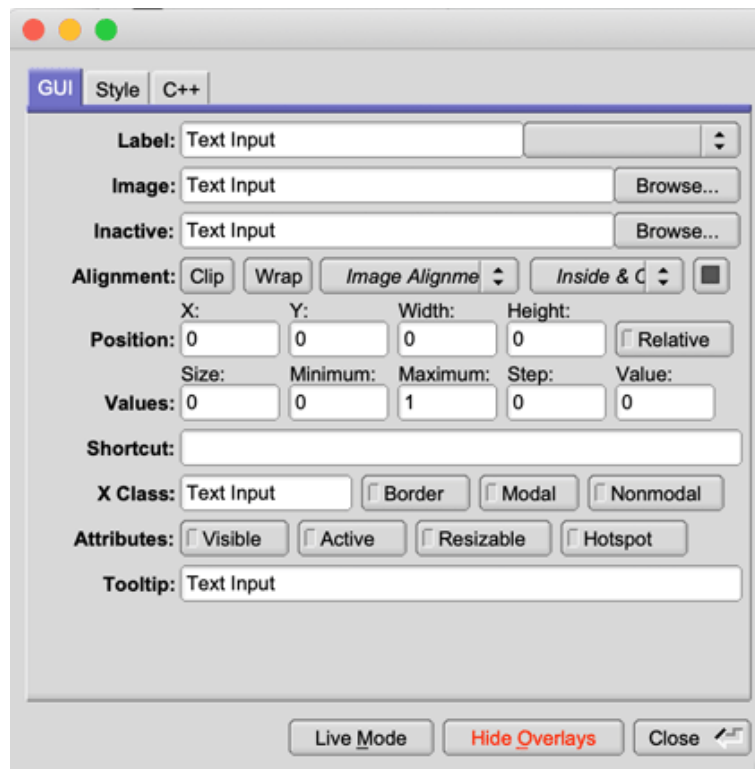


Figure 1.37 The FLUID widget GUI attributes

1.12.7 GUI Attributes

Not all fields in the Widget attributes dialog will be visible

for all types of widgets.

Label (text field)

String to print next to or inside the button. You can put newlines into the string to make multiple lines. The easiest way is by typing Ctrl+j.

[Symbols](#) can be added to the label using the at sign ("@").

Label (pull down menu)

How to draw the label. Normal, shadowed, engraved, and embossed change the appearance of the text.

Image

The active image for the widget. Click on the **Browse...** button to pick an image file using the file chooser.

Inactive

The inactive image for the widget. Click on the **Browse...** button to pick an image file using the file chooser.

Alignment (buttons)

Where to draw the label. The arrows put it on that side of the widget, you can combine them to put it in the corner. The "box" button puts the label inside the widget, rather than outside.

The **clip** button clips the label to the widget box, the **wrap** button wraps any text in the label, and the **text image** button puts the text over the image instead of under the image.

Position (text fields)

The position fields show the current position and size of the widget box. Enter new values to move and/or resize a widget.

These fields understand basic math and variables. Appending +10 to the **X** coordinate will move a widget 10 units to the right without having to reenter the value. Entering the formula $w+3$ in the **Width** field will widen all selected Widgets by 3 units. The formula $py+i*20$ in the **Y** field will order all selected widgets vertically in their group by increments of 20 units.

Name	Value
i	zero based counter of selected widgets
x, y, w, h	position and size of the current widget
px, py, pw, ph	dimensions of the parent widget
sx, sy, sw, sh	dimensions of the previous sibling
cx, cy, cw, ch	bounding box of all children

Values (text fields)

The values and limits of the current widget. Depending on the type of widget, some or all of these fields may be inactive.

Shortcut

The shortcut key to activate the widget. Click on the shortcut button and press any key sequence to set the shortcut.

Attributes (buttons)

The **Visible** button controls whether the widget is visible (on) or hidden (off) initially. Don't change this for windows or for the immediate children of a Tabs group.

The **Active** button controls whether the widget is activated (on) or deactivated (off) initially. Most widgets appear greyed out when deactivated.

The **Resizable** button controls whether the window is resizeable. In addition all the size changes of a window or group will go "into" the resizable child. If you have a large data display surrounded by buttons, you probably want that data area to be resizable. You can get more complex behavior by making invisible boxes the resizable widget, or by using hierarchies of groups. Unfortunately the only way to test it is to compile the program. Resizing the FLUID window is *not* the same as what will happen in the user program.

The **Hotspot** button causes the parent window to be positioned with that widget centered on the mouse. This position is determined *when the FLUID function is called*, so you should call it immediately before showing the window. If you want the window to hide and then reappear at a new position, you should have your program set the hotspot itself just before `show()`.

The **Border** button turns the window manager border on or off. On most window managers you will have to close the window and reopen it to see the effect.

X Class (text field)

The string typed into here is passed to the X window manager as the class. This can change the icon or window decorations. On most (all?) window managers you will have to close the window and reopen it to see the effect.

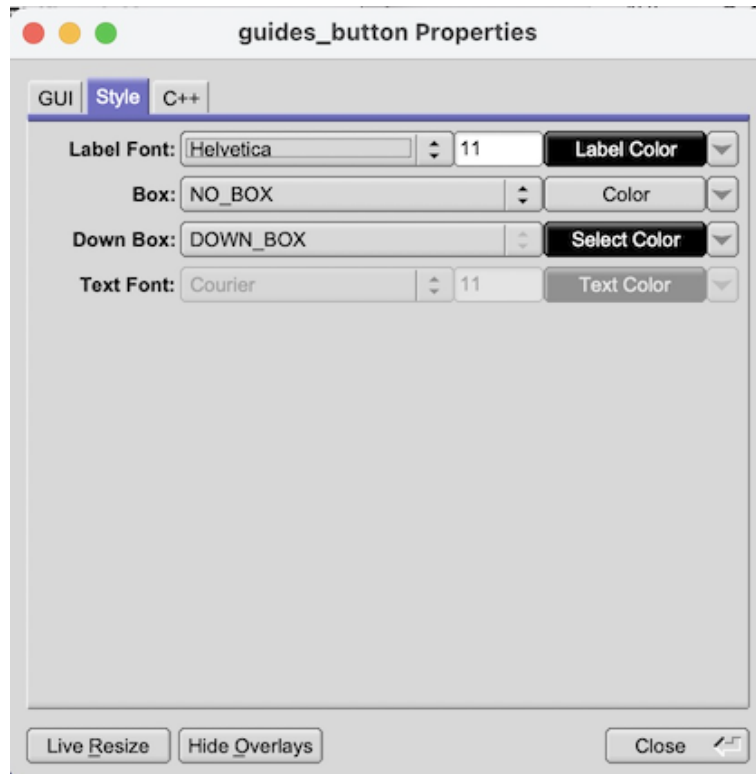


Figure 1.38 The FLUID widget Style attributes

1.12.7.1 Style Attributes

Label Font (pulldown menu)

Font to draw the label in. Ignored by symbols, bitmaps, and pixmaps. Your program can change the actual font used by these "slots" in case you want some font other than the 16 provided.

Label Size (pulldown menu)

Pixel size (height) for the font to draw the label in. Ignored by symbols, bitmaps, and pixmaps. To see the result without dismissing the panel, type the new number and then Tab.

Label Color (button)

Color to draw the label. Ignored by pixmaps (bitmaps, however, do use this color as the foreground color).

Box (pulldown menu)

The boxtype to draw as a background for the widget.

Many widgets will work, and draw faster, with a "frame" instead of a "box". A frame does not draw the colored interior, leaving whatever was already there visible. Be careful, as FLUID may draw this ok but the real program may leave unwanted stuff inside the widget.

If a window is filled with child widgets, you can speed up redrawing by changing the window's box type to "NO_BOX". FLUID will display a checkerboard for any areas that are not colored in by boxes. Note that this checkerboard is not drawn by the resulting program. Instead random garbage will be displayed.

Down Box (pulldown menu)

The boxtype to draw when a button is pressed or for some parts of other widgets like scrollbars and valuator.

Color (button)

The color to draw the box with.

Select Color (button)

Some widgets will use this color for certain parts. FLUID does not always show the result of this: this is the color buttons draw in when pushed down, and the color of input fields when they have the focus.

Text Font, Size, and Color

Some widgets display text, such as input fields, pull-down menus, and browsers.

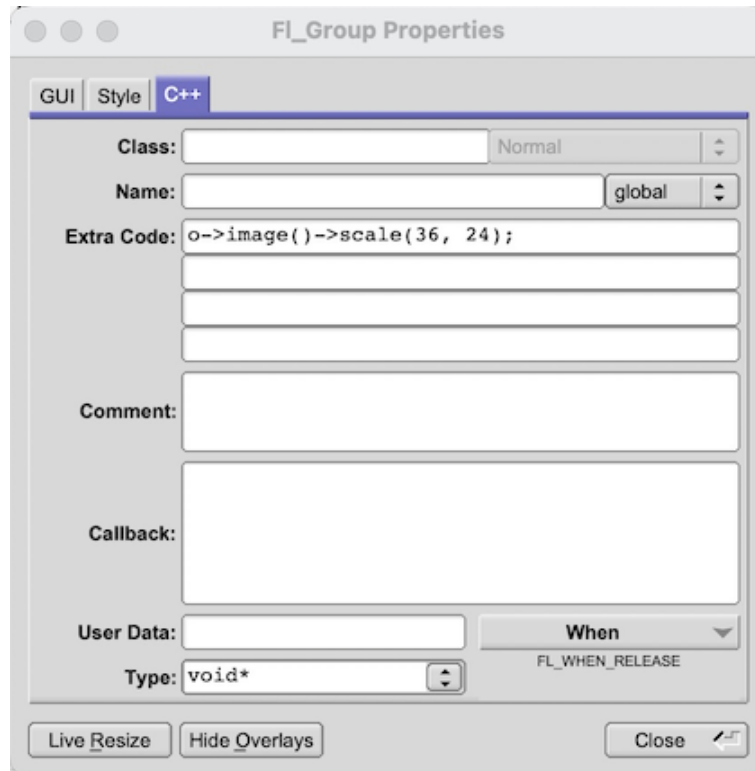


Figure 1.39 The FLUID widget C++ attributes

1.12.7.2 C++ Attributes

Class

This is how you use your own subclasses of [FI_Widget](#). Whatever identifier you type in here will be the class that is instantiated.

In addition, no `#include` header file is put in the `.h` file. You must provide a `#include` line as the first line of the "Extra Code" which declares your subclass.

The class must be similar to the class you are spoofing. It does not have to be a subclass. It is sometimes useful to change this to another FLTK class. For windows you can select either `Single` or `Double` in the drop-down box right to the "Class:" field to get a normal window ([FI_Window](#)) or a double-buffered window ([FI_Double_Window](#)), respectively.

Type (upper-right pulldown menu)

Some classes have subtypes that modify their appearance or behavior. You pick the subtype off of this menu.

Name (text field)

Name of a variable to declare, and to store a pointer to this widget into. This variable will be of type "`<class>*`". If the name is blank then no variable is created.

You can name several widgets with "name[0]", "name[1]", "name[2]", etc. This will cause FLUID to declare an array of pointers. The array is big enough that the highest number found can be stored. All widgets in the array must be the same type.

Public (button)

Controls whether the widget is publicly accessible. When embedding widgets in a C++ class, this controls whether the widget is `public` or `private` in the class. Otherwise it controls whether the widget is declared `static` or global (`extern`).

Extra Code (text fields)

These four fields let you type in literal lines of code to dump into the `.h` or `.cxx` files.

If the text starts with a `#` or the word `extern` then FLUID thinks this is an "include" line, and it is written to the `.h` file. If the same include line occurs several times then only one copy is written.

All other lines are "code" lines. The current widget is pointed to by the local variable `o`. The window being constructed is pointed to by the local variable `w`. You can also access any arguments passed to the function here, and any named widgets that are before this one.

FLUID will check for matching parenthesis, braces, and quotes, but does not do much other error checking. Be careful here, as it may be hard to figure out what widget is producing an error in the compiler. If you need more than four lines you probably should call a function in your own `.cxx` code.

Callback (text field)

This can either be the name of a function, or a small snippet of code. If you enter anything other than letters, numbers, and the underscore then FLUID treats it as code.

A name refers to a function in your own code. It must be declared as `void name (<class>*, void*)`.

A code snippet is inserted into a static function in the `.cxx` output file. The function prototype is `void name(class *o, void *v)` so that you can refer to the widget as `o` and the `user_data()` as `v`. FLUID will check for matching parenthesis, braces, and quotes, but does not do much other error checking. Be careful here, as it may be hard to figure out what widget is producing an error in the compiler.

If the callback is blank then no callback is set.

User Data (text field)

This is a value for the `user_data()` of the widget. If blank the default value of zero is used. This can be any piece of C code that can be cast to a `void` pointer.

Type (text field)

The `void*` in the callback function prototypes is replaced with this. You may want to use `long` for old XForms code. Be warned that anything other than `void*` is not guaranteed to work! However on most architectures other pointer types are ok, and `long` is usually ok, too.

When (pulldown menu)

When to do the callback. This can be **Never**, **Changed**, **Release**, or **Enter Key**. The value of **Enter Key** is only useful for text input fields.

There are other rare but useful values for the `when()` field that are not in the menu. You should use the extra code fields to put these values in.

No Change (button)

The **No Change** button means the callback is done on the matching event even if the data is not changed.

1.12.8 Selecting and Moving Widgets

Double-clicking a window name in the browser will display it, if not displayed yet. From this display you can select widgets, sets of widgets, and move or resize them. To close a window either double-click it or type `ESC`.

To select a widget, click it. To select several widgets drag a rectangle around them. Holding down shift will toggle the selection of the widgets instead.

You cannot pick hidden widgets. You also cannot choose some widgets if they are completely overlapped by later widgets. Use the browser to select these widgets.

The selected widgets are shown with a red "overlay" line around them. You can move the widgets by dragging this box. Or you can resize them by dragging the outer edges and corners. Hold down the `Alt` key while dragging the mouse to defeat the snap-to-grid effect for fine positioning.

If there is a tab box displayed you can change which child is visible by clicking on the file tabs. The child you pick is selected.

The arrow, tab, and shift+tab keys "navigate" the selection. Left, right, tab, or shift+tab move to the next or previous widgets in the hierarchy. Hit the right arrow enough and you will select every widget in the window. Up/down widgets move to the previous/next widgets that overlap horizontally. If the navigation does not seem to work you probably need to "Sort" the widgets. This is important if you have input fields, as FLTK uses the same rules when using arrow keys to move between input fields.

To "open" a widget, double click it. To open several widgets select them and then type `F1` or pick "Edit/Open" off the pop-up menu.

Type `Ctrl+o` to temporarily toggle the overlay off without changing the selection, so you can see the widget borders.

You can resize the window by using the window manager border controls. FLTK will attempt to round the window size to the nearest multiple of the grid size and makes it big enough to contain all the widgets (it does this using illegal X methods, so it is possible it will barf with some window managers!). Notice that the actual window in your program may not be resizable, and if it is, the effect on child widgets may be different.

The panel for the window (which you get by double-clicking it) is almost identical to the panel for any other [FL_Widget](#). There are three extra items:

1.12.9 Image Labels

The *contents* of the image files in the **Image** and **Inactive** text fields are written to the `.cxx` file. If many widgets share the same image then only one copy is written. Since the image data is embedded in the generated source code, you need only distribute the C++ code and not the image files themselves.

However, the *filenames* are stored in the `.fl` file so you will need the image files as well to read the `.fl` file. Filenames are relative to the location of the `.fl` file and not necessarily the current directory. We recommend you either put the images in the same directory as the `.fl` file, or use absolute path names.

Notes for All Image Types

FLUID runs using the default visual of your X server. This may be 8 bits, which will give you dithered images. You may get better results in your actual program by adding the code `Fl::visual(FL_RGB)` to your code right before the first window is displayed.

All widgets with the same image on them share the same code and source X pixmap. Thus once you have put an image on a widget, it is nearly free to put the same image on many other widgets.

If you edit an image at the same time you are using it in FLUID, the only way to convince FLUID to read the image file again is to remove the image from all widgets that are using it or re-load the `.fl` file.

Don't rely on how FLTK crops images that are outside the widget, as this may change in future versions! The cropping of inside labels will probably be unchanged.

To more accurately place images, make a new "box" widget and put the image in that as the label.

XBM (X Bitmap) Files

FLUID reads X bitmap files which use C source code to define a bitmap. Sometimes they are stored with the ".h" or ".bm" extension rather than the standard ".xpm" extension.

FLUID writes code to construct an `Fl_Bitmap` image and use it to label the widget. The '1' bits in the bitmap are drawn using the label color of the widget. You can change this color in the FLUID widget attributes panel. The '0' bits are transparent.

The program "bitmap" on the X distribution does an adequate job of editing bitmaps.

XPM (X Pixmap) Files

FLUID reads X pixmap files as used by the `libxpm` library. These files use C source code to define a pixmap. The filenames usually have the ".xpm" extension.

FLUID writes code to construct an `Fl_Pixmap` image and use it to label the widget. The label color of the widget is ignored, even for 2-color images that could be a bitmap. XPM files can mark a single color as being transparent, and FLTK uses this information to generate a transparency mask for the image.

We have not found any good editors for small iconic pictures. For pixmaps we have used [XPaint](#) and the KDE icon editor.

BMP Files

FLUID reads Windows BMP image files which are often used in Windows applications for icons. FLUID converts BMP files into (modified) XPM format and uses an [FI_BMP_Image](#) image to label the widget. Transparency is handled the same as for XPM files. All image data is uncompressed when written to the source file, so the code may be much bigger than the `.bmp` file.

GIF Files

FLUID reads GIF image files which are often used in HTML documents to make icons. FLUID converts GIF files into (modified) XPM format and uses an [FI_GIF_Image](#) image to label the widget. Transparency is handled the same as for XPM files. All image data is uncompressed when written to the source file, so the code may be much bigger than the `.gif` file. Only the first image of an animated GIF file is used.

JPEG Files

If FLTK is compiled with JPEG support, FLUID can read JPEG image files which are often used for digital photos. FLUID uses an [FI_JPEG_Image](#) image to label the widget, and writes uncompressed RGB or grayscale data to the source file.

PNG (Portable Network Graphics) Files

If FLTK is compiled with PNG support, FLUID can read PNG image files which are often used in HTML documents. FLUID uses a [FI_PNG_Image](#) image to label the widget, and writes uncompressed RGB or grayscale data to the source file. PNG images can provide a full alpha channel for partial transparency, and FLTK supports this as best as possible on each platform.

1.12.10 FLUID Templates

Fluid can store a number of project templates. Project templates are great for storing often used boilerplate code for fast access. A common use would be projects with readily prepared copyright messages.

A sample template for FLTK projects is included with Fluid.

Choose "File > New From Template..." to create a new project based on a template file. In the template dialog, select one of the existing templates. All occurrences of the word "@INSTANCE@" in the template are replaced with the text in the "Instance" field. To create the new project click "New".

To add your current project as a new template, choose "File > Save As Template...", fill in a name, and click "Save".

To delete a template, open the template dialog using "New from Template" or "Save As Template", then select any existing template, and click "Delete Template".

1.12.11 Internationalization with FLUID

FLUID supports internationalization (I18N for short) of label strings and tooltips used by widgets. The GNU gettext option also supports deferred translation of statically initialised menu item labels. The preferences window (`Ctrl+p`) provides access to the I18N options.

1.12.11.1 I18N Methods

FLUID supports three methods of I18N: none, GNU gettext, and POSIX catgets. The "none" method is the default and just passes the label strings as-is to the widget constructors.

The "GNU gettext" method uses GNU gettext (or a similar text-based I18N library) to retrieve a localized string before calling the widget constructor.

The "POSIX catgets" method uses the POSIX catgets function to retrieve a numbered message from a message catalog before calling the widget constructor.

1.12.11.2 Using GNU gettext for I18N

FLUID's code support for GNU gettext is limited to calling a function or macro to retrieve the localized label; you still need to call `setlocale()` and `textdomain()` or `bindtextdomain()` to select the appropriate language and message file.

To use GNU gettext for I18N, open the preferences window and choose "GNU gettext" from the **Use:** chooser. Four new input fields will then appear to control the include file and function/macro names to use when retrieving localized label strings in dynamic allocation and static initialisation.

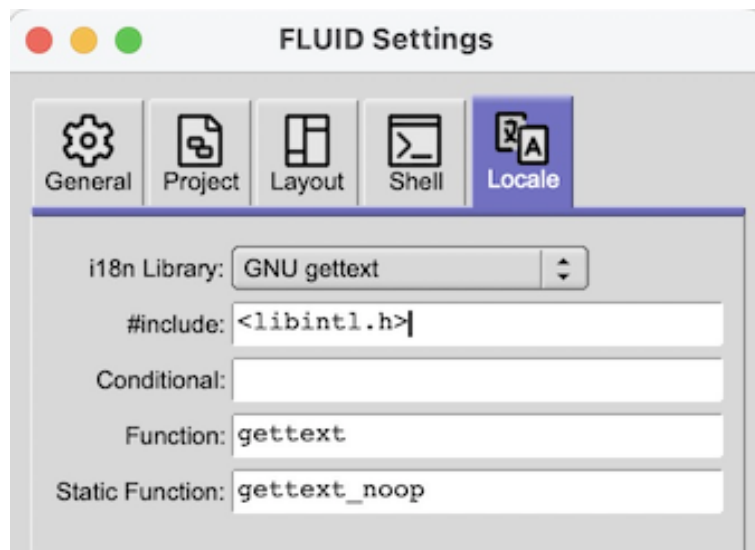


Figure 1.40 Internationalization using GNU gettext

The **#include** field controls the header file to include for I18N; by default this is `<libintl.h>`, the standard I18N file for GNU gettext.

If the **Conditional:** field contains a macro name, i18n will only be compiled into the product if this macro is defined. The build system should define the macro only if all required headers and libraries are available. If the macro is not defined, no headers are included and `gettext` passes text through untranslated.

The **Function:** field controls the function (or macro) that will retrieve the localized message; by default the `gettext` function will be called.

The **Static Function:** field names a macro that will mark static text fields for extraction with the `xgettext` tool. The default macro name is `gettext_noop` and will be defined as `#define gettext_noop(text) text` right after the `#include` statement. Fluid will do its best to call `gettext` on static texts later, after the `textdomain` was set by the user.

See also

[GNU gettext special cases](#)

1.12.11.3 Using POSIX catgets for I18N

FLUID's code support for POSIX catgets allows you to use a global message file for all interfaces or a file specific to each `.fl` file; you still need to call `setlocale()` to select the appropriate language.

To use POSIX catgets for I18N, open the preferences window and choose "POSIX catgets" from the **Use:** chooser. Three new input fields will then appear to control the include file, catalog file, and set number for retrieving the localized label strings.

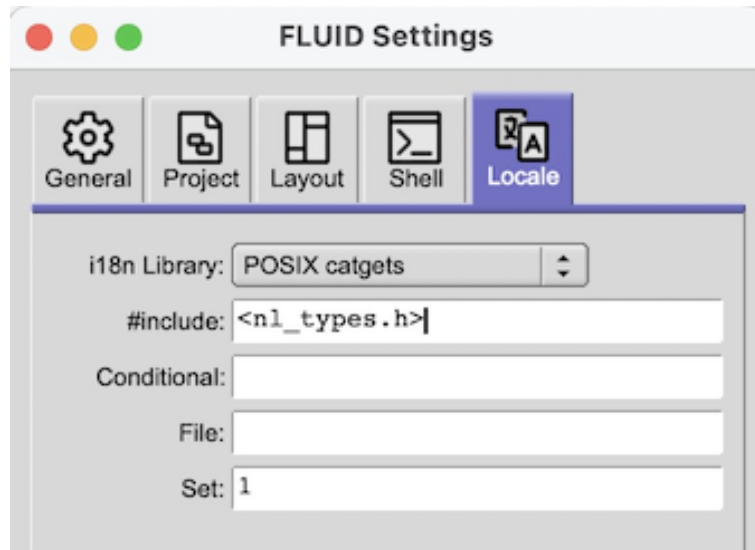


Figure 1.41 Internationalization using POSIX catgets

The **#include** field controls the header file to include for I18N; by default this is `<nl_types.h>`, the standard I18N file for POSIX catgets.

The **File:** field controls the name of the catalog file variable to use when retrieving localized messages; by default the file field is empty which forces a local (static) catalog file to be used for all of the windows defined in your `.fl` file.

The **Set:** field controls the set number in the catalog file. The default set is 1 and rarely needs to be changed.

1.12.12 Known Limitations

Declaration Blocks can be used to temporarily block out already designed code using `#if 0` and `#endif` type construction. This will effectively avoid compilation of blocks of code. However, static code and data generated by this segment (menu items, images, include statements, etc.) will still be generated and likely cause compile-time warnings.

1.12.13 Keyboard Shortcuts

On Apple computers, use the Apple Command key instead of Ctrl.

Key Combo	Function
F1	widget properties dialog
F2	move widget earlier in tree
F3	move widget later in tree
F7	group widgets
F8	ungroup widgets
Delete	delete selected widgets
Ctrl-1..9	load project from history

Key Combo	Function
Alt-1	label text tiny
Alt-2	lLabel text small
Alt-3	label text normal
Alt-4	label text medium
Alt-5	label text large
Alt-6	label text huge
Ctrl-A	select all
Shift-Ctrl-A	select none
Alt-B	widget bin
Ctrl-C	copy widgets
Shift-Ctrl-C	generate C code
Ctrl-G	grid setting dialog
Alt-G	execute again
Shift-Alt-G	FLTK settings dialog
Ctrl-I	insert design into project
Ctrl-N	new design
Shift-Ctrl-N	new design from template
Ctrl-O	open design file
Shift-Ctrl-O	toggle overlays
Ctrl-P	print all windows
Alt-P	project settings
Shift-Alt-P	Fluid settings dialog
Ctrl-Q	quit Fluid
Ctrl-S	save design
Shift-Ctrl-S	save design with new name
Shift-Alt-S	source view window
Ctrl-U	duplicate widgets
Ctrl-V	paste widgets
Shift-Ctrl-W	write text strings
Ctrl-X	cut selected Widgets
Alt-X	show 'execute command' dialog
Ctrl-Z	undo
Shift-Ctrl-Z	redo
Key Combo	Function in interactive Window
LMB	select one widget
Shift-LMB	extend widget selection
Shift-LMB-Drag	window only: resize proportional
Tab	select next
Shift-Tab	select previous
Arrow	move by one unit
Shift-Arrow	resize by one unit
Ctrl-Arrow	move by grid units
Shift-Ctrl-Arrow	resize by grid units

1.12.14 Licenses

FLUID uses graphical images based on the Zendesk Garden Stroke icon set: <https://github.com/zendesk/garden>. Garden Stroke is licensed under the Apache License, Version 2.0: <https://www.apache.org/licenses/LICENSE-2.0.html>.

1.13 FLTK Runtime Options

In this chapter, we will cover how to access and alter settings for applications created using FLTK, both as an administrator and as a regular user.

Subchapters:

- [Runtime Options](#)
- [Obtaining Current Settings](#)
- [Administrative Tool](#)
- [List of Options](#)

1.13.1 Runtime Options

FLTK keeps track of various aspects of the user interface in a system-wide database. Users have the ability to set their own preferences and override default or system settings. For instance, FLTK will display a dotted rectangle around the widget with current focus. This might not be desirable for users who do not use keyboard navigation and do not need the rectangle. This can be turned off by setting the `OPTION_VISIBLE_FOCUS` option to 'off' for that user, which will disable the focus rectangle in all FLTK-based applications.

1.13.2 Obtaining Current Settings

Options are kept in preference files using the signature `Fl_Preferences::CORE_SYSTEM, "fltk.org", "fltk"` for system-wide settings and `Fl_Preferences::CORE_USER, "fltk.org", "fltk"` for individual users. They can be accessed by using the function `bool Fl::option(Fl_Option opt)`. If an application needs to temporarily override user or system settings, it can use the function `void option(Fl_Option opt, bool val)`.

To make changes to options permanently, FLTK provides an administrative tool called `fltk-options`.

1.13.3 Administrative Tool

`fltk-options` is a hybrid app that is part of FLTK and can be installed on the target system. It includes an up-to-date man page.

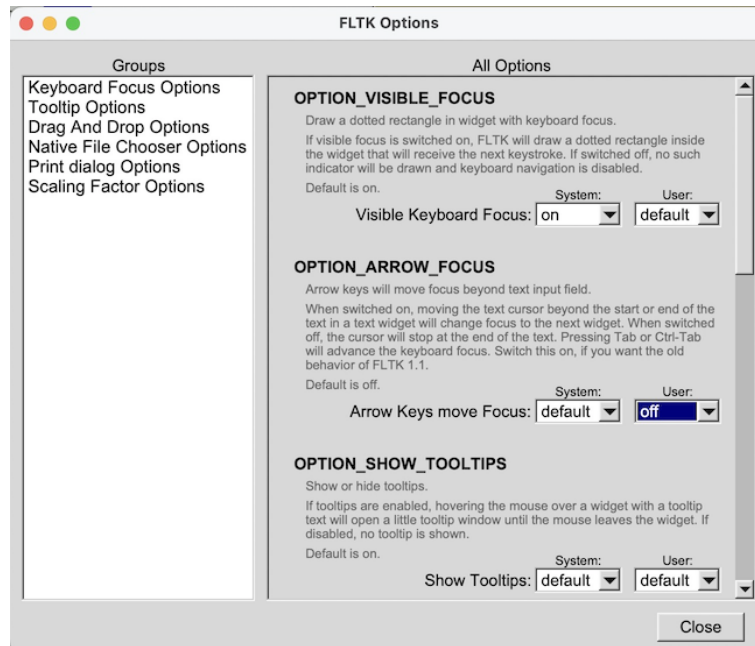


Figure 1.42 fltk-options Application

When `fltk-options` is called without any command-line arguments, it opens in interactive mode and provides a user interface to view and alter all system and current user options.

Starting the tool from a shell, the command-line options `-S` and `-U` can be used to display or change system or user options. On MS-Windows, `fltk-options` is also available as `fltk-options-cmd.exe`.

1.13.4 List of Options

Calling `fltk-options --help` gives a list of all available commands, and options and their values. `fltk-options --help OPTION` prints more detailed information for `OPTION` if available. In interactive mode, tooltips provide this additional information.

A full list of options can be found in the manual at [Fl::Fl_Option](#).

1.14 Advanced FLTK

This chapter explains advanced programming and design topics that will help you to get the most out of FLTK.

1.14.1 Multithreading

FLTK can be used to implement a GUI for a multithreaded application but, as with multithreaded programming generally, there are some concepts and caveats that must be kept in mind.

Key amongst these is that, for many of the target platforms on which FLTK is supported, only the `main()` thread of the process is permitted to handle system events, create or destroy windows and open or close windows. Further, only the `main()` thread of the process can safely write to the display.

To support this in a portable way, all FLTK `draw()` methods are executed in the `main()` thread. A worker thread may update the state of an existing widget, but it may not do any rendering directly, nor create or destroy a window. (**NOTE:** A special case exists for [Fl_Gl_Window](#) where it can, with suitable precautions, be possible to safely render to an existing GL context from a worker thread.)

Creating portable threads

We do not provide a threading interface as part of the library. A simple example showing how threads can be implemented, for all supported platforms, can be found in `test/threads.h` and `test/threads.cxx`.

FLTK has been used with a variety of thread interfaces, so if the simple example shown in `test/threads.cxx` does not cover your needs, you might want to select a third-party library that provides the features you require.

1.14.2 FLTK multithread locking - `Fl::lock()` and `Fl::unlock()`

In a multithreaded program, drawing of widgets (in the `main()` thread) happens asynchronously to widgets being updated by worker threads, so no drawing can occur safely whilst a widget is being modified (and no widget should be modified whilst drawing is in progress).

FLTK supports multithreaded applications using a locking mechanism internally. This allows a worker thread to lock the rendering context, preventing any drawing from taking place, whilst it changes the value of its widget.

Note

The converse is also true; whilst a worker thread holds the lock, the `main()` thread may not be able to process any drawing requests, nor service any events. So a worker thread that holds the FLTK lock **must** contrive to do so for the shortest time possible or it could impair operation of the application.

The lock operates broadly as follows.

Using the FLTK library, the `main()` thread holds the lock whenever it is processing events or redrawing the display. It acquires (locks) and releases (unlocks) the FLTK lock automatically and no "user intervention" is required. Indeed, a function that runs in the context of the `main()` thread ideally should **not** acquire / release the FLTK lock explicitly. (Though note that the lock calls are recursive, so calling `Fl::lock()` from a thread that already holds the lock, including the `main()` thread, is benign. The only constraint is that every call to `Fl::lock()` **must** be balanced by a corresponding call to `Fl::unlock()` to ensure the lock count is preserved.)

The `main()` thread **must** call `Fl::lock()` **once** before any windows are shown, to enable the internal lock (it is "off" by default since it is not useful in single-threaded applications) but thereafter the `main()` thread lock is managed by the library internally.

A worker thread, when it wants to alter the value of a widget, can acquire the lock using `Fl::lock()`, update the widget, then release the lock using `Fl::unlock()`. Acquiring the lock ensures that the worker thread can update the widget, without any risk that the `main()` thread will attempt to redraw the widget whilst it is being updated.

Note that acquiring the lock is a blocking action; the worker thread will stall for as long as it takes to acquire the lock. If the `main()` thread is engaged in some complex drawing operation this may block the worker thread for a long time, effectively serializing what ought to be parallel operations. (This frequently comes as a surprise to coders less familiar with multithreaded programming issues; see the discussion of "lockless programming" later for strategies for managing this.)

To incorporate the locking mechanism in the library, FLTK must be compiled with `--enable-threads` set during the `configure` process. IDE-based versions of FLTK are automatically compiled with the locking mechanism incorporated if possible. Since version 1.3, the `configure` script that builds the FLTK library also sets `--enable-threads` by default.

1.14.3 Simple multithreaded examples using Fl::lock

In `main()`, call `Fl::lock()` once before `Fl::run()` or `Fl::wait()` to enable the lock and start the runtime multithreading support for your program. All callbacks and derived functions like `handle()` and `draw()` will now be properly locked.

This might look something like this:

```
int main(int argc, char **argv) {
    /* Create your windows and widgets here */

    Fl::lock(); /* "start" the FLTK lock mechanism */

    /* show your window */
    main_win->show(argc, argv);

    /* start your worker threads */
    ... start threads ...

    /* Run the FLTK main loop */
    int result = Fl::run();

    /* terminate any pending worker threads */
    ... stop threads ...

    return result;
}
```

You can start as many threads as you like. From within a thread (other than the `main()` thread) FLTK calls must be wrapped with calls to `Fl::lock()` and `Fl::unlock()`:

```
void my_thread(void) {
    while (thread_still_running) {
        /* do thread work */
        ...
        /* compute new values for widgets */
        ...

        Fl::lock(); // acquire the lock
        my_widget->update(values);
        Fl::unlock(); // release the lock; allow other threads to access FLTK again
        Fl::awake(); // use Fl::awake() to signal main thread to refresh the GUI
    }
}
```

Note

To trigger a refresh of the GUI from a worker thread, the worker code should call `Fl::awake()`

Using Fl::awake thread messages

You can send messages from worker threads to the `main()` thread using `Fl::awake(void* message)`. If using this thread message interface, your `main()` might look like this:

```
int main(int argc, char **argv) {
    /* Create your windows and widgets here */

    Fl::lock(); /* "start" the FLTK lock mechanism */

    /* show your window */
    main_win->show(argc, argv);

    /* start your worker threads */
    ... start threads ...

    /* Run the FLTK loop and process thread messages */
    while (Fl::wait() > 0) {
        if ((next_message = Fl::thread_message()) != NULL) {
            /* process your data, update widgets, etc. */
            ...
        }
    }

    /* terminate any pending worker threads */
    ... stop threads ...

    return 0;
}
```

Your worker threads can send messages to the `main()` thread using `Fl::awake(void* message)`:

```
void *msg; // "msg" is a pointer to your message
Fl::awake(msg); // send "msg" to main thread
```

A message can be anything you like. The `main()` thread can retrieve the message by calling `Fl::thread_message()`.

Using `Fl::awake` callback messages

You can also request that the `main()` thread call a function on behalf of the worker thread by using `Fl::awake(Fl_Awake_Handler cb, void* userdata)`.

The `main()` thread will execute the callback "as soon as possible" when next processing the pending events. This can be used by a worker thread to perform operations (for example showing or hiding windows) that are prohibited in a worker thread.

```
void do_something_cb(void *userdata) {
    // Will run in the context of the main thread
    ... do_stuff ...
}

// running in worker thread
void *data; // "data" is a pointer to your user data
Fl::awake(do_something_cb, data); // call to execute cb in main thread
```

Note

The `main()` thread will execute the `Fl_Awake_Handler` callback `do_something_cb` asynchronously to the worker thread, at some short but indeterminate time after the worker thread registers the request. When it executes the `Fl_Awake_Handler` callback, the `main()` thread will use the contents of `*userdata` **at the time of execution**, not necessarily the contents that `*userdata` had at the time that the worker thread posted the callback request. The worker thread should therefore contrive **not** to alter the contents of `*userdata` once it posts the callback, since the worker thread does not know when the `main()` thread will consume that data. It is often useful that `userdata` point to a struct, one member of which the `main()` thread can modify to indicate that it has consumed the data, thereby allowing the worker thread to re-use or update `userdata`.

Warning

The mechanisms used to deliver `Fl::awake(void* message)` and `Fl::awake(Fl_Awake_Handler cb, void* userdata)` events to the `main()` thread can interact in unexpected ways on some platforms. Therefore, for reliable operation, it is advised that a program use either `Fl::awake(Fl_Awake_Handler cb, void* userdata)` or `Fl::awake(void* message)`, but that they never be intermixed. Calling `Fl::awake()` with no parameters should be safe in either case.

If you have to choose between using the `Fl::awake(void* message)` and `Fl::awake(Fl_Awake_Handler cb, void* userdata)` mechanisms and don't know which to choose, then try the `Fl::awake(Fl_Awake_Handler cb, void* userdata)` method first as it tends to be more powerful in general.

1.14.4 FLTK multithreaded "lockless programming"

The simple multithreaded examples shown above, using the FLTK lock, work well for many cases where multiple threads are required. However, when that model is extended to more complex programs, it often produces results that the developer did not anticipate.

A typical case might go something like this. A developer creates a program to process a huge data set. The program has a `main()` thread and 7 worker threads and is targeted to run on an 8-core computer. When it runs, the program divides the data between the 7 worker threads, and as they process their share of the data, each thread updates its portion of the GUI with the results, locking and unlocking as they do so.

But when this program runs, it is much slower than expected and the developer finds that only one of the eight CPU cores seems to be utilised, despite there being 8 threads in the program. What happened?

The threads in the program all run as expected, but they end up being serialized (that is, not able to run in parallel) because they all depend on the single FLTK lock. Acquiring (and releasing) that lock has an associated cost, and is a **blocking** action if the lock is already held by any other worker thread or by the `main()` thread.

If the worker threads are acquiring the lock "too often", then the lock will **always** be held **somewhere** and every attempt by any other thread (even `main()`) to lock will cause that other thread (including `main()`) to block. And blocking `main()` also blocks event handling, display refresh...

As a result, only one thread will be running at any given time, and the multithreaded program is effectively reduced to being a (complicated and somewhat less efficient) single thread program.

A "solution" is for the worker threads to lock "less often", such that they do not block each other or the `main()` thread. But judging what constitutes locking "too often" for any given configuration, and hence will block, is a very tricky question. What works well on one machine, with a given graphics card and CPU configuration may behave very differently on another target machine.

There are "interesting" variations on this theme, too: for example it is possible that a "faulty" multithreaded program such as described above will work adequately on a single-core machine (where all threads are inherently serialized anyway and so are less likely to block each other) but then stall or even deadlock in unexpected ways on a multicore machine when the threads do interfere with each other. (I have seen this - it really happens.)

The "better" solution is to avoid using the FLTK lock so far as possible. Instead, the code should be designed so that the worker threads do not update the GUI themselves and therefore never need to acquire the FLTK lock. This would be FLTK multithreaded "lockless programming".

There are a number of ways this can be achieved (or at least approximated) in practice but the most direct approach is for the worker threads to make use of the `Fl::awake(Fl_Awake_Handler cb, void* userdata)` method so that GUI updates can all run in the context of the `main()` thread, alleviating the need for the worker thread to ever lock. The onus is then on the worker threads to manage the `userdata` so that it is delivered safely to the `main()` thread, but there are many ways that can be done.

Note

Using `Fl::awake` is not, strictly speaking, entirely "lockless" since the awake handler mechanism incorporates resource locking internally to protect the queue of pending awake messages. These resource locks are held transiently and generally do not trigger the pathological blocking issues described here.

However, aside from using `Fl::awake`, there are many other ways that a "lockless" design can be implemented, including message passing, various forms of IPC, etc.

If you need high performing multithreaded programming, then take some time to study the options and understand the advantages and disadvantages of each; we can't even begin to scratch the surface of this huge topic here!

And of course occasional, sparse, use of the FLTK lock from worker threads will do no harm; it is "excessive" locking (whatever that might be) that triggers the failing behaviour.

It is always a Good Idea to update the GUI at the lowest rate that is acceptable when processing bulk data (or indeed, in all cases!) Updating at a few frames per second is probably adequate for providing feedback during a long calculation. At the upper limit, anything faster than the frame rate of your monitor and the updates will never even be displayed; why waste CPU computing pixels that you will never show?

1.14.5 FLTK multithreaded Constraints

FLTK supports multiple platforms, some of which allow only the `main()` thread to handle system events and open or close windows. The safe thing to do is to adhere to the following rules for threads on all operating systems:

- Don't `show()` or `hide()` anything that contains `Fl_Window` based widgets from a worker thread. This includes any windows, dialogs, file choosers, subwindows or widgets using `Fl_Gl_Window`. Note that this constraint also applies to non-window widgets that have tooltips, since the tooltip will contain a `Fl_Window` object. The safe and portable approach is **never** to call `show()` or `hide()` on any widget from the context of a worker thread. Instead you can use the `Fl_Awake_Handler` variant of `Fl::awake()` to request the `main()` thread to create, destroy, show or hide the widget on behalf of the worker thread.
- Don't call `Fl::run()`, `Fl::wait()`, `Fl::flush()`, `Fl::check()` or any related methods that will handle system messages from a worker thread
- Don't intermix use of `Fl::awake(Fl_Awake_Handler cb, void* userdata)` and `Fl::awake(void* message)` calls in the same program as they may interact unpredictably on some platforms; choose one or other style of `Fl::awake(<thing>)` mechanism and use that. (Intermixing calls to `Fl::awake()` should be safe with either however.)
- Starting with FLTK 1.4, it's possible to start (or cancel) a timer from a worker thread under the condition that the call to `Fl::add_timeout` (or `Fl::remove_timeout`) is wrapped in `Fl::lock()` and `Fl::unlock()`.
- Don't change window decorations or titles from a worker thread
- The `make_current()` method will probably not work well for regular windows, but should always work for a `Fl_Gl_Window` to allow for high speed rendering on graphics cards with multiple pipelines. Managing thread-safe access to the GL pipelines is left as an exercise for the reader! (And may be target specific...)

See also: `Fl::lock()`, `Fl::unlock()`, `Fl::awake()`, `Fl::awake(Fl_Awake_Handler cb, void* userdata)`, `Fl::awake(void* message)`, `Fl::thread_message()`.

1.15 Unicode and UTF-8 Support

This chapter explains how FLTK handles international text via Unicode and UTF-8.

Unicode support was added to FLTK starting with version 1.3.0 and is still incomplete but mostly functional. This chapter is Work in Progress, reflecting the current state of Unicode support.

1.15.1 About Unicode, ISO 10646 and UTF-8

The summary of Unicode, ISO 10646 and UTF-8 given below is deliberately brief and provides just enough information for the rest of this chapter.

For further information, please see:

- <https://unicode.org>
- <https://iso.org>
- <https://en.wikipedia.org/wiki/Unicode>
- <https://www.cl.cam.ac.uk/~mgk25/unicode.html>
- <https://tools.ietf.org/html/rfc3629>

The Unicode Standard

The Unicode Standard was originally developed by a consortium of mainly US computer manufacturers and developers of multi-lingual software. It has now become a defacto standard for character encoding and is supported by most of the major computing companies in the world.

Before Unicode, many different systems, on different platforms, had been developed for encoding characters for different languages, but no single encoding could satisfy all languages. Unicode provides access to over 130,000 characters used in all the major languages written today, and is independent of platform and language.

Unicode also provides higher-level concepts needed for text processing and typographic publishing systems, such as algorithms for sorting and comparing text, composite character and text rendering, right-to-left and bi-directional text handling.

Note

There are currently no plans to add this extra functionality to FLTK.

ISO 10646

The International Organisation for Standardization (ISO) had also been trying to develop a single unified character set. Although both ISO and the Unicode Consortium continue to publish their own standards, they have agreed to coordinate their work so that specific versions of the Unicode and ISO 10646 standards are compatible with each other.

The international standard ISO 10646 defines the **Universal Character Set** (UCS) which contains the characters required for almost all known languages. The standard also defines three different implementation levels specifying how these characters can be combined.

Note

There are currently no plans for handling the different implementation levels or the combining characters in FLTK.

In UCS, characters have a unique numerical code and an official name, and are usually shown using 'U+' and the code in hexadecimal, e.g. U+0041 is the "Latin capital letter A". The UCS characters U+0000 to U+007F correspond to US-ASCII, and U+0000 to U+00FF correspond to ISO 8859-1 (Latin1).

ISO 10646 was originally designed to handle a 31-bit character set from U+00000000 to U+7FFFFFFF, but the current idea is that 21 bits will be sufficient for all future needs, giving characters up to U+10FFFF. The complete character set is sub-divided into *planes*. *Plane 0*, also known as the **Basic Multilingual Plane** (BMP), ranges from U+0000 to U+FFFF and consists of the most commonly used characters from previous encoding standards. Other planes contain characters for specialist applications.

Todo FLTK 1.3 and later supports the full Unicode range (21 bits), but there are a few exceptions, for instance binary shortcut values in menus ([Fl_Shortcut](#)) can only be used with characters from the BMP (16 bits). This may be extended in a future FLTK version.

The UCS also defines various methods of encoding characters as a sequence of bytes. UCS-2 encodes Unicode characters into two bytes, which is wasteful if you are only dealing with ASCII or Latin1 text, and insufficient if you need characters above U+00FFFF. UCS-4 uses four bytes, which lets it handle higher characters, but this is even more wasteful for ASCII or Latin1.

UTF-8

The Unicode standard defines various UCS Transformation Formats (UTF). UTF-16 and UTF-32 are based on units of two and four bytes. UCS characters requiring more than 16 bits are encoded using "surrogate pairs" in UTF-16.

UTF-8 encodes all Unicode characters into variable length sequences of bytes. Unicode characters in the 7-bit ASCII range map to the same value and are represented as a single byte, making the transformation to Unicode quick and easy.

All UCS characters above U+007F are encoded as a sequence of several bytes. The top bits of the first byte are set to show the length of the byte sequence, and subsequent bytes are always in the range 0x80 to 0xBF. This combination provides some level of synchronisation and error detection.

Unicode range	Byte sequences
U+00000000 - U+0000007F	0xxxxxxx
U+00000080 - U+000007FF	110xxxxx 10xxxxxx
U+00000800 - U+0000FFFF	1110xxxx 10xxxxxx 10xxxxxx
U+00010000 - U+001FFFFF	11110xxx 10xxxxxx 10xxxxxx 10xxxxxx
U+00200000 - U+03FFFFFF	111110xx 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx
U+04000000 - U+7FFFFFFF	1111110x 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx

Note

This table contains theoretical values outside the valid Unicode range (U+000000 – U+10FFFF). Such values can only be returned by conversion functions for illegal input values (see [Illegal Unicode and UTF-8 Sequences](#)).

Moving from ASCII encoding to Unicode will allow all new FLTK applications to be easily internationalized and used all over the world. By choosing UTF-8 encoding, FLTK remains largely source-code compatible to previous iterations of the library.

1.15.2 Unicode in FLTK

Todo Work through the code and this documentation to harmonize the `[OksiD]` and `[fltk2]` functions.

FLTK will be entirely converted to Unicode using UTF-8 encoding. If a different encoding is required by the underlying operating system, FLTK will convert the string as needed.

It is important to note that the initial implementation of Unicode and UTF-8 in FLTK involves three important areas:

- provision of Unicode character tables and some simple related functions;
- conversion of `char*` variables and function parameters from single byte per character representation to UTF-8 variable length sequences;
- modifications to the display font interface to accept general Unicode character or UCS code numbers instead of just ASCII or Latin1 characters.

The current implementation of Unicode / UTF-8 in FLTK will impose the following limitations:

- An implementation note in the `[OksiD]` code says that all functions are LIMITED to 24 bit Unicode values, but also says that only 16 bits are really used under linux and win32. **[Can we verify this?]**
- The `[fltk2]` `fl_utf8encode()` and `fl_utf8decode()` functions are designed to handle Unicode characters in the range U+000000 to U+10FFFF inclusive, which covers all UTF-16 characters, as specified in RFC 3629. *Note that the user must first convert UTF-16 surrogate pairs to UCS.*
- FLTK will only handle single characters, so composed characters consisting of a base character and floating accent characters will be treated as multiple characters.
- FLTK will only compare or sort strings on a byte by byte basis and not on a general Unicode character basis.
- FLTK will not handle right-to-left or bi-directional text.

Todo Verify 16/24 bit Unicode limit for different character sets? OksiD's code appears limited to 16-bit whereas the FLTK2 code appears to handle a wider set. What about illegal characters? See comments in `fl_utf8fromwc()` and `fl_utf8toUtf16()`.

1.15.3 Illegal Unicode and UTF-8 Sequences

Three pre-processor variables are defined in the source code [1] that determine how `fl_utf8decode()` handles illegal UTF-8 sequences:

- if `ERRORS_TO_CP1252` is set to 1 (the default), `fl_utf8decode()` will assume that a byte sequence starting with a byte in the range 0x80 to 0x9f represents a Microsoft CP1252 character, and will return the value of an equivalent UCS character. Otherwise, it will be processed as an illegal byte value as described below.
- if `STRICT_RFC3629` is set to 1 (not the default!) then UTF-8 sequences that correspond to illegal UCS values are treated as errors. Illegal UCS values include those above U+10FFFF, or corresponding to UTF-16 surrogate pairs. Illegal byte values are handled as described below.
- if `ERRORS_TO_ISO8859_1` is set to 1 (the default), the illegal byte value is returned unchanged, otherwise 0xFFFD, the Unicode REPLACEMENT CHARACTER, is returned instead.

[1] Since FLTK 1.3.4 you may set these three pre-processor variables on your compile command line with `-D"variable=value"` (value: 0 or 1) to avoid editing the source code.

`fl_utf8encode()` is less strict, and only generates the UTF-8 sequence for 0xFFFD, the Unicode REPLACEMENT CHARACTER, if it is asked to encode a UCS value above U+10FFFF.

Many of the [fltk2] functions below use `fl_utf8decode()` and `fl_utf8encode()` in their own implementation, and are therefore somewhat protected from bad UTF-8 sequences.

The [OksiD] `fl_utf8len()` function assumes that the byte it is passed is the first byte in a UTF-8 sequence, and returns the length of the sequence. Trailing bytes in a UTF-8 sequence will return -1.

- **WARNING:** `fl_utf8len()` can not distinguish between single bytes representing Microsoft CP1252 characters 0x80-0x9f and those forming part of a valid UTF-8 sequence. You are strongly advised not to use `fl_utf8len()` in your own code unless you know that the byte sequence contains only valid UTF-8 sequences.
- **WARNING:** Some of the [OksiD] functions below still use `fl_utf8len()` in their implementations. These may need further validation.

Please see the individual function description for further details about error handling and return values.

1.15.4 FLTK Unicode and UTF-8 Functions

This section provides a brief overview of the functions. For more details, consult the main text for each function via its link.

`int fl_utf8locale()` **FLTK2**

`fl_utf8locale()` returns true if the "locale" seems to indicate that UTF-8 encoding is used.

It is highly recommended that you change your system so this does return true!

`int fl_utf8test(const char *src, unsigned len)` **FLTK2**

`fl_utf8test()` examines the first `len` bytes of `src`. It returns 0 if there are any illegal UTF-8 sequences; 1 if `src` contains plain ASCII or if `len` is zero; or 2, 3 or 4 to indicate the range of Unicode characters found.

`int fl_utf_nb_char(const unsigned char *buf, int len) OksID`

Returns the number of UTF-8 characters in the first `len` bytes of `buf`.

`int fl_unichar_to_utf8_size(Fl_Unichar)`
`int fl_utf8bytes(unsigned ucs)`

Returns the number of bytes needed to encode `ucs` in UTF-8.

`int fl_utf8len(char c) OksID`

If `c` is a valid first byte of a UTF-8 encoded character sequence, `fl_utf8len()` will return the number of bytes in that sequence. It returns -1 if `c` is not a valid first byte.

`unsigned int fl_nonspacing(unsigned int ucs) OksID`

Returns true if `ucs` is a non-spacing character.

`const char* fl_utf8back(const char *p, const char *start, const char *end) FLTK2`
`const char* fl_utf8fwd(const char *p, const char *start, const char *end) FLTK2`

If `p` already points to the start of a UTF-8 character sequence, these functions will return `p`. Otherwise `fl_utf8back()` searches backwards from `p` and `fl_utf8fwd()` searches forwards from `p`, within the `start` and `end` limits, looking for the start of a UTF-8 character.

`unsigned int fl_utf8decode(const char *p, const char *end, int *len) FLTK2`
`int fl_utf8encode(unsigned ucs, char *buf) FLTK2`

`fl_utf8decode()` attempts to decode the UTF-8 character that starts at `p` and may not extend past `end`. It returns the Unicode value, and the length of the UTF-8 character sequence is returned via the `len` argument. `fl_utf8encode()` writes the UTF-8 encoding of `ucs` into `buf` and returns the number of bytes in the sequence. See the main documentation for the treatment of illegal Unicode and UTF-8 sequences.

`unsigned int fl_utf8froma(char *dst, unsigned dstlen, const char *src, unsigned srclen) FLTK2`
`unsigned int fl_utf8toa(const char *src, unsigned srclen, char *dst, unsigned dstlen) FLTK2`

`fl_utf8froma()` converts a character string containing single bytes per character (i.e. ASCII or ISO-8859-1) into UTF-8. If the `src` string contains only ASCII characters, the return value will be the same as `srclen`.

`fl_utf8toa()` converts a string containing UTF-8 characters into single byte characters. UTF-8 characters that do not correspond to ASCII or ISO-8859-1 characters below 0xFF are replaced with '?'.

Both functions return the number of bytes that would be written, not counting the null terminator. `dstlen` provides a means of limiting the number of bytes written, so setting `dstlen` to zero is a means of measuring how much storage would be needed before doing the real conversion.

`char* fl_utf2mbcs(const char *src)` **OksiD**

converts a UTF-8 string to a local multi-byte character string. **[More info required here!]**

`unsigned int fl_utf8fromwc(char *dst, unsigned dstlen, const wchar_t *src, unsigned srclen)` **FLTK2**

`unsigned int fl_utf8towc(const char *src, unsigned srclen, wchar_t *dst, unsigned dstlen)` **FLTK2**

`unsigned int fl_utf8toUtf16(const char *src, unsigned srclen, unsigned short *dst, unsigned dstlen)` **FLTK2**

These routines convert between UTF-8 and `wchar_t` or "wide character" strings. The difficulty lies in the fact that `sizeof(wchar_t)` is 2 on Windows and 4 on Linux and most other systems. Therefore some "wide characters" on Windows may be represented as "surrogate pairs" of more than one `wchar_t`.

`fl_utf8fromwc()` converts from a "wide character" string to UTF-8. Note that `srclen` is the number of `wchar_t` elements in the source string and on Windows this might be larger than the number of characters. `dstlen` specifies the maximum number of **bytes** to copy, including the null terminator.

`fl_utf8towc()` converts a UTF-8 string into a "wide character" string. Note that on Windows, some "wide characters" might result in "surrogate pairs" and therefore the return value might be more than the number of characters. `dstlen` specifies the maximum number of **wchar_t** elements to copy, including a zero terminating element. **[Is this all worded correctly?]**

`fl_utf8toUtf16()` converts a UTF-8 string into a "wide character" string using UTF-16 encoding to handle the "surrogate pairs" on Windows. `dstlen` specifies the maximum number of **wchar_t** elements to copy, including a zero terminating element. **[Is this all worded correctly?]**

These routines all return the number of elements that would be required for a full conversion of the `src` string, including the zero terminator. Therefore setting `dstlen` to zero is a way of measuring how much storage would be needed before doing the real conversion.

```
unsigned int fl_utf8from_mb(char *dst, unsigned dstlen, const char *src, unsigned srclen) FLTK2
unsigned int fl_utf8to_mb(const char *src, unsigned srclen, char *dst, unsigned dstlen) FLTK2
```

These functions convert between UTF-8 and the locale-specific multi-byte encodings used on some systems for filenames, etc. If `fl_utf8locale()` returns true, these functions don't do anything useful. **[Is this all worded correctly?]**

```
int fl_tolower(unsigned int ucs) OksiD
int fl_toupper(unsigned int ucs) OksiD
int fl_utf_tolower(const unsigned char *str, int len, char *buf) OksiD
int fl_utf_toupper(const unsigned char *str, int len, char *buf) OksiD
```

`fl_tolower()` and `fl_toupper()` convert a single Unicode character from upper to lower case, and vice versa. `fl_utf_tolower()` and `fl_utf_toupper()` convert a string of bytes, some of which may be multi-byte UTF-8 encodings of Unicode characters, from upper to lower case, and vice versa.

Warning: to be safe, `buf` length must be at least `3*len` [for 16-bit Unicode]

```
int fl_utf_strcasecmp(const char *s1, const char *s2) OksiD
int fl_utf_strncasecmp(const char *s1, const char *s2, int n) OksiD
```

`fl_utf_strcasecmp()` is a UTF-8 aware string comparison function that converts the strings to lower case Unicode as part of the comparison. `fl_utf_strncasecmp()` only compares the first `n` characters [bytes?]

1.15.5 FLTK Unicode Versions of System Calls

- `int fl_access(const char* f, int mode) OksiD`
- `int fl_chmod(const char* f, int mode) OksiD`
- `int fl_execvp(const char* file, char* const* argv) OksiD`
- `FILE* fl_fopen(const char* f, const char* mode) OksiD`
- `char* fl_getcwd(char* buf, int maxlen) OksiD`
- `char* fl_getenv(const char* name) OksiD`
- `char fl_make_path(const char* path) - returns char ? OksiD`
- `void fl_make_path_for_file(const char* path) OksiD`

- `int fl_mkdir(const char* f, int mode)` **OksiD**
- `int fl_open(const char* f, int o, ...)` **OksiD**
- `int fl_rename(const char* f, const char* t)` **OksiD**
- `int fl_rmdir(const char* f)` **OksiD**
- `int fl_stat(const char* path, struct stat* buffer)` **OksiD**
- `int fl_system(const char* f)` **OksiD**
- `int fl_unlink(const char* f)` **OksiD**

TODO:

- more doc on unicode, add links
- write something about filename encoding on OS X...
- explain the `fl_utf8_...` commands
- explain issues with [FL_Preferences](#)

1.16 Constants and Enumerations

Note

This file is not actively maintained any more, but is left here as a reference, until the doxygen documentation is completed.

See also

[FL/Enumerations.H](#).

This appendix lists the enumerations provided in the `<FL/Enumerations.H>` header file, organized by section. Constants whose value are zero are marked with "(0)", this is often useful to know when programming.

1.16.1 Version Numbers

The FLTK version number is stored in a number of compile-time constants:

- `FL_MAJOR_VERSION` - The major release number, currently 1
- `FL_MINOR_VERSION` - The minor release number, currently 4
- `FL_PATCH_VERSION` - The patch release number, currently 0
- `FL_VERSION` - [Deprecated] A combined floating-point version number for the major, minor, and patch release numbers, currently 1.0400
- `FL_API_VERSION` - A combined integer version number for the major, minor, and patch release numbers, currently 10400 (use this instead of `FL_VERSION`, if possible)
- `FL_ABI_VERSION` - A combined integer version number for the application binary interface (ABI) major, minor, and patch release numbers, currently 10400 (default)

Note

The ABI version (`FL_ABI_VERSION`) is usually constant throughout one major/minor release version, for instance 10300 if `FL_API_VERSION` is 10304. Hence the ABI is constant if only the patch version is changed. You can change this with `configure` or `CMake` though if you want the latest enhancements (called "ABI features", see `CHANGES`).

1.16.2 Events

Events are identified by an [FL_Event](#) enumeration value. The following events are currently defined:

- `FL_NO_EVENT` - No event (or an event fltk does not understand) occurred (0).
- `FL_PUSH` - A mouse button was pushed.
- `FL_RELEASE` - A mouse button was released.
- `FL_ENTER` - The mouse pointer entered a widget.
- `FL_LEAVE` - The mouse pointer left a widget.
- `FL_DRAG` - The mouse pointer was moved with a button pressed.
- `FL_FOCUS` - A widget should receive keyboard focus.
- `FL_UNFOCUS` - A widget loses keyboard focus.
- `FL_KEYBOARD` - A key was pressed.
- `FL_CLOSE` - A window was closed.
- `FL_MOVE` - The mouse pointer was moved with no buttons pressed.
- `FL_SHORTCUT` - The user pressed a shortcut key.
- `FL_DEACTIVATE` - The widget has been deactivated.
- `FL_ACTIVATE` - The widget has been activated.
- `FL_HIDE` - The widget has been hidden.
- `FL_SHOW` - The widget has been shown.
- `FL_PASTE` - The widget should paste the contents of the clipboard.
- `FL_SELECTIONCLEAR` - The widget should clear any selections made for the clipboard.
- `FL_MOUSEWHEEL` - The horizontal or vertical mousewheel was turned.
- `FL_DND_ENTER` - The mouse pointer entered a widget dragging data.
- `FL_DND_DRAG` - The mouse pointer was moved dragging data.
- `FL_DND_LEAVE` - The mouse pointer left a widget still dragging data.
- `FL_DND_RELEASE` - Dragged data is about to be dropped.
- `FL_SCREEN_CONFIGURATION_CHANGED` - The screen configuration (number, positions) was changed.
- `FL_FULLSCREEN` - The fullscreen state of the window has changed.

1.16.3 Callback "When" Conditions

The following constants determine when a callback is performed:

- `FL_WHEN_NEVER` - Never call the callback (0).
- `FL_WHEN_CHANGED` - Do the callback only when the widget value changes.
- `FL_WHEN_NOT_CHANGED` - Do the callback whenever the user interacts with the widget.
- `FL_WHEN_RELEASE` - Do the callback when the button or key is released and the value changes.
- `FL_WHEN_ENTER_KEY` - Do the callback when the user presses the ENTER key and the value changes.
- `FL_WHEN_RELEASE_ALWAYS` - Do the callback when the button or key is released, even if the value doesn't change.
- `FL_WHEN_ENTER_KEY_ALWAYS` - Do the callback when the user presses the ENTER key, even if the value doesn't change.

1.16.4 Fl::event_button() Values

The following constants define the button numbers for FL_PUSH and FL_RELEASE events:

- FL_LEFT_MOUSE - the left mouse button
- FL_MIDDLE_MOUSE - the middle mouse button
- FL_RIGHT_MOUSE - the right mouse button

1.16.5 Fl::event_key() Values

The following constants define the non-ASCII keys on the keyboard for FL_KEYBOARD and FL_SHORTCUT events:

- FL_Button - A mouse button; use `Fl_Button + n` for mouse button `n`.
- FL_BackSpace - The backspace key.
- FL_Tab - The tab key.
- FL_Enter - The enter key.
- FL_Pause - The pause key.
- FL_Scroll_Lock - The scroll lock key.
- FL_Escape - The escape key.
- FL_Home - The home key.
- FL_Left - The left arrow key.
- FL_Up - The up arrow key.
- FL_Right - The right arrow key.
- FL_Down - The down arrow key.
- FL_Page_Up - The page-up key.
- FL_Page_Down - The page-down key.
- FL_End - The end key.
- FL_Print - The print (or print-screen) key.
- FL_Insert - The insert key.
- FL_Menu - The menu key.
- FL_Num_Lock - The num lock key.
- FL_KP - One of the keypad numbers or keys; use `FL_KP + 'n'` for number `n` and, say, `FL_KP + '*'`.
- FL_KP_Enter - The enter key on the keypad.
- FL_F - One of the function keys; use `FL_F + n` for function key `n`.
- FL_Shift_L - The lefthand shift key.
- FL_Shift_R - The righthand shift key.
- FL_Control_L - The lefthand control key.

- `FL_Control_R` - The righthand control key.
- `FL_Caps_Lock` - The caps lock key.
- `FL_Meta_L` - The left meta/Windows key.
- `FL_Meta_R` - The right meta/Windows key.
- `FL_Alt_L` - The left alt key.
- `FL_Alt_R` - The right alt key.
- `FL_Delete` - The delete key.

1.16.6 `Fl::event_state()` Values

The following constants define bits in the `Fl::event_state()` value:

- `FL_SHIFT` - One of the shift keys is down.
- `FL_CAPS_LOCK` - The caps lock is on.
- `FL_CTRL` - One of the ctrl keys is down.
- `FL_ALT` - One of the alt keys is down.
- `FL_NUM_LOCK` - The num lock is on.
- `FL_META` - One of the meta/Windows keys is down.
- `FL_COMMAND` - An alias for `FL_CTRL` on Windows, X11 and Wayland, or `FL_META` on MacOS X.
- `FL_CONTROL` - An alias for `FL_META` on Windows, X11 and Wayland, or `FL_CTRL` on MacOS X.
- `FL_SCROLL_LOCK` - The scroll lock is on.
- `FL_BUTTON1` - Mouse button 1 is pushed.
- `FL_BUTTON2` - Mouse button 2 is pushed.
- `FL_BUTTON3` - Mouse button 3 is pushed.
- `FL_BUTTONS` - Any mouse button is pushed.
- `FL_BUTTON(n)` - Mouse button n (where $n > 0$) is pushed.

1.16.7 Alignment Values

The following constants define bits that can be used with `Fl_Widget::align()` to control the positioning of the label:

- `FL_ALIGN_CENTER` - The label is centered (0).
- `FL_ALIGN_TOP` - The label is top-aligned.
- `FL_ALIGN_BOTTOM` - The label is bottom-aligned.
- `FL_ALIGN_LEFT` - The label is left-aligned.
- `FL_ALIGN_RIGHT` - The label is right-aligned.
- `FL_ALIGN_CLIP` - The label is clipped to the widget.

- FL_ALIGN_WRAP - The label text is wrapped as needed.
- FL_ALIGN_TOP_LEFT - The label appears at the top of the widget, aligned to the left.
- FL_ALIGN_TOP_RIGHT - The label appears at the top of the widget, aligned to the right.
- FL_ALIGN_BOTTOM_LEFT - The label appears at the bottom of the widget, aligned to the left.
- FL_ALIGN_BOTTOM_RIGHT - The label appears at the bottom of the widget, aligned to the right.
- FL_ALIGN_LEFT_TOP - The label appears to the left of the widget, aligned at the top. Outside labels only.
- FL_ALIGN_RIGHT_TOP - The label appears to the right of the widget, aligned at the top. Outside labels only.
- FL_ALIGN_LEFT_BOTTOM - The label appears to the left of the widget, aligned at the bottom. Outside labels only.
- FL_ALIGN_RIGHT_BOTTOM - The label appears to the right of the widget, aligned at the bottom. Outside labels only.
- FL_ALIGN_INSIDE - 'or' this with other values to put label inside the widget.
- FL_ALIGN_TEXT_OVER_IMAGE - Label text will appear above the image.
- FL_ALIGN_IMAGE_OVER_TEXT - Label text will be below the image.
- FL_ALIGN_IMAGE_NEXT_TO_TEXT - The image will appear to the left of the text.
- FL_ALIGN_TEXT_NEXT_TO_IMAGE - The image will appear to the right of the text.
- FL_ALIGN_IMAGE_BACKDROP - The image will be used as a background for the widget.

1.16.8 Fonts

The following constants define the standard FLTK fonts:

- FL_HELVETICA - Helvetica (or Arial) normal (0).
- FL_HELVETICA_BOLD - Helvetica (or Arial) bold.
- FL_HELVETICA_ITALIC - Helvetica (or Arial) oblique.
- FL_HELVETICA_BOLD_ITALIC - Helvetica (or Arial) bold-oblique.
- FL_COURIER - Courier normal.
- FL_COURIER_BOLD - Courier bold.
- FL_COURIER_ITALIC - Courier italic.
- FL_COURIER_BOLD_ITALIC - Courier bold-italic.
- FL_TIMES - Times roman.
- FL_TIMES_BOLD - Times bold.
- FL_TIMES_ITALIC - Times italic.
- FL_TIMES_BOLD_ITALIC - Times bold-italic.
- FL_SYMBOL - Standard symbol font.
- FL_SCREEN - Default monospaced screen font.
- FL_SCREEN_BOLD - Default monospaced bold screen font.
- FL_ZAPF_DINGBATS - Zapf-dingbats font.

1.16.9 Colors

The `Fl_Color` enumeration type holds a FLTK color value. Colors are either 8-bit indexes into a `virtual colormap` or 24-bit RGB color values. Color indices occupy the lower 8 bits of the value, while RGB colors occupy the upper 24 bits, for a byte organization of RGBI.

1.16.9.1 Color Constants

Constants are defined for the user-defined foreground and background colors, as well as specific colors and the start of the grayscale ramp and color cube in the `virtual colormap`. Inline functions are provided to retrieve specific grayscale, color cube, or RGB color values.

The following color constants can be used to access the user-defined colors:

- `FL_BACKGROUND_COLOR` - the default background color
- `FL_BACKGROUND2_COLOR` - the default background color for text, list, and valuator widgets
- `FL_FOREGROUND_COLOR` - the default foreground color (0) used for labels and text
- `FL_INACTIVE_COLOR` - the inactive foreground color
- `FL_SELECTION_COLOR` - the default selection/highlight color

The following color constants can be used to access the colors from the FLTK standard color cube:

- `FL_BLACK`
- `FL_BLUE`
- `FL_CYAN`
- `FL_DARK_BLUE`
- `FL_DARK_CYAN`
- `FL_DARK_GREEN`
- `FL_DARK_MAGENTA`
- `FL_DARK_RED`
- `FL_DARK_YELLOW`
- `FL_GREEN`
- `FL_MAGENTA`
- `FL_RED`
- `FL_WHITE`
- `FL_YELLOW`

The following are named values within the standard grayscale:

- `FL_GRAY0`
- `FL_DARK3`

- FL_DARK2
- FL_DARK1
- FL_LIGHT1
- FL_LIGHT2
- FL_LIGHT3

The inline methods for getting a grayscale, color cube, or RGB color value are described in the [Colors](#) section of the [Drawing Things in FLTK](#) chapter.

1.16.10 Cursors

The following constants define the mouse cursors that are available in FLTK. The double-headed arrows are bitmaps provided by FLTK on X, the others are provided by system-defined cursors.

- FL_CURSOR_DEFAULT - the default cursor, usually an arrow (0)
- FL_CURSOR_ARROW - an arrow pointer
- FL_CURSOR_CROSS - crosshair
- FL_CURSOR_WAIT - watch or hourglass
- FL_CURSOR_INSERT - I-beam
- FL_CURSOR_HAND - hand (uparrow on Windows)
- FL_CURSOR_HELP - question mark
- FL_CURSOR_MOVE - 4-pointed arrow
- FL_CURSOR_NS - up/down arrow
- FL_CURSOR_WE - left/right arrow
- FL_CURSOR_NWSE - diagonal arrow
- FL_CURSOR_NESW - diagonal arrow
- FL_CURSOR_NONE - invisible

1.16.11 FD "When" Conditions

- FL_READ - Call the callback when there is data to be read.
- FL_WRITE - Call the callback when data can be written without blocking.
- FL_EXCEPT - Call the callback if an exception occurs on the file.

1.16.12 Damage Masks

The following damage mask bits are used by the standard FLTK widgets:

- `FL_DAMAGE_CHILD` - A child needs to be redrawn.
- `FL_DAMAGE_EXPOSE` - The window was exposed.
- `FL_DAMAGE_SCROLL` - The [Fl_Scroll](#) widget was scrolled.
- `FL_DAMAGE_OVERLAY` - The overlay planes need to be redrawn.
- `FL_DAMAGE_USER1` - First user-defined damage bit.
- `FL_DAMAGE_USER2` - Second user-defined damage bit.
- `FL_DAMAGE_ALL` - Everything needs to be redrawn.

1.17 GLUT Compatibility

This appendix describes the GLUT compatibility header file supplied with FLTK.

FLTK's GLUT compatibility is based on the original GLUT 3.7 and the follow-on FreeGLUT 2.4.0 libraries.

1.17.1 Using the GLUT Compatibility Header File

You should be able to compile existing GLUT source code by including `<FL/glut.H>` instead of `<GL/glut.h>`. This can be done by editing the source, by changing the `-I` switches to the compiler, or by providing a symbolic link from `GL/glut.h` to `FL/glut.H`.

All files calling GLUT procedures must be compiled with C++. You may have to alter them slightly to get them to compile without warnings, and you may have to rename them to get make to use the C++ compiler.

You must link with the FLTK library. Most of `FL/glut.H` is inline functions. You should take a look at it (and maybe at `test/glpuzzle.cxx` in the FLTK source) if you are having trouble porting your GLUT program.

This has been tested with most of the demo programs that come with the GLUT and FreeGLUT distributions.

1.17.2 Known Problems

The following functions and/or arguments to functions are missing, and you will have to replace them or comment them out for your code to compile:

- `glutGet (GLUT_ELAPSED_TIME)`
- `glutGet (GLUT_SCREEN_HEIGHT_MM)`
- `glutGet (GLUT_SCREEN_WIDTH_MM)`
- `glutGet (GLUT_WINDOW_NUM_CHILDREN)`
- `glutInitDisplayMode (GLUT_LUMINANCE)`
- `glutKeyboardUpFunc(void(*callback)(unsigned char key, int x, int y))`

- `glutLayerGet (GLUT_HAS_OVERLAY)`
- `glutLayerGet (GLUT_LAYER_IN_USE)`
- `glutPushWindow ()`
- `glutSetColor (), glutGetColor (), glutCopyColormap ()`
- `glutVideoResize ()` missing.
- `glutWarpPointer ()`
- `glutWindowStatusFunc ()`
- Spaceball, buttonbox, dials, and tablet functions

Most of the symbols/enumerations have different values than GLUT uses. This will break code that relies on the actual values. The only symbols guaranteed to have the same values are true/false pairs like `GLUT_DOWN` and `GLUT_UP`, mouse buttons `GLUT_LEFT_BUTTON`, `GLUT_MIDDLE_BUTTON`, `GLUT_RIGHT_BUTTON`, and `GLUT_KEY_F1` thru `GLUT_KEY_F12`.

The strings passed as menu labels are not copied.

`glutPostRedisplay ()` does not work if called from inside a display function. You must use `glutIdleFunc ()` if you want your display to update continuously.

`glutSwapBuffers ()` does not work from inside a display function. This is on purpose, because FLTK swaps the buffers for you.

`glutUseLayer ()` does not work well, and should only be used to initialize transformations inside a resize callback. You should redraw overlays by using `glutOverlayDisplayFunc ()`.

Overlays are cleared before the overlay display function is called. `glutLayerGet (GLUT_OVERLAY_DAMAGED)` always returns true for compatibility with some GLUT overlay programs. You must rewrite your code so that `gl_color ()` is used to choose colors in an overlay, or you will get random overlay colors.

`glutSetCursor (GLUT_CURSOR_FULL_CROSSHAIR)` just results in a small crosshair.

The fonts used by `glutBitmapCharacter ()` and `glutBitmapWidth ()` may be different.

`glutInit (argc, argv)` will consume different switches than GLUT does. It accepts the switches recognized by `Fl::args()`, and will accept any abbreviation of these switches (such as `"-di"` for `"-display"`).

1.17.3 Mixing GLUT and FLTK Code

You can make your GLUT window a child of a [Fl_Window](#) with the following scheme. The biggest trick is that GLUT insists on a call to `show ()` the window at the point it is created, which means the [Fl_Window](#) parent window must already be shown.

- Don't call `glutInit ()`.
- Create your [Fl_Window](#), and any FLTK widgets. Leave a blank area in the window for your GLUT window.
- `show ()` the [Fl_Window](#). Perhaps call `show (argc, argv)`.
- Call `window->begin ()` so that the GLUT window will be automatically added to it.
- Use `glutInitWindowSize ()` and `glutInitWindowPosition ()` to set the location in the parent window to put the GLUT window.
- Put your GLUT code next. It probably does not need many changes. Call `window->end ()` immediately after the `glutCreateWindow ()` !
- You can call either `glutMainLoop ()`, `Fl::run()`, or loop calling `Fl::wait()` to run the program.

1.17.4 class Fl_Glut_Window

1.17.4.1 Class Hierarchy

```
Fl_Gl_Window
|
+----Fl_Glut_Window
```

1.17.4.2 Include Files

```
#include <FL/glut.H>
```

1.17.4.3 Description

Each GLUT window is an instance of this class. You may find it useful to manipulate instances directly rather than use GLUT window id's. These may be created without opening the display, and thus can fit better into FLTK's method of creating windows.

The current GLUT window is available in the global variable `glut_window`.

`new Fl_Glut_Window(...)` is the same as `glutCreateWindow()` except it does not `show()` the window or make the window current.

`window->make_current()` is the same as `glutSetWindow(number)`. If the window has not had `show()` called on it yet, some functions that assume an OpenGL context will not work. If you do `show()` the window, call `make_current()` again to set the context.

`~Fl_Glut_Window()` is the same as `glutDestroyWindow()`.

1.17.4.4 Members

The `Fl_Glut_Window` class contains several public members that can be altered directly:

member	description
<code>display</code>	A pointer to the function to call to draw the normal planes.
<code>entry</code>	A pointer to the function to call when the mouse moves into or out of the window.
<code>keyboard</code>	A pointer to the function to call when a regular key is pressed.
<code>menu[3]</code>	The menu to post when one of the mouse buttons is pressed.
<code>mouse</code>	A pointer to the function to call when a button is pressed or released.
<code>motion</code>	A pointer to the function to call when the mouse is moved with a button down.
<code>overlaydisplay</code>	A pointer to the function to call to draw the overlay planes.
<code>passivemotion</code>	A pointer to the function to call when the mouse is moved with no buttons down.
<code>reshape</code>	A pointer to the function to call when the window is resized.
<code>special</code>	A pointer to the function to call when a special key is pressed.
<code>visibility</code>	A pointer to the function to call when the window is iconified or restored (made visible.)

1.17.4.5 Methods

`Fl_Glut_Window::Fl_Glut_Window(int x, int y, int w, int h, const char *title = 0)`

`Fl_Glut_Window::Fl_Glut_Window(int w, int h, const char *title = 0)`

The first constructor takes 4 int arguments to create the window with a preset position and size. The second constructor with 2 arguments will create the window with a preset size, but the window manager will choose the position according to its own whims.

`virtual Fl_Glut_Window::~~Fl_Glut_Window()`

Destroys the GLUT window.

`void Fl_Glut_Window::make_current()`

Switches all drawing functions to the GLUT window.

1.18 Forms Compatibility

This appendix describes the Forms compatibility included with FLTK.

Warning: The Forms compatibility is deprecated and no longer maintained since FLTK 1.3.0 and is likely to be removed completely in FLTK 1.4 or 1.5

1.18.1 Importing Forms Layout Files

`FLUID` can read the `.fd` files put out by all versions of Forms and XForms `fdesign`. However, it will mangle them a bit, but it prints a warning message about anything it does not understand. `FLUID` cannot write `fdesign` files, so you should save to a new name so you don't write over the old one.

You will need to edit your main code considerably to get it to link with the output from `FLUID`. If you are not interested in this you may have more immediate luck with the forms compatibility header, `<FL/forms.H>`.

1.18.2 Using the Compatibility Header File

You should be able to compile existing Forms or XForms source code by changing the include directory switch to your compiler so that the `forms.h` file supplied with FLTK is included. The `forms.h` file simply pulls in `<FL/forms.H>` so you don't need to change your source code. Take a look at `<FL/forms.H>` to see how it works, but the basic trick is lots of inline functions. Most of the XForms demo programs work without changes.

You will also have to compile your Forms or XForms program using a C++ compiler. The FLTK library does not provide C bindings or header files.

Although FLTK was designed to be compatible with the GL Forms library (version 0.3 or so), XForms has bloated severely and its interface is X-specific. Therefore, XForms compatibility is no longer a goal of FLTK. Compatibility was limited to things that were free, or that would add code that would not be linked in if the feature is unused, or that was not X-specific.

To use any new features of FLTK, you should rewrite your code to not use the inline functions and instead use "pure" FLTK. This will make it a lot cleaner and make it easier to figure out how to call the FLTK functions. Unfortunately this conversion is harder than expected and even Digital Domain's inhouse code still uses `forms.H` a lot.

1.18.3 Problems You Will Encounter

Many parts of XForms use X-specific structures like `XEvent` in their interface. I did not emulate these! Unfortunately these features (such as the "canvas" widget) are needed by most large programs. You will need to rewrite these to use FLTK subclasses.

`FL_Free` widgets emulate the *old* Forms "free" widget. It may be useful for porting programs that change the `handle()` function on widgets, but you will still need to rewrite things.

`FL_Timer` widgets are provided to emulate the XForms timer. These work, but are quite inefficient and inaccurate compared to using `Fl::add_timeout()`.

All instance variables are hidden. If you directly refer to the `x`, `y`, `w`, `h`, `label`, or other fields of your Forms widgets you will have to add empty parenthesis after each reference. The easiest way to do this is to globally replace `"->x"` with `"->x()"`, etc. Replace `"boxtype"` with `"box()"`.

`const char *` arguments to most FLTK methods are simply stored, while Forms would `strdup()` the passed string. This is most noticeable with the label of widgets. Your program must always pass static data such as a string constant or malloc'd buffer to `label()`. If you are using labels to display program output you may want to try the `FL_Output` widget.

The default fonts and sizes are matched to the older GL version of Forms, so all labels will draw somewhat larger than an XForms program does.

`fdesign` outputs a setting of a "fdui" instance variable to the main window. I did not emulate this because I wanted all instance variables to be hidden. You can store the same information in the `user_data()` field of a window. To do this, search through the `fdesign` output for all occurrences of `"->fdui"` and edit to use `"->user_data()"` instead. This will require casts and is not trivial.

The prototype for the functions passed to `fl_add_timeout()` and `fl_set_idle_callback()` callback are different.

All the following XForms calls are missing:

- `FL_REVISION, fl_library_version()`
- `FL_RETURN_DBLCLICK` (use `Fl::event_clicks()`)
- `fl_add_signal_callback()`
- `fl_set_form_atactivate()` `fl_set_form_atdeactivate()`
- `fl_set_form_property()`
- `fl_set_app_mainform(), fl_get_app_mainform()`

- `fl_set_form_minsize()`, `fl_set_form_maxsize()`
- `fl_set_form_event_cmask()`, `fl_get_form_event_cmask()`
- `fl_set_form_dblbuffer()`, `fl_set_object_dblbuffer()` (use an [FL_Double_Window](#) instead)
- `fl_adjust_form_size()`
- `fl_register_raw_callback()`
- `fl_set_object_bw()`, `fl_set_border_width()`
- `fl_set_object_resize()`, `fl_set_object_gravity()`
- `fl_set_object_shortcutkey()`
- `fl_set_object_automatic()`
- `fl_get_object_bbox()` (maybe FLTK should do this)
- `fl_set_object_prehandler()`, `fl_set_object_posthandler()`
- `fl_enumerate_fonts()`
- **Most drawing functions**
- `fl_set_coordunit()` (FLTK uses pixels all the time)
- `fl_ringbell()`
- `fl_gettime()`
- `fl_win*()` (all these functions)
- `fl_initialize(argc, argv, x, y, z)` ignores last 3 arguments
- `fl_read_bitmapfile()`, `fl_read_pixmapfile()`
- `fl_addto_browser_chars()`
- `FL_MENU_BUTTON` just draws normally
- `fl_set_bitmapbutton_file()`, `fl_set_pixmapbutton_file()`
- `FL_CANVAS` objects
- `FL_DIGITAL_CLOCK` (comes out analog)
- `fl_create_bitmap_cursor()`, `fl_set_cursor_color()`
- `fl_set_dial_angles()`
- `fl_show_oneliner()`
- `fl_set_choice_shortcut(a, b, c)`
- command log
- Only some of file selector is emulated
- `FL_DATE_INPUT`
- `fl_pup*()` (all these functions)
- textbox object (should be easy but I had no sample programs)
- xyplot object

1.18.4 Additional Notes

These notes were written for porting programs written with the older IRISGL version of Forms. Most of these problems are the same ones encountered when going from old Forms to XForms:

Does Not Run In Background

The IRISGL library always forked when you created the first window, unless "foreground()" was called. FLTK acts like "foreground()" is called all the time. If you really want the fork behavior do "if (fork()) exit(0)" right at the start of your program.

You Cannot Use IRISGL Windows or fl_queue

If a Forms (not XForms) program if you wanted your own window for displaying things you would create a IRISGL window and draw in it, periodically calling Forms to check if the user hit buttons on the panels. If the user did things to the IRISGL window, you would find this out by having the value FL_EVENT returned from the call to Forms.

None of this works with FLTK. Nor will it compile, the necessary calls are not in the interface.

You have to make a subclass of [FL_Gl_Window](#) and write a `draw()` method and `handle()` method. This may require anywhere from a trivial to a major rewrite.

If you draw into the overlay planes you will have to also write a `draw_overlay()` method and call `redraw_↔overlay()` on the OpenGL window.

One easy way to hack your program so it works is to make the `draw()` and `handle()` methods on your window set some static variables, storing what event happened. Then in the main loop of your program, call `Fl::wait()` and then check these variables, acting on them as though they are events read from `fl_queue`.

You Must Use OpenGL to Draw Everything

The file `<FL/gl.h>` defines replacements for a lot of IRISGL calls, translating them to OpenGL. There are much better translators available that you might want to investigate.

You Cannot Make Forms Subclasses

Programs that call `fl_make_object` or directly setting the handle routine will not compile. You have to rewrite them to use a subclass of [Fl_Widget](#). It is important to note that the `handle()` method is not exactly the same as the `handle()` function of Forms. Where a Forms `handle()` returned non-zero, your `handle()` must call `do_callback()`. And your `handle()` must return non-zero if it "understood" the event.

An attempt has been made to emulate the "free" widget. This appears to work quite well. It may be quicker to modify your subclass into a "free" widget, since the "handle" functions match.

If your subclass draws into the overlay you are in trouble and will have to rewrite things a lot.

You Cannot Use `<device.h>`

If you have written your own "free" widgets you will probably get a lot of errors about "getvaluator". You should substitute:

Forms	FLTK
MOUSE_X	Fl::event_x_root()
MOUSE_Y	Fl::event_y_root()
LEFTSHIFTKEY,RIGHTSHIFTKEY	Fl::event_shift()
CAPSLOCKKEY	Fl::event_capslock()
LEFTCTRLKEY,RIGHTCTRLKEY	Fl::event_ctrl()
LEFTALTKEY,RIGHTALTKEY	Fl::event_alt()
MOUSE1,RIGHTMOUSE	Fl::event_state()
MOUSE2,MIDDLEMOUSE	Fl::event_state()
MOUSE3,LEFTMOUSE	Fl::event_state()

Anything else in `getvaluator` and you are on your own...

Font Numbers Are Different

The "style" numbers have been changed because I wanted to insert bold-italic versions of the normal fonts. If you use Times, Courier, or Bookman to display any text you will get a different font out of FLTK. If you are really desperate to fix this use the following code:

```
fl_font_name(3, "*courier-medium-r-no*");
fl_font_name(4, "*courier-bold-r-no*");
fl_font_name(5, "*courier-medium-o-no*");
fl_font_name(6, "*times-medium-r-no*");
fl_font_name(7, "*times-bold-r-no*");
fl_font_name(8, "*times-medium-i-no*");
fl_font_name(9, "*bookman-light-r-no*");
fl_font_name(10, "*bookman-demi-r-no*");
fl_font_name(11, "*bookman-light-i-no*");
```

1.19 Operating System Issues

This appendix describes the operating system specific interfaces in FLTK:

- [Accessing the OS Interfaces](#)
- [The Wayland/X11 hybrid library](#)
- [The UNIX \(X11\) Interface](#)
- [The Windows Interface](#)
- [The Apple OS X Interface](#)
- [The Wayland Interface](#)

1.19.1 Accessing the OS Interfaces

All programs that need to access the operating system specific interfaces must include the following header file:

```
#include <FL/platform.H>
```

This header file will define the appropriate interface for your environment. The pages that follow describe the functionality that is provided for each operating system.

Note

These definitions used to be in `FL/x.H` up to FLTK 1.3.x. Usage of `FL/x.H` is deprecated since FLTK 1.4.0. You should replace all references of `FL/x.H` with `FL/platform.H` if your target is FLTK 1.4 or later. `FL/x.H` will be retained for backwards compatibility for some releases but will be removed in a later (not yet specified) FLTK release.

WARNING:

The interfaces provided by this header file may change radically in new FLTK releases. Use them only when an existing generic FLTK interface is not sufficient.

1.19.2 The Wayland/X11 hybrid library

By default, the FLTK library is, under Linux and Unix, a Wayland/X11 hybrid which can run FLTK-based apps as Wayland clients or as X11 clients. The choice between running an app as a Wayland or an X11 client is done as follows, when the app runs function `fl_open_display()` (that function can be called explicitly by the app or implicitly by FLTK, for example the first time an `Fl_Window` is shown):

- if the app contains a global boolean variable named `fl_disable_wayland` and this variable is true, X11 is used;
- if environment variable `FLTK_BACKEND` is not defined, Wayland is used if a Wayland compositor is available, otherwise X11 is used;
- if `$FLTK_BACKEND` equals "wayland", the library makes the app a Wayland client, and stops with error if no Wayland compositor is available;
- if `$FLTK_BACKEND` equals "x11", the library makes the app an X11 client even if a Wayland compositor is available.

The first condition listed above is meant to facilitate conversion of code written for FLTK 1.3.x and containing X11-specific code; add this single statement anywhere in the app's source code:

```
FL_EXPORT bool fl_disable_wayland = true;
```

and the app will always run as an X11 client.

After function `fl_open_display()` has been called, exactly one of the functions `fl_wl_display()` and `fl_x11_display()` returns a non-NULL value. When the former function does, the app runs as a Wayland client, and Wayland-specific functions and symbols described below ([The Wayland Interface](#)) can be used, whereas X11-specific functions and symbols cannot. Otherwise, the app runs as an X11 client, and only X11-specific functions and symbols below ([The UNIX \(X11\) Interface](#)) can be used.

Because a single app can be expected to run either Wayland or X11, it's necessary to use distinct names for global variables and functions in the X11- and the Wayland-specific source code.

Non-default configurations of the FLTK library under Linux/Unix are described in file `README.Wayland.txt`.

1.19.3 The UNIX (X11) Interface

Cross-platform applications should bracket X11-specific source code between `#if defined(FLTK_USE_X11) / #endif` and should ensure function `fl_x11_display()` returns non-NULL before calling X11-specific functions and using X11-specific symbols.

The UNIX interface provides access to the X Window System state information and data structures.

1.19.3.1 Handling Other X Events

void [Fl::add_handler](#)(int (*f)(int))

Installs a function to parse unrecognized events. If FLTK cannot figure out what to do with an event, it calls each of these functions (most recent first) until one of them returns non-zero. If none of them returns non-zero then the event is ignored.

FLTK calls this for any X events it does not recognize, or X events with a window ID that FLTK does not recognize. You can look at the X event in the `fl_xevent` variable.

The argument is the FLTK event type that was not handled, or zero for unrecognized X events. These handlers are also called for global shortcuts and some other events that the widget they were passed to did not handle, for example `FL_SHORTCUT`.

extern XEvent *fl_xevent

This variable contains the most recent X event.

extern ulong fl_event_time

This variable contains the time stamp from the most recent X event that reported it; not all events do. Many X calls like cut and paste need this value.

Window fl_xid(const Fl_Window *)

Returns the XID for a window, or zero if not `shown()`.

Deprecated Kept for compatibility with FLTK versions before 1.4. Use preferentially [fl_x11_xid\(const Fl_Window *\)](#) with versions 1.4 and above.

[Fl_Window](#) *fl_find(ulong xid)

Returns the [Fl_Window](#) that corresponds to the given XID, or `NULL` if not found. This function uses a cache so it is slightly faster than iterating through the windows yourself.

Deprecated Kept for compatibility with FLTK versions before 1.4. Use preferentially [fl_x11_find\(Window\)](#) with versions 1.4 and above.

int fl_handle(const XEvent &)

This call allows you to supply the X events to FLTK, which may allow FLTK to cooperate with another toolkit or library. The return value is non-zero if FLTK understood the event. If the window does not belong to FLTK and the `add_handler()` functions all return 0, this function will return false.

Besides feeding events your code should call [Fl::flush\(\)](#) periodically so that FLTK redraws its windows.

This function will call the callback functions. It will not return until they complete. In particular, if a callback pops up a modal window by calling `fl_ask()`, for instance, it will not return until the modal function returns.

1.19.3.2 Drawing using Xlib

The following global variables are set before `Fl_Widget::draw()` is called, or by `Fl_Window::make_current()`:

```
extern Display *fl_display; // for compatibility with previous FLTK versions
extern Display *fl_x11_display(); // preferred access starting with FLTK 1.4
extern Window fl_window;
extern GC fl_gc; // for compatibility with previous FLTK versions
extern GC fl_x11_gc(); // preferred access starting with FLTK 1.4
extern int fl_screen;
extern XVisualInfo *fl_visual;
extern Colormap fl_colormap;
```

You must use them to produce Xlib calls. Don't attempt to change them. A typical X drawing call is written like this: `XDrawSomething(fl_display, fl_window, fl_gc, ...);`

Other information such as the position or size of the X window can be found by looking at `Fl_Window::current()`, which returns a pointer to the `Fl_Window` being drawn.

```
unsigned long fl_xpixel(Fl_Color i)
unsigned long fl_xpixel(uchar r, uchar g, uchar b)
```

Returns the X pixel number used to draw the given FLTK color index or RGB color. This is the X pixel that `fl_color()` would use.

```
int fl_parse_color(const char* p, uchar& r, uchar& g, uchar& b)
```

Convert a name into the red, green, and blue values of a color by parsing the X11 color names. On other systems, `fl_parse_color()` can only convert names in hexadecimal encoding, for example `#ff8083`.

```
extern XFontStruct *fl_xfont
```

Points to the font selected by the most recent `fl_font()`. This is not necessarily the current font of `fl_gc`, which is not set until `fl_draw()` is called. If FLTK was compiled with Xft support, `fl_xfont` will usually be 0 and `fl_xftfont` will contain a pointer to the `XftFont` structure instead.

```
extern void *fl_xftfont
```

If FLTK was compiled with Xft support enabled, `fl_xftfont` points to the xft font selected by the most recent `fl_font()`. Otherwise it will be 0. `fl_xftfont` should be cast to `XftFont*`.

1.19.3.3 Changing the Display, Screen, or X Visual

FLTK uses only a single display, screen, X visual, and X colormap. This greatly simplifies its internal structure and makes it much smaller and faster. You can change which it uses by setting global variables *before the first `Fl_Window::show()` is called*. You may also want to call `Fl::visual()`, which is a portable interface to get a full color and/or double buffered visual.

```
int Fl::display(const char *)
```

Set which X display to use. This actually does `putenv("DISPLAY=...")` so that child programs will display on the same screen if called with `exec()`. This must be done before the display is opened. This call is provided under MacOS and Windows but it has no effect.

extern Display *fl_display

The open X display. This is needed as an argument to most Xlib calls. Don't attempt to change it! This is `NULL` before the display is opened.

void fl_open_display()

Opens the display. Does nothing if it is already open. This will make sure `fl_display` is non-zero. You should call this if you wish to do X calls and there is a chance that your code will be called before the first `show()` of a window.

This may call `Fl::abort()` if there is an error opening the display.

void fl_x11_use_display(Display *d)

Directs FLTK to use a pre-established X11 connection.

void fl_close_display()

This closes the X connection. You do *not* need to call this to exit, and in fact it is faster to not do so! It may be useful to call this if you want your program to continue without the X connection. You cannot open the display again, and probably cannot call any FLTK functions.

extern int fl_screen

Which screen number to use. This is set by `fl_open_display()` to the default screen. You can change it by setting this to a different value immediately afterwards. It can also be set by changing the last number in the `Fl::display()` string to "host:0.#".

extern XVisualInfo *fl_visual
extern Colormap fl_colormap

The visual and colormap that FLTK will use for all windows. These are set by `fl_open_display()` to the default visual and colormap. You can change them before calling `show()` on the first window. Typical code for changing the default visual is:

```
Fl::args(argc, argv); // do this first so $DISPLAY is set
fl_open_display();
fl_visual = find_a_good_visual(fl_display, fl_screen);
if (!fl_visual) Fl::abort("No good visual");
fl_colormap = make_a_colormap(fl_display, fl_visual->visual, fl_visual->depth);
// it is now ok to show() windows:
window->show(argc, argv);
```

1.19.3.4 Using a Subclass of `Fl_Window` for Special X Stuff

FLTK can manage an X window on a different screen, visual and/or colormap, you just can't use FLTK's drawing routines to draw into it. But you can write your own `draw()` method that uses Xlib (and/or OpenGL) calls only.

FLTK can also manage XID's provided by other libraries or programs, and call those libraries when the window needs to be redrawn.

To do this, you need to make a subclass of `Fl_Window` and override some of these virtual functions:

virtual void `Fl_Window::show()`

If the window is already `shown()` this must cause it to be raised, this can usually be done by calling `Fl_Window::show()`. If not `shown()` your implementation must call either `Fl_X::set_xid()` or `Fl_X::make_xid()`.

An example:

```
void MyWindow::show() {
    if (shown()) {Fl_Window::show(); return;} // you must do this!
    fl_open_display(); // necessary if this is first window
    // we only calculate the necessary visual colormap once:
    static XVisualInfo *visual;
    static Colormap colormap;
    if (!visual) {
        visual = figure_out_visual();
        colormap = XCreateColormap(fl_display, RootWindow(fl_display, fl_screen),
                                   vis->visual, AllocNone);
    }
    Fl_X::make_xid(this, visual, colormap);
}
```

```
Fl_X *Fl_X::set_xid(Fl_Window*, Window xid)
```

Allocate a hidden class called an `Fl_X`, put the XID into it, and set a pointer to it from the `Fl_Window`. This causes `Fl_Window::shown()` to return true.

```
void Fl_X::make_xid(Fl_Window*, XVisualInfo* = fl_visual, Colormap = fl_colormap)
```

This static method does the most onerous parts of creating an X window, including setting the label, resize limitations, etc. It then does `Fl_X::set_xid()` with this new window and maps the window.

virtual void `Fl_Window::flush()`

This virtual function is called by `Fl::flush()` to update the window. For FLTK's own windows it does this by setting the global variables `fl_window` and `fl_gc` and then calling the `draw()` method. For your own windows you might just want to put all the drawing code in here.

The X region that is a combination of all `damage()` calls done so far is in `Fl_X::flx(this)->region`. If `NULL` then you should redraw the entire window. The undocumented function `fl_clip_region()` (↔ `XRegion`) will initialize the FLTK clip stack with a region or `NULL` for no clipping. You must set region to `NULL` afterwards as `fl_clip_region()` will own and delete it when done.

If `damage()` & `FL_DAMAGE_EXPOSE` then only X expose events have happened. This may be useful if you have an undamaged image (such as a backing buffer) around.

Here is a sample where an undamaged image is kept somewhere:

```
void MyWindow::flush() {
    fl_clip_region(Fl_X::flx(this)->region);
    Fl_X::flx(this)->region = 0;
    if (damage() != 2) {... draw things into backing store ...}
    ... copy backing store to window ...
}
```

Note

For compatibility with FLTK versions before 1.4, member function `Fl_X::flx(Fl_Window*)` can also be written `Fl_X::i(Fl_Window*)`.

virtual void `Fl_Window::hide()`

Destroy the window server copy of the window. Usually you will destroy contexts, pixmaps, or other resources used by the window, and then call `Fl_Window::hide()` to get rid of the main window identified by `xid()`. If you override this, you must also override the destructor as shown:

```
void MyWindow::hide() {
    if (mypixmap) {
        XFreePixmap(fl_display, mypixmap);
        mypixmap = 0;
    }
    Fl_Window::hide(); // you must call this
}
```

virtual void `Fl_Window::~~Fl_Window()`

Because of the way C++ works, if you override `hide()` you *must* override the destructor as well (otherwise only the base class `hide()` is called):

```
MyWindow::~MyWindow() {
    hide();
}
```

Note

Access to the `Fl_X` hidden class requires to `#define FL_INTERNALS` before compilation.

1.19.3.5 Setting the Icon of a Window

FLTK recommends to set window icons using these platform-independent methods: `FL_Window::icon(const FL_RGB_Image *)` and `FL_Window::icons(const FL_RGB_Image *[], int)`. See also methods setting default window icons `FL_Window::default_icon(const FL_RGB_Image *)` and `FL_Window::default_icons(const FL_RGB_Image *[], int)`.

FLTK on X11 also supports, for backward compatibility, use of the deprecated method `FL_Window::icon(const void *)` as follows :

Sets the icon for the window to the passed pointer. You will need to cast the icon `Pixmap` to a `char*` when calling this method. To set a monochrome icon using a bitmap compiled with your application use:

```
#include "icon.xbm"

fl_open_display(); // needed if display has not been previously opened

Pixmap p = XCreateBitmapFromData(fl_display, DefaultRootWindow(fl_display),
                                icon_bits, icon_width, icon_height);

window->icon((const void*)p);
```

To use a multi-colored icon, the XPM format and library should be used as follows:

```
#include <X11/xpm.h>
#include "icon.xpm"

fl_open_display(); // needed if display has not been previously opened

Pixmap p, mask;

XpmCreatePixmapFromData(fl_display, DefaultRootWindow(fl_display),
                       icon_xpm, &p, &mask, NULL);

window->icon((const void *)p);
```

When using the Xpm library, be sure to include it in the list of libraries that are used to link the application (usually `-lXpm`).

NOTE:

You must call `FL_Window::show(int argc, char** argv)` for the icon to be used. The `FL_Window::show()` method does not bind the icon to the window.

Any window icon must be set with the above methods before the window is shown.

1.19.3.6 X Resources

When the `FL_Window::show(int argc, char** argv)` method is called, FLTK looks for the following X resources:

- `background` - The default background color for widgets (color).
- `dndTextOps` - The default setting for drag and drop text operations (boolean).
- `foreground` - The default foreground (label) color for widgets (color).
- `scheme` - The default scheme to use (string).

- `selectBackground` - The default selection color for menus, etc. (color).
- `Text.background` - The default background color for text fields (color).
- `tooltips` - The default setting for tooltips (boolean).
- `visibleFocus` - The default setting for visible keyboard focus on non-text widgets (boolean).

Resources associated with the first window's `Fl_Window::xclass()` string are queried first, or if no class has been specified then the class "fltk" is used (e.g. `fltk.background`). If no match is found, a global search is done (e.g. `*background`).

1.19.3.7 Display Scaling Factor

FLTK uses the value of the `Xft.dpi` resource divided by 96. to initialize the display scaling factor. That is also what is done by the gnome and KDE desktops.

1.19.4 The Windows Interface

Cross-platform applications should bracket Windows-specific source code between `#ifdef _WIN32 / #endif`.

The Windows interface provides access to the Windows GDI state information and data structures.

1.19.4.1 Using filenames with non-ASCII characters

In FLTK, all strings, including filenames, are UTF-8 encoded. The utility functions `fl_fopen()` and `fl_open()` allow to open files potentially having non-ASCII names in a cross-platform fashion, whereas the standard `fopen()/open()` functions fail to do so.

1.19.4.2 Responding to WM_QUIT

FLTK will intercept `WM_QUIT` messages that are directed towards the thread that runs the main loop. These are converted to `SIGTERM` signals via `raise()`. This allows you to deal with outside termination requests with the same code on both Windows and UNIX systems. Other processes can send this message via `PostThreadMessage()` in order to request, rather than force your application to terminate.

1.19.4.3 Handling Other Windows API Messages

By default a single WNDCLASSEX called "FLTK" is created. All `Fl_Window`'s are of this class unless you use `Fl_Window::xclass()`. The window class is created the first time `Fl_Window::show()` is called.

You can probably combine FLTK with other libraries that make their own window classes. The easiest way is to call `Fl::wait()`, as it will call `DispatchMessage()` for all messages to the other windows. If necessary you can let the other library take over as long as it calls `DispatchMessage()`, but you will have to arrange for the function `Fl::flush()` to be called regularly so that widgets are updated, timeouts are handled, and the idle functions are called.

```
extern MSG fl_msg
```

This variable contains the most recent message read by `GetMessage()`, which is called by `Fl::wait()`. This may not be the most recent message sent to an FLTK window, because silly Windows calls the handle procedures directly for some events (sigh).

```
void Fl::add_handler(int (*f)(int))
```

Installs a function to parse unrecognized messages sent to FLTK windows. If FLTK cannot figure out what to do with a message, it calls each of these functions (most recent first) until one of them returns non-zero. The argument passed to the functions is the FLTK event that was not handled or zero for unknown messages. If all the handlers return zero then FLTK calls `DefWindowProc()`.

```
HWND fl_xid(const Fl_Window *)
```

Returns the window handle for a `Fl_Window`, or zero if not shown().

```
Fl_Window *fl_find(HWND xid)
```

Returns the `Fl_Window` that corresponds to the given window handle, or `NULL` if not found. This function uses a cache so it is slightly faster than iterating through the windows yourself.

1.19.4.4 Drawing Things Using the Windows GDI

When the virtual function `Fl_Widget::draw()` is called, FLTK stores all the extra arguments you need to make a proper GDI call in some global variables:

```
extern HINSTANCE fl_display; // for compatibility with previous FLTK versions
extern HINSTANCE fl_win32_display(); // preferred access starting with FLTK 1.4
extern HWND fl_window;
extern HDC fl_gc; // for compatibility with previous FLTK versions
extern HDC fl_win32_gc(); // preferred access starting with FLTK 1.4
COLORREF fl_rgb();
HPEN fl_pen();
HBRUSH fl_brush();
```

These global variables are set before `Fl_Widget::draw()` is called, or by `Fl_Window::make_current()`. You can refer to them when needed to produce GDI calls, but don't attempt to change them. The functions return GDI objects for the current color set by `fl_color()` and are created as needed and cached. A typical GDI drawing call is written like this:

```
DrawSomething(fl_gc, ..., fl_brush());
```

It may also be useful to refer to `Fl_Window::current()` to get the window's size or position.

1.19.4.5 HighDPI support

FLTK apps for the Windows platform are by default "Per-monitor DPI-aware V2". This means that any window automatically adjusts its physical size in relation to the scaling factor of the display where it maps. This also means that all drawings (e.g., text, lines, images) take advantage of the full resolution of the display in use. FLTK apps may also use the manifest mechanism to declare their level of DPI awareness. The FLTK library adapts to the DPI awareness level set in the app's manifest, which can be lower than the default level if the manifest sets it so.

1.19.4.6 Display Scaling Factor

FLTK uses the value given by function `GetDpiForMonitor()` divided by 96. to initialize the scaling factor of each display in the system. This matches the value of "Change the size of text, apps and other items" found in section "System" subsection "Display" of Windows settings.

1.19.4.7 Setting the Icon of a Window

FLTK recommends to set window icons using these platform-independent methods: `Fl_Window::icon(const Fl_RGB_Image *)` and `Fl_Window::icons(const Fl_RGB_Image *[], int)`. See also methods setting default window icons `Fl_Window::default_icon(const Fl_RGB_Image *)` and `Fl_Window::default_icons(const Fl_RGB_Image *[], int)`.

FLTK on Windows also supports, for backward compatibility, use of the deprecated method `Fl_Window::icon(const void *)` as follows :

Set the icon for the window to the passed pointer. You will need to cast the `HICON` handle to a `char*` when calling this method. To set the icon using an icon resource compiled with your application use:

```
window->icon((const void *)LoadIcon(fl_display, MAKEINTRESOURCE(IDI_ICON)));
```

You can also use the `LoadImage()` and related functions to load specific resolutions or create the icon from bitmap data.

NOTE:

You must call `Fl_Window::show(int argc, char** argv)` for the icon to be used. The `Fl_Window::show()` method does not bind the icon to the window.

Any window icon must be set with the above methods before the window is shown.

1.19.4.8 How to Not Get a MSDOS Console Window

Windows has a really stupid mode switch stored in the executables that controls whether or not to make a console window.

To always get a console window you simply create a console application (the `"/SUBSYSTEM:CONSOLE"` option for the linker). For a GUI-only application create a Windows application (the `"/SUBSYSTEM:WINDOWS"` option for the linker).

FLTK includes a `WinMain()` function that calls the ANSI standard `main()` entry point for you. *This function creates a console window when you use the debug version of the library.*

Windows applications without a console cannot write to `stdout` or `stderr`, even if they are run from a console window. Any output is silently thrown away. Additionally, Windows applications are run in the background by the console, although you can use `"start /wait program"` to run them in the foreground.

1.19.4.9 Known Windows Bugs and Problems

The following is a list of known bugs and problems in the Windows version of FLTK:

- If a program is deactivated, `Fl::wait()` does not return until it is activated again, even though many events are delivered to the program. This can cause idle background processes to stop unexpectedly. This also happens while the user is dragging or resizing windows or otherwise holding the mouse down. We were forced to remove most of the efficiency FLTK uses for redrawing in order to get windows to update while being moved. This is a design error in Windows and probably impossible to get around.
- `Fl_Gl_Window::can_do_overlay()` returns true until the first time it attempts to draw an overlay, and then correctly returns whether or not there is overlay hardware.
- `SetCapture` (used by `Fl::grab()`) doesn't work, and the main window title bar turns gray while menus are popped up.
- Compilation with `gcc 3.4.4` and `-Os` exposes an optimisation bug in `gcc`. The symptom is that when drawing filled circles only the perimeter is drawn. This can for instance be seen in the symbols demo. Other optimisation options such as `-O2` and `-O3` seem to work OK. More details can be found in [STR#1656](#)

1.19.5 The Apple OS X Interface

Cross-platform applications should bracket macOS-specific source code between `#if defined(__APPLE__ && !defined(FLTK_USE_X11)) / #endif`.

FLTK supports Apple OS X using the Apple Cocoa library. Older versions of MacOS are no longer supported.

Control, Option, and Command Modifier Keys

FLTK maps the Mac 'control' key to `FL_CTRL`, the 'option' key to `FL_ALT` and the 'Apple' key to `FL_META`. Furthermore, `FL_COMMAND` designates the 'Apple' key on Mac OS X and the 'control' key on other platforms. Keyboard events return the key name in `Fl::event_key()` and the keystroke translation in `Fl::event_text()`. For example, typing Option-Y on a Mac US keyboard will set `FL_ALT` in `Fl::event_state()`, set `Fl::event_key()` to 'y' and return the Yen symbol in `Fl::event_text()`.

Right Click simulation with Ctrl Click

The Apple HIG guidelines indicate applications should support 'Ctrl Click' to simulate 'Right Click' for e.g. context menus, so users with one-button mice and one-click trackpads can still access right-click features. However, paraphrasing [Manolo's comment on the fltk.coredev newsgroup](#):

- *FLTK does /not/ support Ctrl-Click == Right Click itself because Mac OS X event processing doesn't support this at the system level: the system reports left-clicks with the ctrl modifier when the user ctrl-clicks, and OS X system preferences don't allow changing this behavior. Therefore, applications must handle simulation of Right Click with Ctrl Click in the application code.*

Ian MacArthur provided the following `handle()` method code snippet showing an example of how to do this:

```

case FL_PUSH:
{
    int btn = Fl::event_button();
#ifdef __APPLE__
    int ev_state = Fl::event_state();
#endif
    //
    // Context menu can be called up in one of two ways: -
    // 1 - right click, as normally used on Windows and Linux
    // 2 - Ctrl + left click, as sometimes used on Mac
    //
#ifdef __APPLE__
    // On apple, check right click, and ctrl+left click
    if ((btn == FL_RIGHT_MOUSE) || (ev_state == (FL_CTRL | FL_BUTTON1)))
#else
    // On other platforms, only check right click as ctrl+left is used for selections
    if (btn == FL_RIGHT_MOUSE)
#endif
    {
        // Did we right click on the object?..
    }
}

```

There is a thread about this subject on `ftk.coredev` (Aug 1-14, 2014) entitled "[RFC] Right click emulation for one button mouse on Mac".

Apple "Quit" Event

When the user presses `Cmd-Q` or requests a termination of the application, FLTK sends an `FL_CLOSE` event to all open windows. If any window remains open, the termination request aborts. If all windows close, the application's event loop terminates, that is, `Fl::run()` returns. The application can then follow FLTK's normal termination path executing cleanup code that may be programmed after termination of the event loop, and returning from `main()`. Function `Fl::program_should_quit()` allows to detect whether the event loop terminated because of a program termination request.

Apple "Open" Event

Whenever the user drops a file onto an application icon, OS X generates an Apple Event of the type "Open". You can have FLTK notify you of an Open event by calling the `fl_open_callback()` function.

void `fl_open_display()`

Opens the display. Does nothing if it is already open. You should call this if you wish to do Cocoa or Quartz calls and there is a chance that your code will be called before the first `show()` of a window.

Window `fl_xid(const Fl_Window *)`

Returns the window reference for an `Fl_Window`, or `NULL` if the window has not been shown. This reference is a pointer to an instance of the subclass `FLWindow` of Cocoa's `NSWindow` class.

`Fl_Window *fl_find(Window xid)`

Returns the [FL_Window](#) that corresponds to the given window reference, or `NULL` if not found.

```
void fl_mac_set_about( FL_Callback *cb, void *user_data, int shortcut)
```

Attaches the callback `cb` to the "About myprog" item of the system application menu. `cb` will be called with `NULL` first argument and `user_data` second argument. This MacOS-specific function is deprecated in FLTK 1.4 and replaced by [FL_Sys_Menu_Bar::about\(FL_Callback *cb, void *data\)](#) which is cross-platform.

[FL_Sys_Menu_Bar](#) class

The [FL_Sys_Menu_Bar](#) class allows to build menu bars that, on Mac OS X, are placed in the system menu bar (at top-left of display), and, on other platforms, at a user-chosen location of a user-chosen window.

1.19.5.1 Setting the icon of an application

- First, create a `.icns` file containing several copies of your icon of decreasing sizes. This can be done using the Preview application or the Icon Composer application available in "Graphics Tools for Xcode". To create a high resolution icon file, it is necessary to use the `iconutil` command-line utility.
- Put your `.icns` file in the Resources subdirectory of your application bundle.
- Add these two lines to the `Info.plist` file of your application bundle

```
<key>CFBundleIconFile</key>
<string>foo.icns</string>
```

replacing `foo` by your application name. If you use Xcode, just add your `.icns` file to your application target.

1.19.5.2 Drawing Things Using Quartz

All code inside [FL_Widget::draw\(\)](#) is expected to call Quartz drawing functions. The Quartz coordinate system is flipped to match FLTK's coordinate system. The origin for all drawing is in the top left corner of the enclosing [FL_Window](#). The function [fl_mac_gc\(\)](#) returns the appropriate Quartz 2D drawing environment (of type `CGContextRef`). For compatibility with previous FLTK versions, deprecated global variable `fl_gc` gives the same value.

Include [FL/platform.H](#) to declare the [fl_mac_gc\(\)](#) function (or the `fl_gc` variable).

1.19.5.3 Internationalization

All FLTK programs contain an application menu with, e.g., the About xxx, Hide xxx, and Quit xxx items. This menu can be internationalized/localized by any of two means.

- using the [FL_Mac_App_Menu](#) class.
- using the standard Mac OS X localization procedure. Create a language-specific `.lproj` directory (e.g., `German.lproj`) in the Resources subdirectory of the application bundle. Create therein a `Localizable.strings` file that translates all menu items to this language. The German `Localizable.strings` file, for example, contains:

```
"About %@", "Über %@";
"Print Front Window"="Frontfenster drucken";
"Services" = "Dienste";
"Hide %@", "%@ ausblenden";
"Hide Others"="Andere ausblenden";
"Show All"="Alle einblenden";
"Quit %@", "%@ beenden";
```

Set `"Print Front Window" = ""`; therein so the application menu doesn't show a "Print Front Window" item. To localize the application name itself, create a file `InfoPlist.strings` in each `.lproj` directory and put `CFBundleName = "localized name"`; in each such file.

1.19.5.4 OpenGL and 'retina' displays

It is possible to have OpenGL produce graphics at the high pixel resolution allowed by the so-called 'retina' displays present on recent Apple hardware. For this, call

```
Fl::use_high_res_GL(1);
```

before any `Fl_Gl_Window` is shown. Also, adapt your `Fl_Gl_Window::draw()` and `Fl_Gl_Window::draw_overlay()` methods replacing

```
glViewport(0, 0, w(), h());
```

by

```
glViewport(0, 0, pixel_w(), pixel_h());
```

making use of the `Fl_Gl_Window::pixel_w()` and `Fl_Gl_Window::pixel_h()` methods that return the width and height of the GL scene in pixels: if the `Fl_Gl_Window` is mapped on a retina display, these methods return twice as much as reported by `Fl_Widget::w()` and `Fl_Widget::h()`; if it's mapped on a regular display, they return the same values as `w()` and `h()`. These methods dynamically change their values if the window is moved into/out from a retina display. If `Fl::use_high_res_GL(1)` is not called, all `Fl_Gl_Window`'s are drawn at low resolution. These methods are useful on all platforms because `Fl_Gl_Window::w()` and `Fl_Gl_Window::h()` don't return, on HighDPI displays, the quantities in pixels necessary to OpenGL functions.

The `Fl_Gl_Window::pixels_per_unit()` method is useful when the OpenGL code depends on the pixel dimension of the GL scene. This occurs, e.g., if a window's `handle()` method uses `Fl::event_x()` and `Fl::event_y()` whose returned values should be multiplied by `Fl_Gl_Window::pixels_per_unit()` to obtain the adequate pixel units. This method may also be useful, for example, to adjust the width of a line in a high resolution GL scene.

1.19.5.5 Fl_Double_Window

OS X double-buffers all windows automatically. On OS X, `Fl_Window` and `Fl_Double_Window` are handled internally in the same way.

1.19.5.6 Mac File System Specifics

Resource Forks

FLTK does not access the resource fork of an application. However, a minimal resource fork must be created for OS X applications. Starting with OS X 10.6, resource forks are no longer needed.

Caution (OS X 10.2 and older):

When using UNIX commands to copy or move executables, OS X will NOT copy any resource forks! For copying and moving use `CpMac` and `MvMac` respectively. For creating a tar archive, all executables need to be stripped from their Resource Fork before packing, e.g. `"DeRez fluid > fluid.r"`. After unpacking the Resource Fork needs to be reattached, e.g. `"Rez fluid.r -o fluid"`.

It is advisable to use the Finder for moving and copying and Mac archiving tools like Sit for distribution as they will handle the Resource Fork correctly.

Mac File Paths

FLTK uses UTF-8-encoded UNIX-style filenames and paths.

See also

[Mac OS X-specific symbols](#)

1.19.6 The Wayland Interface

Cross-platform applications should bracket Wayland-specific source code between `#ifdef FLTK_USE_WAYLAND / #endif` and should ensure function `fl_wl_display()` returns non-NULL before calling Wayland-specific functions and using Wayland-specific symbols.

```
extern struct wl_display *fl_wl_display();
```

After `fl_open_display()` has run, function `fl_wl_display()` returns a pointer to the struct `wl_display` representing the connection between the application and Wayland. For example, `wl_display_get_fd(fl_wl_display())` gives the file descriptor one can use to communicate with the Wayland compositor according to the Wayland protocol.

```
struct wld_window *fl_wl_xid(const FL_Window *)
```

Returns a pointer to an FLTK-defined structure holding Wayland-related data created when a window gets `show()`, or NULL if not `show()`.

```
FL_Window *fl_wl_find(struct wld_window * wld_win)
```

Returns the [FL_Window](#) that corresponds to the given Window, or NULL if not found.

```
struct wl_surface *fl_wl_surface(struct wld_window *wld_win)
```

Returns a pointer to the struct `wl_surface` corresponding to a `show()` top-level window or subwindow.

```
cairo_t *fl_wl_gc()
```

Drawing natively to a Wayland window : Within an overridden `FL_Widget::draw()` method, or after a call to `FL_Window::make_current()`, it's possible to draw using the Cairo library. Function `fl_wl_gc()` returns the adequate `cairo_t*` value. Regular FLTK coordinates, with top-left origin, are to be used. All FLTK-defined drawing functions (e.g., `fl_rect()`, `fl_draw()`) can be used too.

```
void fl_close_display()
```

This closes the Wayland connection. You do not need to call this to exit. It may be useful to call this if you want your program to continue without the Wayland connection. You cannot open the display again, and cannot call any FLTK functions.

See also

[wayland.H](#) for all functions specific of the Wayland platform.

1.19.6.1 HiDPI display support

FLTK Wayland apps automatically scale according to the Wayland-defined, integer-valued scale factor. On a HiDPI display, it's enough to set this factor to 2 for any FLTK app to be drawn using twice as many pixels and thus to be as readable as it is on a regular display. With the gnome and KDE-plasma desktops, that is achieved in the "Displays" section of the "Settings" application, selecting 200 % for the "Scale" parameter. In addition to this, FLTK apps can also be scaled up or down typing `ctrl+/-/0/` and with the `FLTK_SCALING_FACTOR` environment variable.

1.19.6.2 Window icons

Standard FLTK functions `Fl_Window::icon(const Fl_RGB_Image*)`, `Fl_Window::icons(const Fl_RGB_Image*[], int)`, `Fl_Window::default_icon(const Fl_RGB_Image*)` and `Fl_Window::default_icons(const Fl_RGB_Image*[], int)` have no effect on the Wayland platform. The equivalent of a call to `Fl_Window::default_icon(const Fl_RGB_Image*)` to set the application-specific window icon can be obtained as follows, using FLTK's editor app as an example:

- create a text file named `editor.desktop` containing :

```
[Desktop Entry]
Version=1.0
Type=Application
Name=Editor
Name[fr]=Editeur
Comment=FLTK editor
Exec=editor %F
Icon=/path/to/icon/file/editor.svg
MimeType=text/plain
```

- The `Name=` line therein determines the string displayed when the app runs.
- Optionally, one or more `Name[locale]=` lines can be used to set locale-specific app names.
- The `Icon=` line accepts also `.png` files.
- Put this file in `/usr/local/share/applications/` so it's available to all system users or in `$HOME/.local/share/applications/` so it's available to a single user.

1.19.6.3 Window titlebars

Wayland supports both client-side window decoration (CSD), where client applications are responsible for drawing window titlebars, and server-side window decoration (SSD), where the Wayland compositor itself draws window titlebars. Among 4 tested Wayland compositors, Mutter (gnome's compositor) and Weston use CSD mode whereas the KWin and Sway compositors use SSD mode. When running in CSD mode, FLTK uses a library called `libdecor` to draw titlebars. The `libdecor` library has been conceived to use various plug-in's to draw titlebars in various fashions intended to match any desktop's preferred titlebar style. FLTK supports drawing titlebars with any `libdecor` plug-in via an environment variable called `LIBDECOR_PLUGIN_DIR` which can be given the name of a directory containing the desired plug-in. When `LIBDECOR_PLUGIN_DIR` is not defined, or points to a directory that doesn't contain a `libdecor` plug-in, FLTK uses its built-in plug-in to draw titlebars. That is the most common situation, until `libdecor` plug-in's become available for popular UNIX desktops.

1.20 Migrating Code from FLTK 1.3 to 1.4

This appendix describes the differences between FLTK 1.3.x and FLTK 1.4.x functions and classes and potential requirements to change source code.

We also explain how code can be made compatible so it can be compiled by both FLTK 1.3.x and 1.4.x.

If you need to migrate your code from prior FLTK versions to FLTK 1.4, then you should first consult the relevant appendices in the FLTK 1.3 online documentation or by downloading the FLTK 1.3 documentation. See <https://www.fltk.org/doc-1.3/index.html> and/or <https://www.fltk.org/software.php>, respectively.

1.20.1 Changes in Header Files

We strive to include only necessary header files in the public headers of the FLTK library to reduce dependencies and hence compile times.

We try to avoid including system header files as far as possible. Known exceptions are `<stdio.h>` where file system structures and functions are visible in the public API, for instance `FILE*`, and sometimes essential header files like `<stdlib.h>` and/or `<stddef.h>`. Some required system headers **may** be included in platform specific header files like `<FL/platform.H>` or `<FL/platform_types.h>`.

In earlier versions (1.3.x) some of the public FLTK headers included some not strictly required system headers by accident.

The consequence for building user programs with FLTK 1.4 is that if you require a system or FLTK header in your user program that you don't *#include* explicitly but which has been included by FLTK 1.3.x your FLTK 1.3 program may issue compiler errors or warnings about missing header files or missing declarations when compiled with FLTK 1.4.

This is not a fault of FLTK 1.4 but a fault of the source code that did not include all required headers.

In FLTK 1.4 inclusion of `<FL/FI.H>` is no longer a strict requirement as it was required and documented in FLTK 1.3.x. In FLTK 1.4 you may still need to `#include <FL/FI.H>` if you are using enumerations or methods of class `Fl` like `Fl::run()` but there are exceptions where this header is included by other FLTK headers, like `Fl_Window.H` and other subclasses.

Suggested solution: include all FLTK and system header files your source code requires explicitly and don't rely on FLTK headers to include a particular header file. If you want your code to be as much as possible compatible with FLTK 1.3.x, then you should `#include <FL/FI.H>` as required by 1.3.x.

You don't need to include headers of base classes - this is done by all FLTK headers as required. Besides that you need to include some support headers if you use FLTK functions like `fl_choice()` and others. This is described in the function's documentation (if a required header is missing in the docs this is a bug).

If you follow these rules your program will be compatible with both FLTK 1.3.x and FLTK 1.4.x as long as you use only functions and classes defined in FLTK 1.3.

1.20.2 FI_Preferences

Starting with FLTK 1.3, preference databases are expected to be in UTF-8 encoding. Previous databases were stored in the current character set or code page which renders them incompatible for text entries using international characters.

Starting with FLTK 1.4, searching a valid path to store the preference files has changed slightly. Please see `Fl_Preferences::Fl_Preferences(Root, const char*, const char*)` for details.

On Unix/Linux platforms new FLTK preference files are stored using the [XDG Base Directory Specification](#) which means in essence that user preference files are stored in the user's home directory under the subdirectory `.config`, i.e. in `$HOME/.config/fltk.org/` rather than `$HOME/.fltk/fltk.org/`. Existing preference files are still found and used, hence this new location is optional.

You may want to move the preference files from their old locations to their new locations as documented in `Fl_Preferences::Fl_Preferences(Root, const char*, const char*)`.

New `Fl_Preferences` types `Fl_Preferences::USER_L`, `Fl_Preferences::SYSTEM_L` and some more combinations with `"_L"` suffix have been defined to make preference files independent of the current locale. This is particularly important for floating point data which is stored in text form with varying decimal separator depending on the locale (either `'.'` or `','`). You may want to change your program to use these new constants instead of those without the `"_L"` suffix. For more information see the documentation of [Fl_Preferences](#).

1.20.3 Fl::add_timeout and friends

Since FLTK 1.4.0 internal timeout handling has been unified across platforms. This ensures equal timeout handling, improved accuracy of `Fl::repeat_timeout()`, and easier maintenance (less potential for errors).

This will very likely not affect user code, however there is one subtle exception on macOS and Windows: in FLTK 1.3.x these platforms used system timers to schedule timeouts. Since FLTK 1.4.0 all platforms use the same internal timer management that was previously only used on Unix/Linux/X11. The consequence of this change is that the FLTK event loop needs to be executed to trigger timeout events, i.e. you must either call `Fl::wait()` repeatedly or start the event loop with `Fl::run()`.

Code that did not execute the event loop and relied on the system timers has never been cross platform compatible, i.e. it wouldn't work on Unix/Linux. An example would be code that opened a splash window, scheduled a timeout with `Fl::add_timeout()`, and waited for the timer event w/o running the FLTK event loop. Such code must be modified to execute `Fl::run()` and/or use `Fl::wait()`.

1.20.4 New FL_OVERRIDE Macro

FLTK 1.4 defines a new macro `FL_OVERRIDE` as "override" if a recent C++ standard (C++11 or higher) is used to compile your code.

This macro is currently defined in `FL/fl_attr.h` but this may change in a future release. It is enough to `#include <FL/Fl.H>` to enable this macro.

Unfortunately Visual Studio does not define a meaningful value of `__cplusplus` to detect the C++ standard. Hence we use the Visual Studio version (2015 or higher) to decide whether we can define `FL_OVERRIDE` or not.

The `FL_OVERRIDE` macro is used to decorate declarations of overridden virtual methods in subclasses. Example code from `FL/Fl_Window.H`:

```
int handle(int) FL_OVERRIDE;
void resize(int X, int Y, int W, int H) FL_OVERRIDE;
Fl_Window * as_window() FL_OVERRIDE { return this; }
```

The `FL_OVERRIDE` macro translates to `'override'` on newer compilers and to an empty string for older compilers.

We recommend to add this to your overridden virtual methods in subclasses derived from FLTK base classes (widgets) and to compile with C++ standard C++11 or higher to enable the compiler to detect some errors if methods are not overridden correctly.

You don't need to declare the overridden methods `'virtual'` if you use `FL_OVERRIDE` or the keyword `override`.

Hint: For the GCC and clang compilers you can enable the warning `'-Wsuggest-override'` to detect where you may (want to) add the `FL_OVERRIDE` macro.

1.20.5 Fl_Image::copy() 'const'

Since FLTK 1.4.0 the virtual method `Fl_Image::copy()` has been declared `'const'` so read-only (`'const'`) images can be copied w/o casts.

This will very likely not affect user code. However, if you derived your own class from any of the `Fl_*_Image` variants **and** you overrode `Your_Image::copy()` then you **must** declare this `'const'` as well, i.e. you must add the keyword `'const'` to the declaration of `copy()` in your header file and in the implementation.

We suggest to add the new `FL_OVERRIDE` macro or the keyword `'override'` (see above) to your own overridden method declarations to enable the compiler to detect such incompatibilities.

Code example in header file:

```
class Your_Image {
    // ...
    Fl_Image *copy() const FL_OVERRIDE;
    Fl_Image *copy(int w, int h) const FL_OVERRIDE;
};
```

Note the `'const'` attribute **and** the `FL_OVERRIDE` macro.

1.20.6 Modern CMake

FLTK 1.4.0 supports "modern" CMake rather than old or "classic" CMake which was used in FLTK 1.3.x. Modern CMake was introduced in CMake 3.0 (~ 2014) and further developed in later CMake versions. FLTK 1.4.0 requires at least CMake 3.15 (~ 2019) as of February 2024.

There are a lot of advantages that motivated this transition (mentioning only some):

- easier to use for projects using FLTK
- better structure
- uses CMake targets rather than variables
- embeddable in user projects via `FetchContent()` etc.
- embeddable in user projects via `add_subdirectory()`
- better coexistence with main projects if built as a subproject

Note that CMake targets can provide all required build flags and build dependencies which is the main advantage for user projects. For instance, instead of linking both `fltk` and `fltk_images` you need only `fltk_images` and `fltk` is linked in automatically.

Unfortunately there is one drawback you may encounter: Several CMake build option names have been changed, compared to FLTK 1.3.x. This is due to the fact that CMake cache variables are shared between the main (aka superbuild) project and all subprojects. Therefore all FLTK options are now prefixed with `FLTK_`.

This feature is now CMake standard and very common in newer projects. The CMake developers recommend strongly to use modern CMake.

We took the opportunity to redesign all CMake related options and target names for FLTK 1.4.0 to avoid changing these names later. Note that CMake support in 1.3.x was only experimental and the one in FLTK 1.4 (Git) up to the official release was beta state by definition. We apologize for all inconveniences, hope that this is one of the rare exceptions in FLTK development, and that the new names are now stable as usual.

Changes in Detail:

Since FLTK 1.4.0 CMake target names are "namespaced", i.e. they are created with the prefix `'fltk::'` and the old prefix `'fltk_'` has been stripped off as far as the `CMakeLists.txt` file of user projects is concerned. The known filenames on disk did not change though.

The shared library target names use the common suffix `"-shared"` rather than `"_SHARED"`.

The library `'fltk_cairo'` is no longer used. Its functionality has been included in `libfltk`. FLTK 1.4.0 creates a dummy (empty) `libfltk_cairo` for backwards compatibility only. Please remove `fltk_cairo` from your projects and use only `'fltk::fltk'` and/or the other libraries instead.

For more information and documentation of all options please refer to the file `README.CMake.txt` in the FLTK root directory.

Old and New Library Targets:

Library	Old Target	New Target	Shared Library Target
<code>fltk</code>	<code>fltk</code>	<code>fltk::fltk</code>	<code>fltk::fltk-shared</code>
<code>fltk_forms</code>	<code>fltk_forms</code>	<code>fltk::forms</code>	<code>fltk::forms-shared</code>
<code>fltk_gl</code>	<code>fltk_gl</code>	<code>fltk::gl</code>	<code>fltk::gl-shared</code>
<code>fltk_images</code>	<code>fltk_images</code>	<code>fltk::images</code>	<code>fltk::images-shared</code>
<code>fltk_jpeg</code>	<code>fltk_jpeg</code>	<code>fltk::jpeg</code>	<code>fltk::jpeg-shared</code>
<code>fltk_png</code>	<code>fltk_png</code>	<code>fltk::png</code>	<code>fltk::png-shared</code>
<code>fltk_z</code>	<code>fltk_z</code>	<code>fltk::z</code>	<code>fltk::z-shared</code>
<code>fluid</code>	<code>fluid</code>	<code>fltk::fluid</code>	n/a

For project developers used to the old (1.3.x) names the following table can assist to find the new option names. This table is ordered alphabetically by the old option name. Note that some option names did not change and some of the "old" names have been introduced in early 1.4.0 development.

Old Option Name (FLTK 1.3.x)	New Option Name (FLTK 1.4.x)
FLTK_BUILD_EXAMPLES	FLTK_BUILD_EXAMPLES
FLTK_BUILD_FLTK_OPTIONS	FLTK_BUILD_FLTK_OPTIONS
FLTK_BUILD_FLUID	FLTK_BUILD_FLUID
FLTK_BUILD_FORMS	FLTK_BUILD_FORMS
FLTK_BUILD_TEST	FLTK_BUILD_TEST
FLTK_MSVC_RUNTIME_DLL	FLTK_MSVC_RUNTIME_DLL
OPTION_ABI_VERSION	FLTK_ABI_VERSION
OPTION_ALLOW_GTK_PLUGIN	FLTK_USE_LIBDECOR_GTK
OPTION_APPLE_X11	FLTK_BACKEND_X11
OPTION_ARCHFLAGS	FLTK_ARCHFLAGS
OPTION_BUILD_HTML_DOCUMENTATION	FLTK_BUILD_HTML_DOCS
OPTION_BUILD_PDF_DOCUMENTATION	FLTK_BUILD_PDF_DOCS
OPTION_BUILD_SHARED_LIBS	FLTK_BUILD_SHARED_LIBS
OPTION_CAIRO	FLTK_OPTION_CAIRO_WINDOW
OPTION_CAIROEXT	FLTK_OPTION_CAIRO_EXT
OPTION_CREATE_LINKS	FLTK_INSTALL_LINKS
OPTION_FILESYSTEM_SUPPORT	FLTK_OPTION_FILESYSTEM_SUPPORT
OPTION_INCLUDE_DRIVER_DOCUMENTATION	FLTK_INCLUDE_DRIVER_DOCS
OPTION_INSTALL_HTML_DOCUMENTATION	FLTK_INSTALL_HTML_DOCS
OPTION_INSTALL_PDF_DOCUMENTATION	FLTK_INSTALL_PDF_DOCS
OPTION_LARGE_FILE	FLTK_OPTION_LARGE_FILE
OPTION_OPTIM	FLTK_OPTION_OPTIM
OPTION_PRINT_SUPPORT	FLTK_OPTION_PRINT_SUPPORT
OPTION_USE_CAIRO	FLTK_GRAPHICS_CAIRO
OPTION_USE_GDIPLUS	FLTK_GRAPHICS_GDIPLUS
OPTION_USE_GL	FLTK_BUILD_GL
OPTION_USE_KDIALOG	FLTK_USE_KDIALOG
OPTION_USE_PANGO	FLTK_USE_PANGO
OPTION_USE_POLL	FLTK_USE_POLL
OPTION_USE_STD	FLTK_OPTION_STD
OPTION_USE_SVG	FLTK_OPTION_SVG
OPTION_USE_SYSTEM_LIBDECOR	FLTK_USE_SYSTEM_LIBDECOR
OPTION_USE_SYSTEM_LIBJPEG	FLTK_USE_SYSTEM_LIBJPEG
OPTION_USE_SYSTEM_LIBPNG	FLTK_USE_SYSTEM_LIBPNG
OPTION_USE_SYSTEM_ZLIB	FLTK_USE_SYSTEM_ZLIB
OPTION_USE_THREADS	FLTK_USE_PTHREADS
OPTION_USE_WAYLAND	FLTK_BACKEND_WAYLAND
OPTION_USE_XCURSOR	FLTK_USE_XCURSOR
OPTION_USE_XFIXES	FLTK_USE_XFIXES
OPTION_USE_XFT	FLTK_USE_XFT
OPTION_USE_XINERAMA	FLTK_USE_XINERAMA
OPTION_USE_XRENDER	FLTK_USE_XRENDER
OPTION_WAYLAND_ONLY	FLTK_BACKEND_X11=OFF

1.21 Software License

December 11, 2001

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1. Modifications to the FLTK configure script, config header file, and makefiles by themselves to support a specific platform do not constitute a modified or derivative work.

The authors do request that such modifications be contributed to the FLTK project - send all contributions through the "Software Trouble Report" on the following page: <https://www.fltk.org/bugs.php>

2. Widgets that are subclassed from FLTK widgets do not constitute a derivative work.

3. Static linking of applications and widgets to the FLTK library does not constitute a derivative work and does not require the author to provide source code for the application or widget, use the shared FLTK libraries, or link their applications or widgets against a user-supplied version of FLTK.

If you link the application or widget to a modified version of FLTK, then the changes to FLTK must be provided under the terms of the LGPL in sections 1, 2, and 4.

4. You do not have to provide a copy of the FLTK license with programs that are linked to the FLTK library, nor do you have to identify the FLTK license in your program or documentation as required by section 6 of the LGPL.

However, programs must still identify their use of FLTK. The following example statement can be included in user documentation to satisfy this requirement:

[program/widget] is based in part on the work of the FLTK project (<https://www.fltk.org>).

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Version 2, June 1991

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However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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1.22 Example Source Code

The FLTK distribution contains over 60 sample applications written in, or ported to, FLTK.

If the FLTK archive you received does not contain either an 'examples' or 'test' directory, you can download the complete FLTK distribution from <https://www.fltk.org/software.php>.

Most of the example programs were created while testing a group of widgets. They are not meant to be great achievements in clean C++ programming, but merely a test platform to verify the functionality of the FLTK library. Note that extra example programs are also available in an additional 'examples' directory, but these are **NOT** built automatically when you build FLTK, unlike those in the 'test' directory shown below.

1.22.1 Example Applications: Overview

adjuster	animated	arc	ask	bitmap	blocks
boxtype	browser	button	buttons	cairo_test	checkers
clock	colbrowser	color_chooser	cube	CubeView	cursor
curve	demo	device	doublebuffer	editor	fast_slow
file_chooser	fluid	fonts	forms	fractals	fullscreen
gl_overlay	glpuzzle	hello	help_dialog	icon	iconize
image	inactive	input	input_choice	keyboard	label
line_style	list_visuals	mandelbrot	menubar	message	minimum
native-filechooser	navigation	offscreen	output	overlay	pack
pixmap	pixmap_browser	preferences	radio	resize	resizebox
rotated_text	scroll	shape	subwindow	sudoku	symbols
table	tabs	threads	tile	tiled_image	tree
twowin	unittests	utf8	valuators	windowfocus	

1.22.1.1 adjuster

`adjuster` shows a nifty little widget for quickly setting values in a great range.

1.22.1.2 animated

`animated` shows a window with an animated square that shows drawing with transparency (alpha channel).

1.22.1.3 arc

The `arc` demo explains how to derive your own widget to generate some custom drawings. The sample drawings use the matrix based arc drawing for some fun effects.

1.22.1.4 ask

`ask` shows some of FLTK's standard dialog boxes. Click the correct answers or you may end up in a loop, or you may end up in a loop, or you... .

1.22.1.5 bitmap

This simple test shows the use of a single color bitmap as a label for a box widget. Bitmaps are stored in the X11 '.bmp' file format and can be part of the source code.

1.22.1.6 blocks

A wonderful and addictive game that shows the usage of FLTK timers, graphics, and how to implement sound on all platforms. `blocks` is also a good example for the Mac OS X specific bundle format.

1.22.1.7 boxtype

`boxtype` gives an overview of readily available boxes and frames in FLTK. More types can be added by the application programmer. When using themes, FLTK shuffles boxtypes around to give your program a new look.

1.22.1.8 browser

`browser` shows the capabilities of the [FI_Browser](#) widget. Important features tested are loading of files, line formatting, and correct positioning of the browser data window.

1.22.1.9 button

The `button` test is a simple demo of push-buttons and callbacks.

1.22.1.10 buttons

`buttons` shows a sample of FLTK button types.

1.22.1.11 cairo_test

`cairo_test` shows a sample of drawing with Cairo in an [FI_Cairo_Window](#). This program can only be built if FLTK was configured with Cairo support.

1.22.1.12 checkers

Written by Steve Poulsen in early 1979, `checkers` shows how to convert a VT100 text-terminal based program into a neat application with a graphical UI. Check out the code that drags the pieces, and how the pieces are drawn by layering. Then tell me how to beat the computer at Checkers.

1.22.1.13 clock

The `clock` demo shows two analog clocks. The innards of the [FI_Clock](#) widget are pretty interesting, explaining the use of timeouts and matrix based drawing.

1.22.1.14 colbrowser

`colbrowser` runs only on X11 systems. It reads `/usr/lib/X11/rgb.txt` to show the color representation of every text entry in the file. This is beautiful, but only moderately useful unless your UI is written in *Motif*.

1.22.1.15 color_chooser

The `color_chooser` gives a short demo of FLTK's palette based color chooser and of the RGB based color wheel.

1.22.1.16 cube

The `cube` demo shows the speed of OpenGL. It also tests the ability to render two OpenGL buffers into a single window, and shows OpenGL text.

1.22.1.17 CubeView

`CubeView` shows how to create a UI containing OpenGL with Fluid.

1.22.1.18 cursor

The `cursor` demo shows all mouse cursor shapes that come standard with FLTK. The `fgcolor` and `bgcolor` sliders work only on few systems (some version of Irix for example).

1.22.1.19 curve

`curve` draws a nice Bézier curve into a custom widget. The `points` option for splines is not supported on all platforms.

1.22.1.20 demo

This tool allows quick access to all programs in the `test` directory. `demo` is based on the visuals of the IrixGL demo program. The menu tree can be changed by editing `test/demo.menu`.

1.22.1.21 device

Exercises the `FI_Image_Surface`, `FI_Copy_Surface`, and `FI_Printer` classes to draw to an `FI_Image` object, copy graphical data to the clipboard, and for print support.

Note

The `clipboard.cxx` program of the 'examples' directory is a clipboard watching application that continuously displays the textual or graphical content of the system clipboard (a.k.a pasteboard on Mac OS X) exercising `FI::paste()`.

1.22.1.22 doublebuffer

The `doublebuffer` demo shows the difference between a single buffered window, which may flicker during a slow redraw, and a double buffered window, which never flickers, but uses twice the amount of RAM. Some modern OS's double buffer all windows automatically to allow transparency and shadows on the desktop. FLTK is smart enough to not tripple buffer a window in that case.

1.22.1.23 editor

FLTK has two very different text input widgets. `FI_Input` and derived classes are rather light weight, however `FI_Text_Editor` is a complete port of `ncedit` (with permission). The `editor` test is almost a full application, showing custom syntax highlighting and dialog creation.

1.22.1.24 fast_slow

`fast_slow` shows how an application can use the `FI_Widget::when()` setting to receive different kinds of callbacks.

1.22.1.25 file_chooser

The standard FLTK `file_chooser` is the result of many iterations, trying to find a middle ground between a complex browser and a fast light implementation.

1.22.1.26 fonts

`fonts` shows all available text fonts on the host system. If your machine still has some pixmap based fonts, the supported sizes will be shown in bold face. Only the first 256 fonts will be listed.

1.22.1.27 forms

`forms` is an XForms program with very few changes. Search for "fltk" to find all changes necessary to port to fltk. This demo shows the different boxtypes. Note that some boxtypes are not appropriate for some objects.

1.22.1.28 fractals

`fractals` shows how to mix OpenGL, Glut and FLTK code. FLTK supports a rather large subset of Glut, so that many Glut applications compile just fine.

1.22.1.29 fullscreen

This demo shows how to do many of the window manipulations that are popular for games. You can toggle the border on/off, switch between single- and double-buffered rendering, and take over the entire screen. More information in the source code.

1.22.1.30 gl_overlay

`gl_overlay` shows OpenGL overlay plane rendering. If no hardware overlay plane is available, FLTK will simulate it for you.

1.22.1.31 glpuzzle

The `glpuzzle` test shows how most Glut source code compiles easily under FLTK.

1.22.1.32 hello

`hello`: Hello, World. Need I say more? Well, maybe. This tiny demo shows how little is needed to get a functioning application running with FLTK. Quite impressive, I'd say.

1.22.1.33 help_dialog

`help_dialog` displays the built-in FLTK help browser. The [FL_Help_Dialog](#) understands a subset of html and renders various image formats. This widget makes it easy to provide help pages to the user without depending on the operating system's html browser.

1.22.1.34 icon

`icon` demonstrates how an application icon can be set from an image. This icon should be displayed in the window bar (label), in the task bar, and in the task switcher (Windows: Alt-Tab). This feature is platform specific, hence it is possible that you can't see the icon. On Unix/Linux (X11) this can even depend on the Window Manager (WM).

1.22.1.35 iconize

`iconize` demonstrates the effect of the window functions `hide()`, `iconize()`, and `show()`.

1.22.1.36 image

The `image` demo shows how an image can be created on the fly. This generated image contains an alpha (transparency) channel which lets previous renderings 'shine through', either via true transparency or by using screen door transparency (pixelation).

1.22.1.37 inactive

`inactive` tests the correct rendering of inactive widgets. To see the inactive version of images, you can check out the pixmap or image test.

1.22.1.38 input

This tool shows and tests different types of text input fields based on `Fl_Input_`. The `input` program also tests various settings of `Fl_Input::when()`.

1.22.1.39 input_choice

`input_choice` tests the latest addition to FLTK1, a text input field with an attached pulldown menu. Windows users will recognize similarities to the 'ComboBox'. `input_choice` starts up in 'plastic' scheme, but the traditional scheme is also supported.

1.22.1.40 keyboard

FLTK unifies keyboard events for all platforms. The `keyboard` test can be used to check the return values of `Fl::event_key()` and `Fl::event_text()`. It is also great to see the modifier buttons and the scroll wheel at work. Quit this application by closing the window. The ESC key will not work.

1.22.1.41 label

Every FLTK widget can have a label attached to it. The `label` demo shows alignment, clipping, and wrapping of text labels. Labels can contain symbols at the start and end of the text, like `@FLTK` or `@circle uh-huh @square`.

1.22.1.42 line_style

Advanced line drawing can be tested with `line_style`. Not all platforms support all line styles.

1.22.1.43 list_visuals

This little app finds all available pixel formats for the current X11 screen. But since you are now an FLTK user, you don't have to worry about any of this.

1.22.1.44 mandelbrot

`mandelbrot` shows two advanced topics in one test. It creates grayscale images on the fly, updating them via the `idle` callback system. This is one of the few occasions where the `idle` callback is very useful by giving all available processor time to the application without blocking the UI or other apps.

1.22.1.45 menubar

The `menubar` tests many aspects of FLTK's popup menu system. Among the features are radio buttons, menus taller than the screen, arbitrary sub menu depth, and global shortcuts.

1.22.1.46 message

`message` pops up a few of FLTK's standard message boxes.

1.22.1.47 minimum

The `minimum` test program verifies that the update regions are set correctly. In a real life application, the trail would be avoided by choosing a smaller label or by setting label clipping differently.

1.22.1.48 native-filechooser

The `native-filechooser` program invokes the platform specific file chooser, if available (see [FI_Native_File_Chooser](#) widget).

1.22.1.49 navigation

`navigation` demonstrates how the text cursor moves from text field to text field when using the arrow keys, tab, and shift-tab.

1.22.1.50 offscreen

`offscreen` shows how to draw into an offscreen image and display the offscreen image in the program window.

1.22.1.51 output

`output` shows the difference between the single line and multi line mode of the [FI_Output](#) widget. Fonts can be selected from the FLTK standard list of fonts.

1.22.1.52 overlay

The `overlay` test app shows how easy an FLTK window can be layered to display cursor and manipulator style elements. This example derives a new class from [FI_Overlay_Window](#) and provides a new function to draw custom overlays.

1.22.1.53 pack

The `pack` test program demonstrates the resizing and repositioning of children of the [FI_Pack](#) group. Putting an [FI_Pack](#) into an [FI_Scroll](#) is a useful way to create a browser for large sets of data.

1.22.1.54 pixmap

This simple test shows the use of a LUT based pixmap as a label for a box widget. Pixmapes are stored in the X11 `.xpm` file format and can be part of the source code. Pixmapes support one transparent color.

1.22.1.55 pixmap_browser

`pixmap_browser` tests the shared-image interface. When using the same image multiple times, [FI_Shared_Image](#) will keep it only once in memory.

1.22.1.56 preferences

I do have my `preferences` in the morning, but sometimes I just can't remember a thing. This is where the [FI_Preferences](#) come in handy. They remember any kind of data between program launches.

1.22.1.57 radio

The `radio` tool was created entirely with *fluid*. It shows some of the available button types and tests radio button behavior.

1.22.1.58 resizebox

`resizebox` shows some possible ways of FLTK's automatic resize behavior.

1.22.1.59 rotated_text

`rotated_text` shows how text can be rotated, i.e. drawn in any given angle. This demo is device specific, for instance it works under X11 only if configured with Xft.

1.22.1.60 resize

The `resize` demo tests size and position functions with the given window manager.

1.22.1.61 scroll

`scroll` shows how to scroll an area of widgets, one of them being a slow custom drawing. [Fl_Scroll](#) uses clipping and smart window area copying to improve redraw speed. The buttons at the bottom of the window control decoration rendering and updates.

1.22.1.62 shape

`shape` is a very minimal demo that shows how to create your own OpenGL rendering widget. Now that you know that, go ahead and write that flight simulator you always dreamt of.

1.22.1.63 subwindow

The `subwindow` demo tests messaging and drawing between the main window and 'true' sub windows. A sub window is different to a group by resetting the FLTK coordinate system to 0, 0 in the top left corner. On Win32 and X11, subwindows have their own operating system specific handle.

1.22.1.64 sudoku

Another highly addictive game - don't play it, I warned you. The implementation shows how to create application icons, how to deal with OS specifics, and how to generate sound.

1.22.1.65 symbols

`symbols` are a speciality of FLTK. These little vector drawings can be integrated into labels. They scale and rotate, and with a little patience, you can define your own. The rotation number refers to 45 degree rotations if you were looking at a numeric keypad (2 is down, 6 is right, etc.).

1.22.1.66 table

The `table` demo shows the features of the [Fl_Table](#) widget.

1.22.1.67 tabs

The `tabs` tool was created with *fluid*. It tests correct hiding and redisplaying of tabs, navigation across tabs, resize behavior, and no unneeded redrawing of invisible widgets.

The `tabs` application shows the `FI_Tabs` widget on the left and the `FI_Wizard` widget on the right side for direct comparison of these two panel management widgets.

1.22.1.68 threads

FLTK can be used in a multithreading environment. There are some limitations, mostly due to the underlying operating system. `threads` shows how to use `Fl::lock()`, `Fl::unlock()`, and `Fl::awake()` in secondary threads to keep FLTK happy. Although locking works on all platforms, this demo is not available on every machine.

1.22.1.69 tile

The `tile` tool shows a nice way of using `FI_Tile`. To test correct resizing of subwindows, the widget for region 1 is created from an `FI_Window` class.

1.22.1.70 tiled_image

The `tiled_image` demo uses a small image as the background for a window by repeating it over the full size of the widget. The window is resizable and shows how the image gets repeated.

1.22.1.71 tree

The `tree` demo shows the features of the `FI_Tree` widget.

1.22.1.72 twowin

The `twowin` program tests focus transfer from one window to another window.

1.22.1.73 unittests

`unittests` exercises all of FLTK's drawing features (e.g., text, lines, circles, images), as well as scrollbars and schemes.

1.22.1.74 utf8

`utf8` shows all fonts available to the platform that runs it, and how each font draws each of the Unicode code points ranging between U+0020 and U+FFFF.

1.22.1.75 valuator

`valuators` shows all of FLTK's nifty widgets to change numeric values.

1.22.1.76 windowfocus

`windowfocus` shows a very special case when a new window is shown while the focus stays in the original window.

1.22.1.77 fluid

`fluid` is not only a big test program, but also a very useful visual UI designer. Many parts of `fluid` were created using `fluid`. See the [Fluid Tutorial](#) for more details.

1.22.2 Example Applications: Images

This chapter contains a few selected images of the test and example applications listed above. It is not meant to be complete or a full reference. The reason some images are included here is to show how the display **should** look when running the example programs.

1.22.2.1 cairo_test

The `cairo_test` demo program shows three shiny buttons drawn with Cairo in an [Fl_Cairo_Window](#).



Figure 1.43 Buttons drawn with Cairo

1.22.2.2 icon

The `icon` program lets you set the program icon from an image (here an [Fl_RGB_Image](#)).

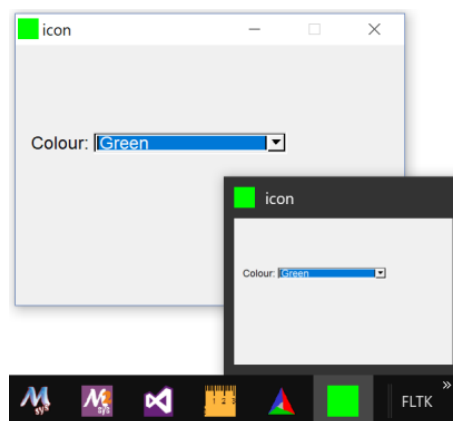


Figure 1.44 Green icon (Windows 10)

1.22.2.3 unittests

Select "drawing images" in the browser at the left side to see the image drawing example:

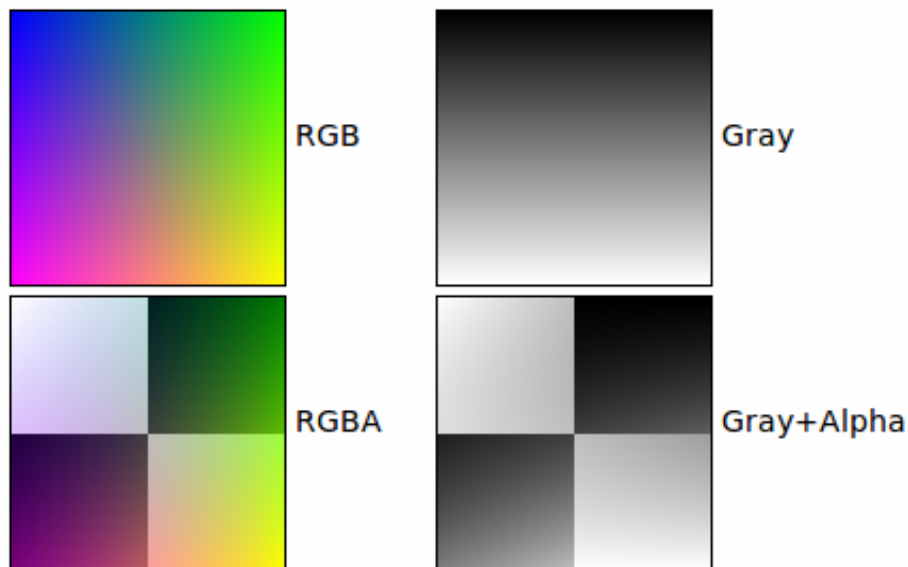


Figure 1.45 Image Drawing

1.23 FAQ (Frequently Asked Questions)

A list of frequently asked questions about FLTK.

This appendix describes various frequently asked questions regarding FLTK.

- [Where do I start learning FLTK?](#)
- [How do I make a box with text?](#)
- [Can I use FLTK to make closed-source commercial applications?](#)
- [Hitting the 'Escape' key closes windows - how do I prevent this?](#)

1.23.1 Where do I start learning FLTK?

It is assumed you know C++, which is the language all FLTK programs are written in, including FLTK itself.

If you like reading manuals to work your way into things, a good start is the FLTK documentation's [Introduction to FLTK](#). Under the [FLTK Basics](#) section there's an example 'hello world' program that includes a line-by-line description.

If you like looking at simple code first to pique your interest, and then read up from there, start with the example programs in the `test/` and `examples/` directory that is included with the source code. A good place to start is the 'hello world' program in `test/hello.cxx`. Also do a google search for "FLTK example programs". "Erco's Cheat Page" is one that shows many simple examples of how to do specific things.

If you like to run example programs and look for ones that are like yours and then read them, download and build FLTK from the source, then run the `test/demo` program. Also, go into the `examples/` directory and run 'make', then run some of those programs.

If you prefer watching TV to reading books and code, google search for "FLTK video tutorials" which has some introductory examples of how to write FLTK programs in C++ and build them.

1.23.2 How do I make a box with text?

The 'hello world' program shows how to make a box with text. All widgets have labels, so picking a simple widget like `Fl_Box` and setting its `label()` and using `align()` to align the label and `labelfont()` to set the font, and `labelsize()` to set the size, you can get text just how you want.

Labels are not selectable though; if you want selectable text, you can use `Fl_Output` or `Fl_Multiline_Output` for simple text that doesn't include scrollbars. For more complex text that might want scrollbars and multiple colors/fonts, use either `Fl_Text_Display` which handles plain text, or `Fl_Help_View` which handles simple HTML formatted text.

1.23.3 Can I use FLTK to make closed-source commercial applications?

Yes. The FLTK [Software License](#) is standard LGPL, but also includes a special clause ("exception") to allow for static linking. Specifically:

[from the top of the FLTK LGPL License section on exceptions]

3. Static linking of applications and widgets to the FLTK library does not constitute a derivative work and does not require the author to provide source code for the application or widget, use the shared FLTK libraries, or link their applications or widgets against a user-supplied version of FLTK.

If you link the application or widget to a modified version of FLTK, then the changes to FLTK must be provided under the terms of the LGPL in sections 1, 2, and 4.

4. You do not have to provide a copy of the FLTK license with programs that are linked to the FLTK library, nor do you have to identify the FLTK license in your program or documentation as required by section 6 of the LGPL.

However, programs must still identify their use of FLTK. The following example statement can be included in user documentation to satisfy this requirement:

```
[program/widget] is based in part on the work of the
FLTK project (https://www.fltk.org).
```

1.23.4 Hitting the 'Escape' key closes windows - how do I prevent this?

[From FLTK article #378]

1. FLTK has a "global event handler" that makes Escape try to close the window, the same as clicking the close box. To disable this everywhere you can install your own that pretends it wants the escape key and thus stops the default one from seeing it (this may not be what you want, see below about the callbacks):

```
static int my_handler(int event) {
    if (event == FL_SHORTCUT) return 1; // eat all shortcut keys
    return 0;
}
...in main():
    Fl::add_handler(my_handler);
...
```

1. Attempts to close a window (both clicking the close box or typing Escape) call that window's callback. The default version of the callback does `hide()`. To make the window not close or otherwise do something different you replace the callback. To make the main window exit the program:

```
void my_callback(Fl_Widget*, void*) {
    exit(0);
}
...
main_window->callback(my_callback);
...
```

If you don't want Escape to close the main window and exit you can check for and ignore it. This is better than replacing the global handler because Escape will still close pop-up windows:

```
void my_callback(Fl_Widget*, void*) {
    if (Fl::event() == FL_SHORTCUT && Fl::event_key() == FL_Escape)
        return; // ignore Escape
    exit(0);
}
```

The reason for calling a window callback can also be found using using the `Fl::callback_reason()` method:

```
void my_callback(Fl_Widget*, void*) {
    if (Fl::callback_reason() == FL_REASON_CANCELLED)
        return; // ignore that the user pressed the Escape key
    if (Fl::callback_reason() == FL_REASON_CLOSED)
```

```
    save_and_exit(); // user clicked the Close button in the window decoration
    exit(0); // fallback for other callback reasons
}
```

It is very common to ask for confirmation before exiting, this can be done with:

```
void my_callback(Fl_Widget*, void*) {
    if (fl_choice("Are you sure you want to quit?",
                 "continue", "quit", NULL))
        exit(0);
}
```


Chapter 2

FI_Terminal Technical Documentation

This chapter covers the vt100/xterm style "escape codes" used by [FI_Terminal](#) for cursor positioning, text colors, and other display screen control features such as full or partial screen clearing, up/down scrolling, character insert/delete, etc.

2.1 The Escape Codes FI_Terminal Supports

These are the escape codes [FI_Terminal](#) actually supports, and is not the 'complete' list that e.g. xterm supports. Most of the important stuff has been implemented, but esoteric features (such as scroll regions) has not. Features will be added as the widget matures.

```
-----  
--- The CSI (Control Sequence Introducer, or "ESC[") ---  
-----  
ESC[#@ - (ICH) Insert blank Chars (default=1)  
ESC[#A - (CUU) Cursor Up, no scroll/wrap  
ESC[#B - (CUD) Cursor Down, no scroll/wrap  
ESC[#C - (CUF) Cursor Forward, no wrap  
ESC[#D - (CUB) Cursor Back, no wrap  
ESC[#E - (CNL) Cursor Next Line (crlf) xterm, !gnome  
ESC[#F - (CPL) Cursor Preceding Line: move to sol and up # lines  
ESC[#G - (CHA) Cursor Horizontal Absolute positioning  
  
ESC[G - move to column 1 (start of line, sol)  
ESC[#G - move to column #  
ESC[#H - (CUP) Cursor Position (#'s are 1 based)  
  
ESC[H - go to row #1  
ESC[#H - go to (row #) (default=1)  
ESC[#;#H - go to (row# ; col#)  
ESC[#I - (CHT) Cursor Horizontal Tab: tab forward  
  
ESC[#I - tab # times (default 1)  
ESC[#J - (ED) Erase in Display  
  
ESC[0J - clear to end of display (default)  
ESC[1J - clear to start of display  
ESC[2J - clear all lines  
ESC[3J - clear screen history  
ESC[#K - (EL) Erase in line  
  
ESC[0K - clear to end of line (default)  
ESC[1K - clear to start of line  
ESC[2K - clear current line  
ESC[#L - (IL) Insert # Lines (default=1)  
ESC[#M - (DL) Delete # Lines (default=1)  
ESC[#P - (DCH) Delete # Chars (default=1)  
ESC[#S - (SU) Scroll Up # lines (default=1)  
ESC[#T - (SD) Scroll Down # lines (default=1)  
ESC[#X - (ECH) Erase Characters (default=1)  
ESC[#Z - (CBT) Cursor Backwards Tab  
  
ESC[#Z - backwards tab # times (default=1)  
ESC[#a - (HPR) move cursor relative [columns] (default=[row,col+1]) (NOT IMPLEMENTED)  
ESC[#b - (REP) repeat prev graphics char # times (NOT IMPLEMENTED)  
ESC[#d - (VPA) Line Position Absolute [row] (NOT IMPLEMENTED)  
ESC[#e - (LPA) Line Position Relative [row] (NOT IMPLEMENTED)  
ESC[#f - (CUP) cursor position (#'s 1 based), same as ESC[H  
ESC[#g - (TBC) Tabulation Clear  
  
ESC[0g - Clear tabstop at cursor  
ESC[3g - Clear all tabstops
```

```

ESC[#m - (SGR) Set Graphic Rendition

    *** Attribute Enable ***

ESC[0m - reset: normal attribs/default fg/bg color (VT100)
ESC[1m - bold (VT100)
ESC[2m - dim
ESC[3m - italic
ESC[4m - underline (VT100)
ESC[5m - blink (NOT IMPLEMENTED) (VT100)
ESC[6m - (unused)
ESC[7m - inverse (VT100)
ESC[8m - (unused)
ESC[9m - strikeout
ESC[21m - doubly underline (Currently this just does single underline)

    *** Attribute Disable ***

ESC[22m - disable bold/dim
ESC[23m - disable italic
ESC[24m - disable underline
ESC[25m - disable blink (NOT IMPLEMENTED)
ESC[26m - (unused)
ESC[27m - disable inverse
ESC[28m - disable hidden
ESC[29m - disable strikeout

    *** Foreground Text "8 Color" ***

ESC[30m - fg Black
ESC[31m - fg Red
ESC[32m - fg Green
ESC[33m - fg Yellow
ESC[34m - fg Blue
ESC[35m - fg Magenta
ESC[36m - fg Cyan
ESC[37m - fg White
ESC[39m - fg default

    *** Background Text "8 Color" ***

ESC[40m - bg Black
ESC[41m - bg Red
ESC[42m - bg Green
ESC[43m - bg Yellow
ESC[44m - bg Blue
ESC[45m - bg Magenta
ESC[46m - bg Cyan
ESC[47m - bg White
ESC[49m - bg default

    *** Special RGB Color ***

ESC [ 38 ; Red ; Grn ; Blue m - where Red,Grn,Blu are decimal (0-255)
ESC[s - save cursor pos (ansi.sys+xterm+gnome, but NOT vt100)
ESC[u - rest cursor pos (ansi.sys+xterm+gnome, but NOT vt100)
ESC[>#q - (DECSCA) Set Cursor style (block/line/blink..) (NOT IMPLEMENTED)
ESC[#;#r - (DECSTBM) Set scroll Region top;bot (NOT IMPLEMENTED)
ESC[#..$t - (DECRARA) (NOT IMPLEMENTED)
-----
--- C1 Control Codes ---
-----
<ESC>c - (RIS) Reset term to Initial State
<ESC>D - (IND) Index: move cursor down a line, scroll if at bottom
<ESC>E - (NEL) Next Line: basically do a crlf, scroll if at bottom
<ESC>H - (HTS) Horizontal Tab Set: set a tabstop
<ESC>M - (RI) Reverse Index (up w/scroll)
NOTE: Acronyms in parens are Digital Equipment Corporation's names these VT features.

```

2.2 Useful Terminal Escape Code Documentation

Useful links for reference:

- <https://vt100.net/docs/vt100-ug/chapter3.html>
- <https://www.xfree86.org/current/ctlseqs.html>
- <https://www.x.org/docs/xterm/ctlseqs.pdf>
- <https://gist.github.com/justinmk/a5102f9a0c1810437885a04a07ef0a91> ← alphabetic!

- <https://invisible-island.net/xterm/ctlseqs/ctlseqs.html>

2.3 FI_Terminal Design Document

When I started this project, I identified the key concepts needed to implement `FI_Terminal`:

- Draw and manage multiline Unicode text in FLTK
- Allow per-character colors and attributes
- Efficient screen buffer to handle "scrollback history"
- Efficient scrolling with vertical scrollbar for even large screen history
- Mouse selection for copy/paste
- Escape code management to implement VT100 style / ANSI escape codes.

A class was created for each character, since characters can be either ASCII or Utf8 encoded byte sequences. This class is called `Utf8Char`, and handles the character, its fg and bg color, and any attributes like dim, bold, italic, etc. For managing the screen, after various experiments, I decided a ring buffer was the best way to manage things, the ring split in two:

- 'screen history' which is where lines scrolled off the top are saved
- 'display screen' displayed to the user at all times, and where the cursor lives

Scrolling the display, either by scrollbar or by new text causing the display to scroll up one line, would simply change an 'offset' index# of where in the ring buffer the top of the screen is, automatically moving the top line into the history, all without moving memory around.

In fact the only time screen memory is moved around is during these infrequent operations:

- during scrolling "down"
- character insert/delete operations within a line
- changing the display size
- changing the history size

So a class "RingBuffer" is defined to manage the ring, and accessing its various parts, either as the entire entity ring, just the history, or just the display.

These three concepts, "ring", "history" and "display" are given abbreviated names in the RingBuffer class's API:

NOTE: Abbreviations "hist" and "disp"

"history" may be abbreviated as "hist", and "display" as "disp" in both this text and the source code. 4 character names are used so they line up cleanly in the source, e.g.

```
ring_rows()    ring_cols()
hist_rows()    hist_cols()
disp_rows()    disp_cols()
```

4 characters

These concepts were able to fit into C++ classes:

Utf8Char

Each character on the screen is a "Utf8Char" which can manage the UTF-8 encoding of any character as one or more bytes. Also in that class is a byte for an attribute (underline, bold, etc), and two integers for fg/bg color.

RingBuffer

The RingBuffer class keeps track of the buffer itself, a single array of Utf8Chars called "ring_chars" whose width is ring_cols() and whose height is ring_rows().

The "top" part of the ring is the history, whose width is hist_cols() and whose height is hist_rows(). hist_use_rows() is used to define what part of the history is currently in use.

The "bottom" part of the ring is the display, whose width is disp_cols() and whose height is disp_rows().

An index number called "offset" points to where in the ring buffer the top of the ring currently is. This index changes each time the screen is scrolled, and affects both where the top of the display is, and where the top of the history is.

The memory layout of the Utf8Char character array is:

```
ring_chars[:
  |-----|
  |       |
  |   H i s t o r y   |
  |       |
  |-----|
  |       |
  |   D i s p l a y   |
  |       |
  |-----|
  |<----->|
  |   ring_cols   |
  |   hist_cols   |
  |   disp_cols   |
```

So it's basically a single continuous array of Utf8Char instances where any character can generally be accessed by index# using the formula:

```
ring_chars[ (row*ring_cols)+col ]
```

..where 'row' is the desired row, 'col' is the desired column, and 'ring_cols' is how many columns "wide" the buffer is. The "offset" index affects that formula as an extra row offset, and the resulting index is then clamped within the range of the ring buffer using modulus.

Methods are used to allow direct access to the characters in the buffer that automatically handle the offset and modulus formulas, namely:

```
u8c_ring_row(row,col) // access the entire ring by row/col
u8c_hist_row(row,col) // access just the history buffer
u8c_disp_row(row,col) // access just the display buffer
```

A key concept is the use of the simple 'offset' index integer to allow the starting point of the history and display to be moved around to implement 'text scrolling', such as when crlf at the screen bottom causes a 'scroll up'.

This is simply an "index offset" integer applied to the hist and disp indexes when drawing the display. So after scrolling two lines up, the offset is just increased by 2, redefining where the top of the history and display are, e.g.

```
Offset is 0:      2      Offset now 2:
                  >      D i s p l a y
                  >
H i s t o r y
2
                  >      H i s t o r y
D i s p l a y
                  >      D i s p l a y
```

This 'offset' trivially implements "text scrolling", avoiding having to physically move memory around. Just the 'offset' changes, the text remains where it is in memory.

This also makes it appear the top line in the display is 'scrolled up' into the bottom of the scrollbar 'history'. If the offset exceeds the size of the ring buffer, it simply wraps around back to the beginning of the buffer with a modulo.

Indexes into the display and history are also modulo their respective rows, e.g.

```
act_ring_index = (hist_rows + disp_row + offset - scrollbar_pos) % ring_rows;
```

This way indexes for ranges can run beyond the bottom of the ring, and automatically wrap around the ring, e.g.

```
> 2
  3   D i s p l a y
  4
    <-- offset points here

disp
index      H i s t o r y
wraps

      0   D i s p l a y
      1   <- ring_rows points to end of ring
      2 :           :
      3 :           :
disp_row(5) -> 4 :.....:
```

The dotted lines show where the display would be if not for the fact it extends beyond the bottom of the ring buffer (due to the current offset), and therefore wraps up to the top of the ring.

So to find a particular row in the display, in this case a 5 line display whose lines lie between 0 and 4, some simple math calculates the row position into the ring:

```
act_ring_index = (histrows      // the display exists AFTER the history, so offset the hist_rows
                  + offset      // include the scroll 'offset'
                  + disp_row    // add the desired row relative to the top of the display (0..disp_rows)
                  ) % ring_rows; // make sure the resulting index is within the ring buffer (0..ring_rows)
```

An additional bit of math makes sure if a negative result occurs, that negative value works relative to the end of the ring, e.g.

```
if (act_ring_index < 0) act_ring_index = ring_rows + act_ring_index;
```

This guarantees the `act_ring_index` is within the ring buffer's address space, with all offsets applied.

The math that implements this can be found in the `u8c_xxxx_row()` methods, where "xxxx" is one of the concept regions "ring", "hist" or "disp":

```
Utf8Char *u8c;
u8c = u8c_ring_row(rrow); // address within ring, rrow can be 0..(ring_rows-1)
u8c = u8c_hist_row(hrow); // address within hist, hrow can be 0..(hist_rows-1)
u8c = u8c_disp_row(drow); // address within disp, drow can be 0..(disp_rows-1)
```

The small bit of math is only involved whenever a new row address is needed, so in a display that's 80x25, to walk all the characters in the screen, the math above would only be called 25 times, once for each row, and each column in the row is just a simple integer offset:

```
for ( int row=0; row<disp_rows(); row++ ) { // walk rows: disp_rows = 25
  Utf8Char *u8c = u8c_disp_row(row); // get first char in display 'row'
  for ( int col=0; col<disp_cols(); col++ ) { // walk cols: disp_cols = 80
    u8c[col].do_something(); // work with the char at row/col
  }
}
```

So to recap, the concepts here are:

- The ring buffer itself, a linear array that is conceptually split into a 2 dimensional array of rows and columns whose height and width are:

```
ring_rows -- how many rows in the entire ring buffer
ring_cols -- how many columns in the ring buffer
nchars    -- total chars in ring, e.g. (ring_rows * ring_cols)
```

- The "history" within the ring. For simplicity this is thought of as starting relative to the top of the ring buffer, occupying ring buffer rows:

```
0 .. hist_rows()-1
```

- The "display", or "disp", within the ring, just after the "history". It occupies the ring buffer rows:

```
hist_rows() .. hist_rows()+disp_rows()-1
```

..or similarly:

```
(hist_rows)..(ring_rows-1)
```

The following convenience methods provide access to the start and end indexes within the ring buffer for each entity:

Entire ring ring_srow() – start row index of the ring buffer (always 0) ring_erow() – end row index of the ring buffer
 "history" part of ring hist_srow() – start row index of the screen history hist_erow() – end row index of the screen history

"display" part of ring disp_srow() – start row index of the display disp_erow() – end row index of the display

The values returned by these are as described above. For the hist_xxx() and disp_xxx() methods the 'offset' included into the formula. (For this reason hist_srow() won't always be zero the way ring_srow() is, due to the 'offset')

The values returned by these methods can all be passed to the u8c_ring_row() function to access the actual character buffer's contents.

- An "offset" used to move the "history" and "display" around within the ring buffer to implement the "text scrolling" concept. The offset is applied when new characters are added to the buffer, and during drawing to find where the display actually is within the ring.
- The "scrollbar", which only is used when redrawing the screen the user sees, and is simply an additional offset to all the above, where a scrollbar value of zero (the scrollbar tab at the bottom) shows the display rows, and as the scrollbar values increase as the user moves the scrollbar tab upwards, +1 per line, this is subtracted from the normal starting index to let the user work their way backwards into the scrollbar history. Again, negative numbers wrap around within the ring buffer automatically.

The ring buffer allows new content to simply be appended to the ring buffer, and the index# for the start of the display and start of scrollbar history are simply incremented. So the next time the display is "drawn", it starts at a different position in the ring.

This makes scrolling content at high speed trivial, without memory moves. It also makes the concept of "scrolling" with the scrollbar simple as well, simply being an extra index offset applied during drawing.

Mouse Selection

Dragging the mouse across the screen should highlight the text, allowing the user to extend the selection either beyond or before the point started. Extending the drag to the top of the screen should automatically 'scroll up' to select more lines in the scrollbar history, or below the bottom to do the opposite.

The mouse selection is implemented as a class to keep track of the start/end row/col positions of the selection, and other details such as a flag indicating if a selection has been made, what color the fg/bg text should appear when text is selected, and methods that allow setting and extending the selection, clearing the selection, and "scrolling" the selection, to ensure the row/col indexes adjust correctly to track when the screen or scrollbar is scrolled.

Redraw Timer

Knowing when to redraw is tricky with a terminal, because sometimes high volumes of input will come in asynchronously, so in that case we need to determine when to redraw the screen to show the new content; too quickly will cause the screen to spend more time redrawing itself, preventing new input from being added. Too slowly, the user won't see new information appear in a timely manner.

To solve this, a rate timer is used to prevent too many redraws:

- When new data comes in, a 1/10 sec timer is started and a modify flag is set.
- redraw() is NOT called yet, allowing more data to continue to arrive quickly

- When the 1/10th second timer fires, the callback checks the modify flag:
 - if set, calls `redraw()`, resets the modify to 0, and calls `FI::repeat_timeout()` to repeat the callback in another 1/10th sec.
 - if clear, no new data came in, so DISABLE the timer, done.

In this way, redraws don't happen more than 10x per second, and `redraw()` is called only when there's new content to see.

The redraw rate can be set by the user application using the `FI_Terminal::redraw_rate()`, 0.10 being the default. Some terminal operations necessarily call `redraw()` directly, such as interactive mouse selection, or during user scrolling the terminal's scrollbar, where it's important there's no delay in what the user sees while interacting directly with the widget.

Chapter 3

The gtk protocol

3.1 Interfaces

- [gtk_shell1](#) - gtk specific extensions
- [gtk_surface1](#) -

3.2 gtk_shell1

3.2.1 Description

gtk_shell is a protocol extension providing additional features for clients implementing it.

3.2.2 API

See [The gtk_shell1 interface](#).

3.3 gtk_surface1

3.3.1 API

See [The gtk_surface1 interface](#).

Chapter 4

Development of the FLTK library

- [The Wayland backend for its developer](#)
- [Developer info for bundled libs](#)
- [Developer Information](#)

4.1 The Wayland backend for its developer

This chapter describes how the Wayland backend of FLTK works from a developer's viewpoint.

4.1.1 Introduction to Wayland

Wayland usage involves communication via a Unix domain socket between a client application and another process called the Wayland compositor which creates, moves, resizes and draws windows on the display. Diverse Wayland compositors exist. They can follow rather diverse logics. For example, FreeBSD offers Sway which is a tiling compositor where the display is always entirely filled with whatever resizable windows are mapped at any given time. Compositors follow either the client-side decoration (CSD) rule where client apps draw window titlebars, or the server-side decoration (SSD) rule where the compositor draws titlebars. FLTK supports both CSD and SSD compositors. It uses a library called `libdecor` charged of determining whether a CSD or a SSD compositor is active, and of drawing titlebars in the first case.

Wayland is divided in various protocols that a given compositor may or may not support, although they all support the `core` protocol. Each protocol adds functionality not available in the core protocol. [Wayland Explorer](#) lists all protocols. The core protocol allows a client app to discover what protocols the connected compositor supports. Protocols can be stable, which means they have a defined API that will not change but can be expanded, or unstable. For example, mapping a window on a display is not done by the core protocol but by the `xdg_shell` protocol which is stable. The names of symbols used by unstable protocols always begin with letter 'z'. For example, FLTK uses unstable protocol `Text input` to support CJK input methods; its symbol names begin with `zwp_text_input_v3`.

Wayland makes intensive use of the *listener* mechanism. A listener is a small array of pointers to FLTK-defined callback functions associated to a Wayland-defined object; Wayland calls these functions when defined events occur (more at [Listeners](#) below).

Wayland differs noticeably from X11 in that rendering is left to clients: Wayland provides no drawing API. Instead, Wayland provides objects of type `struct wl_buffer` which encapsulate a memory array of pixel values shared between the client and the compositor. The client app is expected to draw to that memory buffer with whatever means it chooses, and to instruct the compositor to map those pixels to the display when the drawing is complete. The Wayland platform of FLTK draws with the Cairo library to `Fl_Window`'s and `Fl_Image_Surface`'s, and with OpenGL to `Fl_Gl_Window`'s.

Wayland differs also from X11 in that the position of a window in the display is completely hidden to the client app. This prevents function `Fl_Window::position()` from having any effect on a top-level window. Wayland also prevents a client app from knowing whether a window is minimized: `Fl_Window::show()` has no effect on a minimized window. Subwindows can be positioned as usual relatively to their parent window. Wayland allows to create popup windows positioned relatively to a previously mapped other window. This allows FLTK to position adequately menu and tooltip windows (see [Menu windows and other popups](#)). FLTK uses also popups for the small,

yellow windows that display the new scale factor value when it's changed: these are created as short-lived popups centered above `Fl::first_window()`.

Wayland uses a trick of its own to handle lists of linked records. It defines type `struct wl_list` and a few macros (`wl_list_init()`, `wl_list_for_each()`, `wl_list_insert()`, `wl_list_for_each_↵safe()`, `wl_list_remove()`) to manage linked lists. Records put in these lists must contain a member variable of type `struct wl_list` used to link records together and often named 'link'. Access to such a list is possible memorizing a value of type `struct wl_list` computed by macro `wl_list_init()`. Macro `wl_list_for_each(arg1, arg2, arg3)` allows to run through all list elements with:

- `arg1` is a pointer variable of the type of elements of the linked list;
- `arg2` is the address of a variable of type `struct wl_list` identifying the targeted list;
- `arg3` is the name of the member variable of these elements used to link them together.

For example, `wl_list_for_each()` can be used as follows to scan the linked list of all displays of the system (see [Fl_Wayland_Screen_Driver::output](#)):

```
Fl_Wayland_Screen_Driver::output *output;
Fl_Wayland_Screen_Driver *scr_driver = (Fl_Wayland_Screen_Driver*)Fl::screen_driver();
wl_list_for_each(output, &(scr_driver->outputs), link) {
    // ... work with output, an item of the linked list of all displays in the system ...
}
```

Overall, and ignoring for now OpenGL usage, FLTK interacts with Wayland as follows :

- When opening the display: FLTK calls `Fl::add_fd()` in `FL_READ` mode to associate a callback function to the socket connecting the client and the compositor.
- Client to compositor: FLTK calls C functions of the `libwayland-client.so`, `libwayland-cursor.↵so` and `libxkbcommon.so` shared libraries and of the `libdecor` library. These send suitable messages to the compositor writing to the socket. The names of these functions begin with `wl_`, `xkb_` or `libdecor_`.
- Compositor to client: the callback function runs when there are data to read in the socket; it calls `wl_↵display_dispatch()` which interprets the read data and calls corresponding listeners.

The core protocol defines also a number of mostly opaque structures whose names begin with `wl_`. The names of symbols and types defined by the other protocols FLTK uses begin with `xdg_`, `zwp_text_input_v3`, `zxdg_↵_toplevel_decoration_`, `gtk_shell1_` and `gtk_surface1_`. FLTK defines a few structures holding Wayland-related data. The names of FLTK-defined structures don't begin with `wl_`. For example, `struct wld_↵_window` (see [wld_window](#)) is used to store all Wayland-specific data associated to a mapped [Fl_Window](#).

4.1.2 Building libfltk as a Wayland client

Classes `Fl_Wayland_Window_Driver`, `Fl_Wayland_Screen_Driver`, `Fl_Wayland_Graphics_↵_Driver`, `Fl_Wayland_Copy_Surface_Driver`, `Fl_Wayland_Image_Surface_Driver` and `Fl_Wayland_Gl_Window_Driver` and file `fl_wayland_platform_init.cxx` contain all the Wayland-specific code of the FLTK library. This code is located at `src/drivers/Wayland/` in the FLTK source tree. A single C++ source file generally contains all the code of a given class. The code related to copy, paste and drag-and-drop operations, however, is gathered in file `fl_wayland_clipboard_dnd.cxx` and contains a few member functions of class `Fl_Wayland_Screen_Driver`. Furthermore, class `Fl_↵Unix_System_Driver` is used by both the Wayland and the X11 FLTK platforms. File [FL/fl_config.h](#) defines preprocessor variables `FLTK_USE_WAYLAND` and `FLTK_USE_CAIRO`.

The public C API to Wayland, xkb, EGL and libdecor libraries are obtained with

```
#include <wayland-client.h>
#include <wayland-cursor.h>
#include <xkbcommon/xkbcommon.h>
#include <xkbcommon/xkbcommon-compose.h>
#include <linux/input.h> // for BTN_LEFT, BTN_RIGHT, BTN_MIDDLE
#include "../../libdecor/src/libdecor.h"
#include "../../libdecor/src/libdecor-plugin.h"
#if HAVE_GL
# include <wayland-egl.h>
# include <EGL/egl.h>
#endif // HAVE_GL
```

as necessary.

File `README.Wayland.txt` details what software packages are needed on Debian-based, Fedora and FreeBSD systems for FLTK to use Wayland. Wayland protocols are packaged as XML files accompanied by a utility program, `wayland-scanner`, able to generate a header file and a necessary glue C source file from a given XML file. For

example, for FLTK to use the `XDG shell` protocol, these commands are run at build time to generate a `.c` file that will be compiled into `libfltk` and a header file that FLTK code will include:

```
PROTOCOLS=`pkg-config --variable=pkgdatadir wayland-protocols`
wayland-scanner private-code $PROTOCOLS/stable/xdg-shell/xdg-shell.xml xdg-shell-protocol.c
wayland-scanner client-header $PROTOCOLS/stable/xdg-shell/xdg-shell.xml xdg-shell-client-protocol.h
```

Similar operations are performed for FLTK to use protocols `XDG decoration`, `Text input` and `GTK Shell`.

4.1.3 The hybrid Wayland/X11 platform

The Wayland platform of FLTK is normally a two-legged hybrid able to use either Wayland or X11 and to choose between these possibilities at run-time, without any change to the client application. The Wayland/X11 hybrid is essentially a version of the FLTK library containing both all Wayland-specific and all X11-specific code. That's reflected in file `FL/fl_config.h` which defines both `FLTK_USE_WAYLAND` and `FLTK_USE_X11`. This creates the constraint that Wayland and X11 cannot use the same type name for different purposes or the same symbol name. That is why function `fl_xid(const Fl_Window*)` is deprecated in FLTK 1.4 and replaced by `fl_wl_xid()` for Wayland and `fl_x11_xid()` for X11. Also, global variable `Window fl_window` is not used by the Wayland platform which instead uses `static struct wld_window *Fl_Wayland_Window_Driver:: wld_window`. The FLTK library contains also a short source file, `fl_wayland_platform_init.cxx`, that determines, at startup time, whether the app will run as a Wayland or as an X11 client. Function `attempt_wayland()` therein performs this choice as follows :

- if the app defines a global bool variable called `fl_disable_wayland` and this variable is true, the X11 leg is chosen;
- if environment variable `FLTK_BACKEND` is defined to string "wayland", the Wayland leg is chosen;
- if environment variable `FLTK_BACKEND` is defined to string "x11", the X11 leg is chosen;
- otherwise, a connection to a Wayland compositor is attempted; if it's successful, the Wayland leg is chosen; if it's not, the X11 leg is chosen.

The first condition listed above is meant to facilitate transition to FLTK 1.4 of source code written for FLTK 1.3 and containing X11-specific code : it's enough to put

```
FL_EXPORT bool fl_disable_wayland = true;
```

anywhere in the source code, for the app to run with 1.4, using the x11 leg of the hybrid platform, without any other change in the source code nor to the application's environment.

In special situations, such as with embedded systems equipped with the Wayland software but lacking the X11 library, it's possible to build the FLTK library such as it contains only the Wayland backend. This is achieved building FLTK with `cmake -DFLTK_BACKEND_X11=OFF` or with `configure -disable-x11`. In that case, `FL/fl_config.h` does not define `FLTK_USE_X11`.

The rest of this chapter describes what happens when the Wayland leg has been chosen.

4.1.4 Listeners

A Wayland 'listener' is a small array of pointers to FLTK-defined callback functions associated to a Wayland-defined object; Wayland calls these functions when defined events occur, and transmits relevant information to the client app as parameters of these calls. Each listener is associated to its corresponding Wayland object, usually right after the object's creation, by a call to a specific Wayland function named following the form `wl_XXX_add_listener()`.

For example, this code:

```
static void surface_enter(.....) { ..... } // called when a surface enters a display
static void surface_leave(.....) { ..... } // called when a surface leaves a display
```

```
static struct wl_surface_listener surface_listener = {
    surface_enter,
    surface_leave,
};
```

```
some_pointer_type pter_to_data;
struct wl_surface *my_wl_surface;
my_wl_surface = wl_compositor_create_surface(scr_driver->wl_compositor);
wl_surface_add_listener(my_wl_surface, &surface_listener, pter_to_data);
```

creates a Wayland object of type `struct wl_surface`, and associates it with a 2-member listener called `surface_listener`. After this, Wayland is expected to call the 2 listener members, `surface_enter` or `surface_leave`, each time `my_wl_surface` will enter or leave, respectively, a display. The arguments of these calls, not detailed here, allow the member functions to identify which surface enters or leaves which display.

The `wl_surface_add_listener()` call above also associates `pter_to_data` to `my_wl_surface` as *user data*. The `wl_surface` object's "user data" can be obtained later calling function `wl_surface_get_user_data()`.

Wayland function `wl_proxy_get_listener()` returns a pointer to a Wayland object's listener provided that object is transmitted cast to type `struct wl_proxy *`. This gives a handy way to distinguish FLTK-created Wayland objects from objects of other origin: the listener of an FLTK-created object is a known FLTK listener. For example, function `Fl_Wayland_Window_Driver::surface_to_window()` uses this possibility calling `wl_proxy_get_listener((struct wl_proxy *)wl_surface)` for any object of type `struct wl_surface`: if that object was created as in the example above, this call returns a pointer to FLTK's `surface_listener` static variable.

4.1.5 Opening a Wayland connection

Establishing a Wayland connection requires environment variable `XDG_RUNTIME_DIR` to be defined and to point to a directory containing a socket connected to a Wayland compositor. This variable is usually set by the login procedure of Wayland-friendly desktops. The name of the Wayland socket is determined as follows:

- the client may call `Fl::display(const char *display_name)` before `fl_open_display()` runs or use the `-display` command line argument and transmit there the socket name;
- environment variable `WAYLAND_DISPLAY` can be defined to the socket name;
- otherwise, "wayland-0" is used.

What socket is selected determines what compositor will be used by the client application.

Function `Fl_Wayland_Screen_Driver::open_display_platform()` establishes the connection to the Wayland socket identified above calling `wl_display_connect(NULL)` which returns a `struct wl_display` pointer or `NULL` in case of failure. Such `NULL` return is the hint that allows the FLTK display opening procedure of the Wayland/X11 hybrid to recognize when Wayland access is not possible and to fallback to X11.

Then, function `wl_registry_add_listener()` associates a 2-member listener, whose 1st member, `registry_handle_global()`, will be called by Wayland a number of times to indicate each time a protocol supported by the compositor or a system feature such as displays and keyboards. This code allows to run the client until all calls to `registry_handle_global()` have occurred:

```
static void sync_done(void *data, struct wl_callback *cb, uint32_t time) {
    *(struct wl_callback **)data = NULL;
    wl_callback_destroy(cb);
}

static const struct wl_callback_listener sync_listener = {
    sync_done
};
```

```
struct wl_callback *registry_cb = wl_display_sync(wl_display);
wl_callback_add_listener(registry_cb, &sync_listener, &registry_cb);
while (registry_cb) wl_display_dispatch(wl_display);
```

A pointer to an object of type `struct wl_callback` created by function `wl_display_sync()` is assigned to variable `registry_cb`. Then a 1-member listener is attached to this object. Wayland will run this listener's member function, `sync_done()`, after all calls to `registry_handle_global()` have occurred. Function `sync_done()` sets to null variable `registry_cb` and destroys the `wl_callback`. Finally, function `wl_display_dispatch()` is called as long as variable `registry_cb` is not null. This makes Wayland process all its pending requests until `sync_done()` runs.

The prototype of function `registry_handle_global` is:

```
static void registry_handle_global(void *user_data, struct wl_registry *wl_registry,
    uint32_t id, const char *interface, uint32_t version)
```

Each time Wayland calls `registry_handle_global()`, `interface` and `version` give the name and version of a component or feature of the Wayland system. It's necessary to call each time function `wl_registry_bind()` which returns a pointer to a Wayland structure that will be the client's access point to the corresponding Wayland protocol or system feature. This pointer is stored in a dedicated member variable of the unique `Fl_Wayland_Screen_Driver` object of an FLTK app, or of another object accessible from this object. For example, when `interface` equals "wl_compositor", the value returned by `wl_registry_bind()` is stored as member `wl_compositor` of the `Fl_Wayland_Screen_Driver` object. `registry_handle_global()` also identifies whether the Mutter, Weston, or KWin compositor is connected and stores this information in static member variable `Fl_Wayland_Screen_Driver::compositor`.

Wayland calls `registry_handle_global()` with its parameter `interface` equals to "wl_output" once for each screen connected to the system. Each time, an object of type `struct wl_output` is created, to which a 4-

member `listener` is associated by function `wl_output_add_listener()`. The 3rd member of this 4-function listener, `output_done()`, runs after all initialization steps of the screen have completed and turns to `true` member `done` of a record of type `struct Fl_Wayland_Screen_Driver::output` associated to the screen. Function `sync_done()` mentioned above therefore also calls `wl_display_dispatch()` until the `done` member of all `Fl_Wayland_Screen_Driver::output` records are `true`. Overall, after return from function `sync_done()`, FLTK has been made aware of all optional protocols and features of its connected Wayland compositor, and has initialized all screens of the system.

Finally, function `wl_display_get_fd()` is called to obtain the file descriptor of the Wayland socket and a call to `Fl::add_fd()` makes FLTK listen to this descriptor in `FL_READ` mode and associates function `wayland_socket_callback()` from file `Fl_Wayland_Screen_Driver.cxx` with it. This function calls `wl_display_dispatch()` which reads and interprets data available from the file descriptor, and calls corresponding listeners. The `wl_display_dispatch()` call is repeated as long as data are available for reading.

The event loop is run by function `Fl_Unix_System_Driver::wait()` which is used by both the Wayland and X11 FLTK backends. Among various tasks, this function waits for data arriving on the file descriptors FLTK is listening. Overall, the event loop of the Wayland backend is nearly exactly the same as that used by the X11 backend. The Wayland backend differs only in the callback function handling data read from the Wayland connection socket, and in overridden functions `Fl_Wayland_Screen_Driver::poll_or_select_with_delay()` and `Fl_Wayland_Screen_Driver::poll_or_select()`.

4.1.6 Wayland windows and surfaces

Wayland defines objects called surfaces of type `struct wl_surface`. A Wayland surface "has a rectangular area which may be displayed on zero or more displays, present buffers, receive user input, and define a local coordinate system". In other words, surface is the name Wayland uses for a window. Buffers allow the client app to draw to surfaces (see [Wayland buffers](#)). FLTK creates a surface each time an `Fl_Window` is shown calling function `wl_compositor_create_surface()`. Static member function `Fl_Wayland_Window_Driver::surface_to_window(struct wl_surface *)` gives the `Fl_Window*` corresponding to the surface given in argument. FLTK recognizes 4 distinct kinds of surfaces named `DECORATED`, `UNFRAMED`, `POPUP` and `SUBWINDOW`. `DECORATED` are toplevel windows with a titlebar. `UNFRAMED` have no titlebar. `POPUP` correspond to menus and tooltips, `SUBWINDOW` to an `Fl_Window` embedded in another `Fl_Window`. Function `Fl_Wayland_Window_Driver::makeWindow()` creates all these surfaces, creates for each a record of type `struct wld_window` (see [wld_window](#)), and stores the window kind in member variable `kind` of this record. Member variable `xid` of the window's `Fl_X` record stores the address of this record.

Except for `SUBWINDOW`'s, each surface needs a Wayland object of type `struct xdg_surface` used to make it become a mapped window and stored in member `xdg_surface` of the window's `wld_window` record. For `DECORATED` windows, this object is created inside `libdecor` and transmitted to FLTK by function `libdecor_frame_get_xdg_surface()`. For `UNFRAMED` and `POPUP` windows, it's created by function `xdg_wm_base_get_xdg_surface()`. Finally, each surface is also associated to one more Wayland object whose type varies with the window's kind. These explain this part of the `wld_window` record:

```
union {
    struct libdecor_frame *frame; // created for DECORATED by libdecor_decorate()
    struct wl_subsurface *subsurface; // created for SUBWINDOW by wl_subcompositor_get_subsurface()
    struct xdg_popup *xdg_popup; // created for POPUP by xdg_surface_get_popup()
    struct xdg_toplevel *xdg_toplevel; // created for UNFRAMED by xdg_surface_get_toplevel()
};
```

Except for `SUBWINDOW`'s, each surface is associated to a 'configure' function that Wayland calls one or more times when the window is going to be mapped on the display. The 'configure' function of `DECORATED` surfaces is `handle_configure()` which is the 1st member of a 4-member listener named `libdecor_frame_iface` associated to a decorated window when it's created calling `libdecor_decorate()`. Finally, a call to `libdecor_frame_map()` triggers the process of mapping the newly created `DECORATED` surface on a display. Wayland calls `handle_configure()` twice during this process. The first `handle_configure()` run allows to set the window's `xdg_surface` object which is returned by function `libdecor_frame_get_xdg_surface()`. FLTK distinguishes the first from the second run of `handle_configure()` by looking at the `xdg_surface` member variable that's `NULL` at the beginning of the 1st run and not `NULL` later. Wayland calls `handle_configure()` also during operations such as resizing, minimizing (see below). With the help of a few calls to `libdecor` functions, FLTK obtains in this function all needed information about the size and state of the mapped window. The 'configure' functions of `UNFRAMED` and `POPUP` surfaces are `xdg_surface_configure()`, `xdg_toplevel_configure()` and `popup_configure()`. The mapping process of these surfaces is triggered by a call to `wl_surface_commit()`. These 'configure' functions transmit effective window size information to FLTK. Also, they are where the window's `Fl_Window_Driver::wait_for_`

`expose_value` member variable is set to 0 to indicate that the window has been mapped to display. **Caution**: there are some small differences between how and when the various Wayland compositors call `handle_configure()`.

When a decorated window changes size, whatever the cause of it, Wayland calls `handle_configure()` which sets member variable `Fl_Wayland_Window_Driver::in_handle_configure` to true and calls the window's virtual `resize()` function which ultimately runs `Fl_Wayland_Window_Driver::resize()` which calls `Fl_Group::resize()` to perform FLTK's resize operations and `Fl_Wayland_Graphics_Driver::buffer_release()` to delete the existing window buffer that's not adequate for the new window size. At the end of the run of `handle_configure()`, `in_handle_configure` is set back to false. When the window size change is caused by the app itself calling the window's `resize()` function, `Fl_Wayland_Window_Driver::in_handle_configure` is false. This allows `Fl_Wayland_Window_Driver::resize()` to detect that Wayland needs be informed of the desired size change, which gets done by a call to `libdecor_frame_commit()`. Wayland later calls `handle_configure()` and events described above unfold.

Wayland generally does not provide a way to control where the compositor should map a window in the system displays. Nevertheless, for multi-display systems, Wayland allows to control on what display should the compositor map a fullscreen window. That is done inside function `handle_configure()` which calls `libdecor_frame_set_fullscreen()` for DECORATED windows and inside function `xdg_toplevel_configure()` which calls `xdg_toplevel_set_fullscreen()` for UNFRAMED. The struct `wl_output` pointer for the targeted display is transmitted as 2nd argument of these calls.

4.1.7 Menu windows and other popups

Menu windows, tiny menu title windows, and tooltip windows are implemented using Wayland's popup mechanism which allows to position a popup window relatively to a previously mapped window, itself a popup or another kind of window, with the restriction that any popup must overlap or at least touch that other window. Member function `Fl_Wayland_Window_Driver::makeWindow` calls member function `Fl_Wayland_Window_Driver::process_menu_or_tooltip` to create all popups.

This function gets called after FLTK has computed using a given algorithm the desired (x,y) position of the popup window's top-left corner, using coordinates centered on the top-left corner of the toplevel window from which the popup originates. This algorithm is able to prevent popups from being positioned beyond the screen borders under the assumption that the position of a toplevel window inside a screen is known. While this assumption holds for other platforms, it does not for the Wayland platform. The FLTK code for the Wayland platform therefore modifies the algorithm that FLTK uses to compute the position of menu windows. The key information used by this algorithm is obtained by member function `Fl_Window_Driver::menu_window_area` which computes the coordinates of the rectangle where menu windows are allowed to be positioned. Under other platforms, this function just returns the origin and size of the work area of the screen in use. In contrast, the Wayland platform handles two situations differently :

- For menu windows that are not taller than the display in use, the Wayland-overridden member function `Fl_Wayland_Window_Driver::menu_window_area` returns large negative origin and large width and height values. This lets the standard FLTK algorithm position the menu relatively to its window of origin without concern about screen limits, and relies on Wayland's constraint mechanism described below to prevent the menu from going beyond these limits, without FLTK having to know where they are.
- Menu windows taller than the screen where they are mapped need special handling described in detail in a comment above the source code of function `Fl_Wayland_Window_Driver::process_menu_or_tooltip`.

Function `Fl_Wayland_Window_Driver::process_menu_or_tooltip` first computes `origin_win`, pointer to the `Fl_Window` relatively to which the popup is to be positioned. Window `origin_win` is the parent menu window when the popup is a sub-menu; it's the tiny window title when the popup is a menu with a title; otherwise, it's the window containing the point of origin of the popup. An object of type struct `xdg_positioner` created by function `xdg_wm_base_create_positioner()` is used to express the rules that will determine the popup position relatively to `origin_win` as follows:

- Function `xdg_positioner_set_anchor_rect()` determines a rectangle in `origin_win` relatively to which the popup is to be positioned. When the popup to be created is a menu window spawned by an `Fl_Menu_Bar`, that rectangle is the full area of the menu title window. Otherwise, that rectangle is an adequately located point.
- Function `xdg_positioner_set_size()` sets the popup size.

- The `xdg_positioner_set_anchor(positioner, XDG_POSITIONER_ANCHOR_BOTTOM_LEFT);` and `xdg_positioner_set_gravity(positioner, XDG_POSITIONER_GRAVITY_BOTTOM_RIGHT);` calls position the popup so that its top-left corner is initially below and at right of the bottom-left corner of the `origin_win`'s anchor rectangle.
- The call to `xdg_positioner_set_offset()` further changes the popup vertical position.
- The call to `xdg_positioner_set_constraint_adjustment()` uses constraint flags `XDG_POSITIONER_CONSTRAINT_ADJUSTMENT_SLIDE_X` and `XDG_POSITIONER_CONSTRAINT_ADJUSTMENT_SLIDE_Y` which mean that the compositor will move the popup horizontally and vertically if its initial position would make it expand beyond the edges of the screen. Furthermore, flag `XDG_POSITIONER_CONSTRAINT_ADJUSTMENT_FLIP_Y` is added when the popup is a menu window spawned by an `Fl_Menu_Bar`; this has the popup flipped above the `Fl_Menu_Bar` if there's not enough screen room below it for the popup.
- Finally, a call to function `xdg_surface_get_popup()` creates the popup accounting for position rules listed above. The positioner is then deleted by `xdg_positioner_destroy()`, a listener is associated to the popup surface with `xdg_popup_add_listener()`, and a call to `wl_surface_commit()` triggers the mapping of the popup on the display.

Overall, the expected coordinates of the top-left corner of the popup relatively to `origin_win` are `popup_x`, `popup_y`. They are memorized in a record of FLTK-defined type `struct win_positioner` that's associated to the popup listener. When the compositor maps the popup, function `popup_configure`, the first element of the popup listener, runs and receives as arguments the coordinates of the popup top left and its size. These values account for the positioning constraints of the popup which may have moved it to avoid screen borders. This function can therefore detect whether constraints applied have modified the effective popup location in comparison to the expected coordinates which are available as member variables of the `struct win_positioner` record mentioned above. That's key to the handling by FLTK of tall menu windows.

Groups of popups containing a menutitle, the associated menuwindow, and optionally a submenu window and that don't belong to an `Fl_Menu_Bar` are mapped in a different order: the menuwindow is mapped first, and the menutitle is mapped second above it as a child popup. Function `Fl_Window_Driver::is_floating_title()` detects when such a menutitle is created, static member variable `previous_floatingtitle` is assigned the value of this menutitle, and the menutitle is mapped only after the menuwindow has been mapped, as a child of it. This positions better the popup group in the display relatively to where the popup was created.

4.1.8 Fl_Wayland_Graphics_Driver and Fl_Cairo_Graphics_Driver

The Wayland platform of FLTK uses an `Fl_Wayland_Graphics_Driver` object for all its on-screen drawing operations. This object is created by function `Fl_Graphics_Driver::newMainGraphicsDriver()` called by `Fl_Display_Device::display_device()` when the library opens the display. New `Fl_Wayland_Graphics_Driver` objects are also created for each `Fl_Image_Surface` and each `Fl_Copy_Surface` used, and deleted when these objects are deleted.

Class `Fl_Wayland_Graphics_Driver` derives from class `Fl_Cairo_Graphics_Driver` which implements all the FLTK drawing API for a Cairo surface. Function `Fl_Wayland_Graphics_Driver::cairo_init()` creates the Cairo surface used by each `Fl_Wayland_Graphics_Driver` object by calling `cairo_image_surface_create_for_data()` for the window's or offscreen's `draw_buffer` (see below).

Class `Fl_Cairo_Graphics_Driver` is also used by the X11 leg of the hybrid Wayland-X11 platform because this leg draws to the display with an `Fl_X11_Cairo_Graphics_Driver` object which derives from class `Fl_Cairo_Graphics_Driver`. Finally, `Fl_Cairo_Graphics_Driver` is also used, in the form of an object from its derived class `Fl_PostScript_Graphics_Driver`, when the hybrid Wayland-X11 platform draws PostScript, or when the classic X11 platform uses Pango and draws PostScript. This happens when classes `Fl_PostScript_File_Device` and `Fl_Printer` are used.

4.1.9 Wayland buffers

Wayland uses buffers, objects of type `struct wl_buffer`, to draw to surfaces. In principle, one or more buffers can be associated to a surface, and functions `wl_surface_attach()` and `wl_surface_commit()` are called to first attach one such buffer to the surface and then inform the compositor to map this buffer's graphics content on the display. Wayland buffers can use various memory layouts. FLTK uses `WL_SHM_FORMAT_ARGB8888`, which is the same layout as what Cairo calls `CAIRO_FORMAT_ARGB32`.

FLTK calls function `Fl_Wayland_Window_Driver::make_current()` before drawing to any `Fl_Window`. Member `buffer` of this `Fl_Window`'s struct `wld_window` (see `wld_window`) is `NULL` when the window has just been created or resized. In that case, FLTK calls `Fl_Wayland_Graphics_Driver::create_wld_buffer()` which returns a pointer to a struct `wld_buffer` containing

- a Wayland buffer, member `wl_buffer`;
- a Cairo image surface, created by a call to `Fl_Wayland_Graphics_Driver::cairo_init()`.

Each of these two objects encapsulates a byte array of the same size and the same memory layout destined to contain the `Fl_Window`'s graphics. The Cairo image surface object is where FLTK draws. The Wayland buffer is what Wayland maps on the display. FLTK copies the Cairo surface's byte array to the Wayland buffer's byte array before beginning the mapping operation. If `width` and `height` are a window's dimensions in pixels,

```
int stride = cairo_format_stride_for_width(CAIRO_FORMAT_ARGB32, width);
int size = stride * height;
```

give `size`, the common size of both byte arrays.

The effective creation of the `wl_buffer` object is delayed until function `Fl_Wayland_Graphics_Driver::buffer_commit()` gets called. Section [Buffer factories](#) below details how FLTK creates `wl_buffer` objects.

The struct `Fl_Wayland_Graphics_Driver::wld_buffer` (see `wld_buffer`) contains a pointer to the byte array of the Cairo image surface (member `draw_buffer.buffer`), information about the Wayland buffer (members `wl_buffer` and `data`), the common size of the Cairo surface's and Wayland buffer's byte arrays (member `draw_buffer.data_size`), and other information. A pointer to this struct `Fl_Wayland_Graphics_Driver::wld_buffer` is memorized as member `buffer` of the `Fl_Window`'s `wld_window`. All drawing operations to the `Fl_Window` then modify the content of the Cairo image surface.

Function `Fl_Wayland_Window_Driver::flush()` is in charge of sending FLTK graphics data to the display. That is done by calling function `Fl_Wayland_Graphics_Driver::buffer_commit()` which creates the struct `wl_buffer` object calling `create_shm_buffer()` if that was not done before, copies the byte array of the Cairo surface to the Wayland buffer's starting memory address, and calls functions `wl_surface_attach()` and `wl_surface_commit()`. Before calling `Fl_Window::flush()`, FLTK has computed a damaged region. If that region is not null, `Fl_Wayland_Graphics_Driver::buffer_commit()` copies only the damaged parts of the Cairo surface to the Wayland buffer and calls function `wl_surface_damage_buffer()` for these parts to inform the compositor of what parts of the surface need its attention.

Throttling redraw operations

An important detail here is that FLTK uses Wayland's synchronization mechanism to make sure the surface's `wl_buffer` is not changed while the compositor is using it and to refrain from calling `wl_surface_commit()` more frequently than the system can process it. This 2-step mechanism works as follows:

- `Fl_Wayland_Graphics_Driver::buffer_commit()` first calls function `wl_surface_frame()` to obtain a pointer to a struct `wl_callback` object and stores it as member `frame_cb` of the surface's `wld_window`. Then it calls `wl_callback_add_listener()` to associate this object to the FLTK-defined, callback function `surface_frame_done()`. It next calls `wl_surface_commit()`. Together, these 3 calls instruct Wayland to start mapping the buffer content to the display and to call `surface_frame_done()` later, when it will have become ready for another mapping operation.
- Later, `surface_frame_done()` runs and destroys the `wl_callback` object by function `wl_callback_destroy()` and sets member `frame_cb` to `NULL`.

Member variable `draw_buffer_needs_commit` of the `wld_buffer` is also important in this mechanism : it informs FLTK that the graphics buffer has changed and needs being committed. This variable is turned `true` every time a graphics operation changes the buffer content and turned `false` when the buffer gets committed.

This procedure ensures that FLTK never changes the surface's Wayland buffer while it's being used by the compositor and never calls `wl_surface_commit()` before Wayland gets ready for a new commit because `Fl_Wayland_Window_Driver::flush()` calls `Fl_Wayland_Graphics_Driver::buffer_commit()` only if `frame_cb` is `NULL`. If it's not `NULL`, the exact content of function `surface_frame_done()` is:

```
static void surface_frame_done(void *data, struct wl_callback *cb, uint32_t time) {
    struct wld_window *window = (struct wld_window *)data;
    wl_callback_destroy(cb);
    window->frame_cb = NULL;
    if (window->buffer && window->buffer->draw_buffer_needs_commit) {
```

```

    Fl_Wayland_Graphics_Driver::buffer_commit(window);
}
}

```

has the effect that when the mapping operation eventually completes, Wayland runs `surface_frame_done()`, which calls anew `Fl_Wayland_Graphics_Driver::buffer_commit()` if the buffer's `draw_buffer←_needs_commit` member is true. The net result is that the screen shows the most recent surface content.

This synchronization mechanism is also used when performing an interactive window resize operation. During such operation, the compositor informs the client an interactive resize is being performed and sends window resize commands at high rate (~60 Hz) to the client via the socket. Libdecor turns on flag `LIBDECOR_WINDOW←_STATE_RESIZING` to inform the client, and runs function `handle_configure()` for each received resize command. Before calling `Fl_Group::resize()` and later `Fl_Window::draw()`, `handle_configure()` tests whether `window→frame_cb` is NULL. When it's not because a previous resize operation is being performed, the current resize command is skipped. At the end of the interactive resize, flag `LIBDECOR_WINDOW←_STATE_RESIZING` is off and Wayland sends a final resize command which is not skipped. Overall, this ensures the client program resizes its window as frequently as it can without falling behind resize commands sent by the compositor.

To account for a bug in Mutter (issue #878), the `window→frame_cb` object is not created when a toplevel window is being resized and is entirely covered by one subwindow.

Progressive window drawing

FLTK supports progressive drawing when an app calls function `Fl_Window::make_current()` at any time and then calls the FLTK drawing API. This is made possible in function `Fl_Wayland_Window_Driver::make_←current()` with

```

// to support progressive drawing
if ( (!Fl_Wayland_Window_Driver::in_flush_) && window→buffer && (!window→frame_cb)
    && window→buffer→draw_buffer_needs_commit && (!wait_for_expose_value) ) {
    Fl_Wayland_Graphics_Driver::buffer_commit(window);
}

```

Thus, `buffer_commit()` runs only when `frame_cb` is NULL. If an app rapidly performs calls to `Fl_Window::make_current()` and to drawing functions, FLTK will copy `draw_buffer` to the Wayland buffer and instruct Wayland to map it to the display when `frame_cb` is NULL which means that the compositor is ready to start performing a mapping operation. This occurs when the progressive drawing operation begins. Later, `frame_cb` is generally found non NULL when `Fl_Wayland_Window_Driver::make_current()` runs because the compositor is busy processing the previous Wayland buffer. When the compositor has completed this processing, the client app runs `surface_frame_done()` which, provided member variable `draw_buffer←_needs_commit` is true, calls `Fl_Wayland_Graphics_Driver::buffer_commit()`. This makes the compositor map the Wayland buffer in its new, more advanced, state.

An example of progressive drawing is given by FLTK's mandelbrot test app. When set to fullscreen, this app can be seen to progressively fill its window from top to bottom by blocks of lines, each block appearing when the compositor is ready to map a new buffer. When the compositor is not ready, the app does not block but continues computing and drawing in memory but not on display more lines of the desired Mandelbrot graph.

Wayland buffer deletion

Each `wld_buffer` record contains boolean member `in_use` which is set to `true` just before the buffer gets committed, and boolean member `released` which is set to `true` when FLTK no longer needs the buffer and calls `Fl←_Wayland_Graphics_Driver::buffer_release()`. FLTK's buffer-creating function, `Fl_Wayland←_Graphics_Driver::create_shm_buffer()`, attaches a 1-member listener to each buffer which Wayland calls after a commit operation to indicate the client is allowed to re-use the buffer. This listener's member function, `buffer_release_listener()`, turns to false member `in_use` of the buffer's `wld_buffer` record. Since the two events 'FLTK no longer needs the buffer' and 'the client is allowed to re-use the buffer' can arrive in any order, FLTK deletes the `struct wl_buffer` object by running `do_buffer_release()` only after both events happened, that is, when `in_use` is false and `released` is true. That's why function `do_buffer←_release()` is called by both functions `Fl_Wayland_Graphics_Driver::buffer_release()` and `buffer_release_listener()`.

4.1.10 Buffer factories

Wayland names *buffer factory* a software procedure that constructs objects of type `struct wl_buffer` for use by a client application. FLTK creates a `wl_buffer` object each time an `Fl_Window` is mapped on a display or

resized. That's done by member function `Fl_Wayland_Graphics_Driver::create_shm_buffer()` which follows this 3-step procedure to create a "buffer factory" for FLTK and to construct Wayland buffers from it:

- Libdecor function `os_create_anonymous_file(off_t size)` creates an adequate file and mmap's it. This file lives in RAM because it is created by function `memfd_create()`. FLTK sets this file size to 10 MB unless the size of the buffer to be created is larger; in that case the anonymous file is sized to twice the buffer size.
- Wayland function `wl_shm_create_pool()` shares this mmap'ed memory with the Wayland compositor and returns an object of type `struct wl_shm_pool` which encapsulates this memory. A record of type `struct Fl_Wayland_Graphics_Driver::wld_shm_pool_data` is created and associated to the newly created `wl_shm_pool` by `wl_shm_pool_set_user_data()`. This record stores the starting address (`pool_memory`) and size (`pool_size`) of the pool's encapsulated memory. The record also contains member `buffers` of type `struct wl_list` which stores the access point to the linked list of `wl_buffer` objects that will be created from the `wl_shm_pool`.

- A variable named `chunk_offset` represents the offset within the pool's shared memory available for the buffer being constructed. It equals 0 when the pool has just been created and is updated as detailed below when one or more buffers have been previously created from the pool. A record of type `struct Fl_Wayland_Graphics_Driver::wld_buffer` is created. This record will contain (member `wl_buffer`) the address of a `wl_buffer` object that's created by function `wl_shm_pool_create_buffer()`. This `wl_buffer` object encapsulates a section of a given size of the pool's shared memory beginning at offset `chunk_offset` in it. Quantity `pool_memory + chunk_offset` is therefore the address of the beginning of the mmap'ed memory section encapsulated by this `wl_buffer`. Member `shm_pool` of the newly constructed `Fl_Wayland_Graphics_Driver::wld_buffer` object is set to the address of the current `wl_shm_pool` object. This record is added to the head of the linked list of current pool's buffers by a call to `wl_list_insert()`. At that point, a `struct Fl_Wayland_Graphics_Driver::wld_buffer` record is part of the linked list of all such records corresponding to `wl_buffer` objects created from the same `wl_shm_pool` object, and member `shm_pool` of this record gives the address of this `wl_shm_pool`. When a new `struct Fl_Wayland_Graphics_Driver::wld_buffer` record is to be created,

```
struct wld_shm_pool_data *pool_data =
    (struct wld_shm_pool_data *)wl_shm_pool_get_user_data(pool);
struct Fl_Wayland_Graphics_Driver::wld_buffer *record = wl_container_of(pool_data->buffers.next,
record, link);
int chunk_offset = ((char*)record->data - pool_data->pool_memory) + record->data_size;
```

gives the offset within the current pool's mmap'ed memory available for a new `wl_buffer`. Macro `wl_container_of()` gives the address of a record belonging to a linked list of records of the same type.

A window's `wl_buffer` is re-filled by graphics data and committed each time the window gets redrawn, and is set to be destroyed by function `Fl_Wayland_Graphics_Driver::buffer_release()` when `Fl_Window::hide()` runs or the window is resized. When the `wl_buffer` is no longer in use, function `do_buffer_release()` gets called as explained above. It destroys the `wl_buffer` with `wl_buffer->destroy()`, and removes the corresponding `Fl_Wayland_Graphics_Driver::wld_buffer` record from the linked list of buffers from the same `wl_shm_pool`. Since new `Fl_Wayland_Graphics_Driver::wld_buffer` records are added at the head of the linked list, and since the record at the head of this list is used to compute the offset within the pool's mmap'ed memory available for a new `wl_buffer`, destruction of the last created `wl_buffer` allows to re-use the destroyed buffer's pool's memory for a new `wl_buffer`.

When function `do_buffer_release()` finds the list of buffers from a given pool empty, two situations can occur.

1) This pool is the current pool. Its mmap'ed memory will be re-used from offset 0 to create future `wl_buffer` objects. 2) This pool is not current. It gets destroyed with `wl_shm_pool_destroy()`, the pool's mmap'ed memory is munmap'ed, and the pool's associated `struct wld_shm_pool_data` is freed. In situation 1) above, the next `wl_buffer` to be created can need more memory than the current pool's memory size. If so, the current pool gets destroyed and replaced by a new, larger pool.

If the sum of `chunk_offset` plus the buffer size is larger than the current pool's size when function `create_shm_buffer()` is called, `chunk_offset` is reset to 0, and a new `wl_shm_pool` object is created and used by FLTK's "buffer factory". This mechanism allows to access new mmap'ed memory when `chunk_offset` reaches the end of the previous mmap'ed section.

Wayland uses also `wl_buffer` objects to support cursors. FLTK uses the "buffer factory" described here when creating custom cursors (see [custom-cursor](#)) with function `Fl_Wayland_Window_Driver::set_cursor(const Fl_RGB_Image *, ...)` which calls `create_shm_buffer()` via `set_cursor_4args()`, `custom_offscreen()` and `create_wld_buffer()`. In contrast, standard shaped-cursors

(e.g., `FL_CURSOR_INSERT`) use their own "buffer factory" inside Wayland functions such as `wl_cursor_↵ theme_get_cursor()`. Therefore, the fact that the `wl_buffer` objects behind standard cursors are never destroyed doesn't prevent disused `struct wl_shm_pool` objects from being freed because those buffers come from a distinct "buffer factory". The "buffer factory" described here is also used by function `offscreen_from_↵ _text()` when displaying dragged text in a DnD operation.

4.1.11 Displays and HighDPI support

Wayland uses the concept of *seat* of type `struct wl_seat` which encompasses displays, a keyboard, a mouse, and a trackpad. Although Wayland may be in principle able to deal with several seats, FLTK's Wayland platform is conceived for one seat only. That seat may contain one or more displays, which Wayland calls *outputs*, of type `struct wl_output`.

As written above, function `registry_handle_global()` discovers the available seat at start-up time. This function also associates a listener to each display connected to the system by calling function `wl_output_↵ add_listener()`. This listener's member functions run at program startup when Wayland discovers its displays (see [Opening a Wayland connection](#)). Member `output_mode` runs also when the display is resized and member `output_scale` also when the Wayland scale factor (see below) is changed. FLTK defines type `struct Fl_Wayland_Screen_Driver::output` to store display size and scaling information. One such record is created for each display. These records are put in a `struct wl_list` accessible from member `outputs` of the single `Fl_Wayland_Screen_Driver` object.

FLTK uses 2 distinct scaling parameters for each display:

- `int wld_scale;` This member variable of the `struct Fl_Wayland_Screen_Driver::output` record typically equals 1 for standard, and 2 for HighDPI displays. The effect of value `n` of variable `wld_scale` is that 1 Wayland graphics unit represents a block of `n × n` pixels. Another effect is that a drawing buffer for a surface of size `W × H` units contains `W * n * H * n * 4` bytes. Member function `output_scale()` mentioned above sets this value for each system's display at startup time. Member function `Fl_Wayland_↵ _Graphics_Driver::buffer_commit()` informs the Wayland compositor of the value of `wld_↵ scale` calling `wl_surface_set_buffer_scale()` which is enough to make FLTK apps HighDPI-aware. Under the gnome and KDE desktops, this parameter is visible in the "Settings" app, "Displays" section, "Scale" parameter which is 200% on HighDPI displays.
- `float gui_scale;` This other member variable is where FLTK's own GUI scaling mechanism with `ctrl+/-/0/` keystrokes and with environment variable `FLTK_SCALING_FACTOR` operates: when FLTK is scaled at 150%, `gui_scale` is assigned value 1.5. Function `Fl_Wayland_Screen_Driver::scale(int n, float f)` assigns value `f` to the `gui_scale` member variable of display # `n`. This variable is used by function `Fl_Wayland_Window_Driver::make_current()` when it calls `Fl_Wayland_↵ _Graphics_Driver::set_buffer()` that scales the graphics driver by this factor with `cairo_↵ scale()`.

Overall, an FLTK object, say an `Fl_Window`, of size `W × H` FLTK units occupies `int(W * gui_scale) * wld_↵ _scale × int(H * gui_scale) * wld_scale` pixels on the display.

When an `Fl_Window` is to be show()'n, `Fl_Wayland_Window_Driver::makeWindow()` creates a `struct wl_surface` with `wl_compositor_create_surface()` and associates it calling `wl_↵ surface_add_listener()` with a 2-member listener called `surface_listener` encharged of managing as follows the list of displays where this `wl_surface` will map. The `Fl_Window` possesses an initially empty linked list of displays accessible at member `outputs` of the window's `wld_window` record. When the `Fl_Window`, or more exactly its associated `struct wl_surface` is mapped on a display, member `surface_enter()` of `surface_listener` runs. This function adds the display where the surface belongs to the end of the linked list of displays for this surface. When a surface is dragged or enlarged across the edge of a display in a multi-display system and expands on a second display, `surface_enter()` runs again, and this surface's list of displays contains 2 items. When a surface leaves a display, member `surface_leave()` of `surface_↵ listener` runs. It removes that display from the surface's list of displays. Each time the first item of a surface's list of displays changes, function `change_scale()` is called and applies that display's `gui_scale` value to that surface calling `Fl_Window_Driver::screen_num(int)`. When a window is unmapped by function `Fl_Wayland_Window_Driver::hide()`, the surface's list of displays is emptied.

Fractional scaling

The KWin compositor, and gnome too if specially set, allow to use *fractional scaling* that can take intermediate values between 100% and 200%. Wayland implements this rendering all `wl_surface`'s as if the scaling was at 200%, and downsizing them to the desired fractional scale value at the compositing stage. Seen from FLTK, everything runs as when `wld_scale = 2`.

These commands make gnome accept fractional scaling, and turn that off:

```
gsettings set org.gnome.mutter experimental-features "['scale-monitor-framebuffer']"
gsettings reset org.gnome.mutter experimental-features
```

4.1.12 Mouse and trackpad handling

FLTK receives information about mouse and pointer events via a 'listener' made up of 5 pointers to functions which Wayland calls when events listed in table below occur. These functions receive from Wayland enough information in their parameters to generate corresponding FLTK events, that is, calls to `Fl::handle(int event_type, Fl_Window *)`.

listener function	called by Wayland when	resulting FLTK events
<code>pointer_enter</code>	pointer enters a window	FL_ENTER
<code>pointer_leave</code>	pointer leaves a window	FL_LEAVE
<code>pointer_motion</code>	pointer moves inside a window	FL_MOVE
<code>pointer_button</code>	state of mouse buttons changes	FL_PUSH, FL_RELEASE
<code>pointer_axis</code>	trackpad is moved vertically or horizontally	FL_MOUSEWHEEL

`pointer_listener` is installed by a call to function `wl_pointer_add_listener()` made by function `seat_capabilities()` which is itself another 'listener' made up of 2 function pointers

```
static struct wl_seat_listener seat_listener = {
    seat_capabilities,
    seat_name
};
```

installed by a call to function `wl_seat_add_listener()` made by function `registry_handle_global()` when it receives a "wl_seat" interface.

Handling middle mouse button clicks on window titlebars

The gnome desktop, via its `gnome-tweaks` application, allows to determine what happens when a middle mouse button click occurs on a window titlebar. To obey this setting, FLTK implements part of the `GTK Shell` protocol as follows. Mutter, gnome's Wayland compositor, declares its support of the `GTK Shell` protocol calling `registry_handle_global()` with its interface argument equal to "gtk_shell". FLTK initializes then a static global variable `gtk_shell` of type `struct gtk_shell1*`.

Member functions of `pointer_listener` mentioned above run for all mouse events on all `wl_surface` objects. The table above describes what these functions do for mouse events on FLTK-created `wl_surface` objects. But they also run for the `libdecor`-created `wl_surface` objects corresponding to window titlebars. Thus, member function `pointer_enter()` runs when the mouse enters a titlebar. It calls `Fl_Wayland_Screen_Driver::event_coords_from_surface()` which calls `Fl_Wayland_Window_Driver::surface_to_window()` which, as mentioned above, can distinguish FLTK-created from non FLTK-created `wl_surface` objects. This allows `pointer_enter()` to identify the entered surface as a titlebar and to assign static global variable `gtk_shell_surface` with the titlebar's `wl_surface` when the mouse enters a titlebar. Similarly, member function `pointer_leave()` sets `gtk_shell_surface` to NULL when the mouse leaves this titlebar. When there's a click on a titlebar, member function `pointer_button()` runs this code

```
if (gtk_shell_surface && state == WL_POINTER_BUTTON_STATE_PRESSED && button == BTN_MIDDLE) {
    struct gtk_surface1 *gtk_surface = gtk_shell1_get_gtk_surface(gtk_shell, gtk_shell_surface);
    gtk_surface1_titlebar_gesture(gtk_surface, serial, seat->wl_seat, GTK_SURFACE1_GESTURE_MIDDLE_CLICK);
    gtk_surface1_release(gtk_surface);
    return;
}
```

which ensures that what `gnome-tweaks` has assigned to middle-click events is executed. At this point, FLTK obeys what `libdecor` decides for right-click (display the window menu) and double-click (maximize the window) events on titlebars which may diverge from `gnome-tweaks` settings.

4.1.13 Wayland cursors

Wayland defines types `struct wl_cursor` and `struct wl_cursor_theme` to hold cursor-related data. FLTK uses function `init_cursors()` from file `Fl_Wayland_Screen_Driver.cxx` to obtain the 'cursor theme' name using function `libdecor_get_cursor_settings()` of library `libdecor`. Function `wl_cursor_theme_load()` then returns a pointer to an object of type `struct wl_cursor_theme` stored in member variable `cursor_theme` of the `Fl_Wayland_Screen_Driver::seat` record. Function `init_cursors()` is itself called by a 'listener' called `seat_capabilities()` installed when function `registry_handle_global()` receives a "wl_seat" interface, at program startup. It is also called when the value of the Wayland scaling factor changes: `output_done()` calls `try_update_cursor()` calls `init_cursors()`. Function `output_done()` belongs to a 'listener' installed when function `registry_handle_global()` receives a "wl_output" interface.

Each time `Fl_Window::cursor(Fl_Cursor)` runs, FLTK calls `Fl_Wayland_Window_Driver::set_cursor(Fl_Cursor)` which calls `wl_cursor_theme_get_cursor()` to set the current cursor shape to one of the standard shapes from the `Fl_Cursor` enumeration. This Wayland function selects a cursor shape based on the current `wl_cursor_theme` object and a cursor name and returns a pointer to a `struct wl_cursor`. Under the gnome desktop, cursor names are the files of directory `/usr/share/icons/XXXX/cursors/` where `XXXX` is the 'gnome cursor theme' (default= `Adwaita`). For example, what FLTK calls `FL_CURSOR_INSERT` corresponds to file `xterm` therein. The full correspondance between `Fl_Cursor` values and names of files therein is found in function `Fl_Wayland_Window_Driver::set_cursor(Fl_Cursor)`. FLTK stores in member variable `default_cursor` of the `Fl_Wayland_Screen_Driver::seat` record a pointer to the currently used `wl_cursor` object, and the current `Fl_Cursor` value in member `standard_cursor` of the `Fl_Wayland_Window_Driver` object.

Finally, function `do_set_cursor()` of file `Fl_Wayland_Screen_Driver.cxx` makes the system pointer use the current `wl_cursor` object to draw its shape on screen. That's done with a call to `wl_pointer_set_cursor()` and a few other functions.

Custom cursor shapes

To support custom cursors, FLTK presently uses a non-public type, `struct cursor_image`, defined in file `Fl_Wayland_Window_Driver.cxx` as follows:

```
struct cursor_image {
    struct wl_cursor_image image;
    struct wl_cursor_theme *theme;
    struct wl_buffer *buffer;
    int offset;
};
```

This definition has been copied to the FLTK source code from file `wayland-cursor.c` of the Wayland project source code because it's not accessible via Wayland header files. It shows that a pointer to a `cursor_image` object can also be viewed as a pointer to the embedded `struct wl_cursor_image` object, this one being part of the public Wayland API. It also shows that a `struct cursor_image` object has an associated `struct wl_buffer` object used to contain the cursor's graphics.

Function `Fl_Wayland_Window_Driver::set_cursor(const Fl_RGB_Image *rgb, int hotx, int hoty)` gives FLTK support of custom cursor shapes. It calls `Fl_Wayland_Window_Driver::set_cursor_4args()` that creates a `cursor_image` object, allocates the corresponding `wl_buffer` by a call to `Fl_Wayland_Graphics_Driver::create_shm_buffer()` via `custom_offscreen()` and `create_wld_buffer()` and draws the cursor shape into that buffer using the offscreen-drawing method of FLTK.

The public type `struct wl_cursor` is essentially an array of `wl_cursor_image` objects and a name:

```
struct wl_cursor {
    unsigned int image_count;
    struct wl_cursor_image **images;
    char *name;
};
```

Function `Fl_Wayland_Window_Driver::set_cursor_4args()` also creates a `struct wl_cursor` object containing a single `wl_cursor_image`, which is in fact the `cursor_image`. Finally, a `struct custom_cursor_` (see [wld_window](#)) is allocated and used to memorize the `struct wl_cursor` and the cursor's image and hotspot. A pointer to this `struct custom_cursor_` object is stored in member `custom_cursor` of the window's [wld_window](#).

Function `Fl_Wayland_Window_Driver::set_cursor_4args()` is also called when a window with a custom cursor is moved between distinct displays or when a display is rescaled to adapt the cursor size to the new display's scale factor.

Member function `Fl_Wayland_Window_Driver::delete_cursor_()` is used to delete any custom cur-

sor shape. This occurs when a window associated to a custom cursor is un-mapped and when such a window gets associated to a standard cursor or to a new custom cursor.

4.1.14 Keyboard support

The "Mouse handling" section above mentioned function `seat_capabilities()` that Wayland calls when the app discovers its "seat". Presence of flag `WL_SEAT_CAPABILITY_KEYBOARD` in argument `capabilities` of this function indicates that a keyboard is available. In that case, a call to `wl_seat_get_keyboard()` returns a pointer stored in member `wl_keyboard` of the `Fl_Wayland_Screen_Driver::seat` object, and a call to `wl_keyboard_add_listener()` installs a 6-member listener of type `struct wl_keyboard_listener`. These 6 FLTK-defined, callback functions are used as follows.

Function `wl_keyboard_keymap()` runs when the app starts and also if the keyboard layout is changed during run-time. It allows initialization of access to this keyboard. Noticeably, member `xkb_state` of type `struct xkb_state*` of the current `Fl_Wayland_Screen_Driver::seat` record is adequately initialized.

Functions `wl_keyboard_enter()` and `wl_keyboard_leave()`, called when focus enters and leaves a surface, send `FL_FOCUS` and `FL_UNFOCUS` events to the `Fl_Window` object corresponding to this surface.

Function `wl_keyboard_key()` runs each time a keyboard key is pressed or released. Its argument `key`, to which 8 must be added, provides the keycode via function `xkb_state_key_get_one_sym()` and then the corresponding text via function `xkb_state_key_get_utf8()` which is put in `Fl::e_text`. Then, a few calls to functions whose name begin with `xkb_compose_` are necessary to support dead and compose keys. Finally a call to `Fl::handle()` sends an `FL_KEYDOWN` or `FL_KEYUP` event to the appropriate `Fl_Window`. Also, function `wl_keyboard_key()` uses global variable `Fl_Int_Vector key_vector` to record all currently pressed keys. This is the base of the implementation of `Fl_Wayland_Screen_Driver::event_key(int)`.

Function `wl_keyboard_modifiers()` runs when a modifier key (e.g., shift, control) is pressed or released. Calls to functions `xkb_state_update_mask()` and `xkb_state_mod_name_is_active()` allow FLTK to set `Fl::e_state` adequately.

Function `wl_keyboard_repeat_info()` does not run, for now, because this would require version 4 of the `wl_keyboard` object which is at version 2 in all tested Wayland compositors.

4.1.15 Support of text input methods

When the connected Wayland compositor supports text input methods, function `registry_handle_global()` gets called with its `interface` argument equal to `zwp_text_input_manager_v3` interface.name. The following call to `wl_registry_bind()` returns a pointer to type `struct zwp_text_input_manager_v3` that is stored as member `text_input_base` of the `Fl_Wayland_Screen_Driver` object.

Later, when function `seat_capabilities()` runs, `text_input_base` is found not NULL, which triggers a call to function `zwp_text_input_manager_v3_get_text_input()` returning a value of type `struct zwp_text_input_v3 *` and stored as member `text_input` of the `Fl_Wayland_Screen_Driver::seat` object. Next, a call to `zwp_text_input_v3_add_listener()` associates this `text_input` with a 6-member listener of type `struct zwp_text_input_v3_listener`. These 6 FLTK-defined, callback functions are used as follows.

Functions `text_input_enter()` and `text_input_leave()` are called when text input enters or leaves a surface (which corresponds to an `Fl_Window`).

Functions `text_input_preedit_string()` and `text_input_commit_string()` are called when the text input method asks the client app to insert 'marked' text or regular text, respectively. Complex text input often begins by inserting temporary text which is said to be 'marked' before replacing it with the text that will stay in the document. FLTK underlines marked text to distinguish it from regular text.

Functions `text_input_delete_surrounding_text()` and `text_input_done()` have no effect at present, without this preventing input methods that have been tested with FLTK from working satisfactorily.

It's necessary to inform text input methods of the current location of the insertion point in the active surface. This information allows them to map their auxiliary windows next to the insertion point, where they are expected to appear. The flow of information on this topic is as follows:

- The two FLTK widgets supporting text input, `Fl_Input` and `Fl_Text_Display`, transmit to FLTK the window coordinates of the bottom of the current insertion point and the line height each time they change calling function `fl_set_spot()`.

- `fl_set_spot()` calls the platform override of virtual member function `Fl_Screen_Driver::set_spot()`. Under Wayland, this just calls `Fl_Wayland_Screen_Driver::insertion_point_location(int x, int y, int height)` which calls `zwp_text_input_v3_set_cursor_rectangle()` to inform the text input method about the surface position and size of the insertion point and also memorizes this information in static member variables of class `Fl_Wayland_Screen_Driver`.
- Callback function `text_input_enter()` calls `Fl_Wayland_Screen_Driver::insertion_point_location(int *x, int *y, int *height)` which gives it the stored position information, and then calls `zwp_text_input_v3_set_cursor_rectangle()` to inform the text input method about the position of the insertion point.

4.1.16 Interface with libdecor

FLTK uses a library called `libdecor` to determine whether the Wayland compositor uses CSD or SSD mode, and also to draw window titlebars when in CSD mode (see [libdecor](#)). `libdecor` is conceived to be present in a shared library linked to the Wayland client application which itself, and if the running Wayland compositor uses CSD mode, loads another shared library intended to draw titlebars in a way that best matches the Desktop. As of late 2023, `libdecor` is at version 0.2.0 and contains two titlebar-drawing plugins:

- `libdecor-gtk` intended for the Gnome desktop;
- `libdecor-cairo` for other situations.

Because `libdecor` is not yet in major Linux packages, or only at version 0.1.x, FLTK bundles the most recent source code of `libdecor` and its plugins. This code is included in `libfltk`. FLTK uses `libdecor-gtk` when software package `libgtk-3-dev` is present in the build system, and `libdecor-cairo` otherwise.

As of late 2023, `libdecor` version 0.2.0 is available in very recent Linux distributions in packages `libdecor-0-dev` and `libdecor-0-plugin-1-gtk`. If they are installed on the build system, preprocessor variable `USE_SYSTEM_LIBDECOR` is 1, and both `libdecor` and its plugin are loaded at run-time from shared libraries. When these packages are not available or are at an earlier version, FLTK uses the bundled copy of `libdecor`. When CMake `FLTK_USE_SYSTEM_LIBDECOR` is OFF, FLTK uses the bundled `libdecor` copy even if shared libraries `libdecor.so` and `libdecor-gtk.so` are installed. This option is ON by default.

`libdecor` uses the Wayland protocol `XDG decoration` to request being decorated by a supporting compositor. If the running compositor supports SSD, `libdecor` doesn't draw window titlebars because the compositor does it. That is what happens with the KWin and Sway compositors. However, if environment variable `LIBDECOR_FORCE_CSD` is defined to value 1 when an FLTK app runs, `libdecor` instructs an SSD-able compositor to refrain from decorating its windows and decorates windows itself.

Whatever the value of `FLTK_USE_SYSTEM_LIBDECOR`, FLTK and `libdecor` use environment variable `LIBDECOR_PLUGIN_DIR` as follows: if this variable is defined and points to the name of a directory, this directory is searched for a potential `libdecor` plugin in the form of a shared library; if one is found, FLTK and `libdecor` load it and use it.

The `libdecor` source code bundled in FLTK is identical to that of the `libdecor` repository. Nevertheless, FLTK uses this code with some minor changes. For example, except if `USE_SYSTEM_LIBDECOR` is 1, FLTK needs to modify function `libdecor_new()` charged of loading the plugin, to make it use the plugin code that is included in `libfltk` if none is found as a dynamic library. This is done as follows in file `libdecor/build/fl_libdecor.c`:

```
#define libdecor_new libdecor_new_orig
#include "../src/libdecor.c"
#undef libdecor_new

void libdecor_new() { // FLTK rewrite of this function
    .....
}
```

FLTK compiles file `fl_libdecor.c` which includes `libdecor.c` to the effect that all of the `libdecor` code becomes part of `libfltk` except that function `libdecor_new()` is substituted by its FLTK rewrite, without file `libdecor.c` being modified at all. This trick is also used to modify function `libdecor_frame_set_minimized()` to bypass a bug in the Weston compositor before version 10. Similarly, FLTK compiles file `fl_libdecor-plugins.c` which includes either `libdecor-gtk.c` or `libdecor-cairo.c` to the effect that the desired plugin becomes part of `libfltk`.

To support function `Fl_Widget_Surface::draw_decorated_window()` that draws a mapped window and its titlebar, FLTK needs to perform two operations: 1) identify what plugin is operating, and 2) call a function that is specific of that plugin and that returns the pixels of the drawn titlebar.

FLTK performs operation 1) above using its function `get_libdecor_plugin_description()` of file `fl_libdecor-plugins.c` that returns a human readable string describing the running plugin. Each plugin puts

its own string in member `description` of a record of type `struct libdecor_plugin_description`. Although this type is public in header file `libdecor-plugin.h`, accessing the symbol defined by the plugin to store a pointer to a value of this type is complicated for a reason and solved by a method detailed in a comment before function `get_libdecor_plugin_description()`.

Operation 2) above is done by FLTK-defined function `fl_libdecor_titlebar_buffer()` from file `fl_libdecor-plugins.c`. This function calls `get_libdecor_plugin_description()` seen above to get the running plugin's descriptive string. That is "GTK3 plugin" with `libdecor-gtk`. FLTK function `gtk_titlebar_buffer()` is then called, and returns a pointer to the start of a byte buffer containing the titlebar graphics. That is, again, not possible with the public `libdecor` API. Therefore, FLTK copies to `fl_libdecor-plugins.c` the definitions of several types given in `libdecor-gtk.c` or `libdecor-cairo.c` such as type `struct border_component`.

4.1.17 Copy/Paste/Drag-n-Drop

FLTK follows the procedure that is very well described in item "Wayland clipboard and drag & drop" of the [Documentation resources](#). All corresponding source code is in file `src/drivers/Wayland/fl_wayland_clipboard_dnd.cxx`.

This part of the `Fl_Wayland_Screen_Driver::seat` record stores pointers to Wayland objects used for clipboard and D-n-D operations:

```
struct wl_data_device_manager *data_device_manager;
struct wl_data_device *data_device;
struct wl_data_source *data_source;
```

FLTK can copy or paste plain UTF-8 text or image data to/from the clipboard. Images are copied to the clipboard as `image/bmp` mime type. Images in `image/bmp` or `image/png` mime types from the clipboard can be pasted to FLTK apps.

Files dropped are received one pathname per line, with no `'\n'` after the last pathname.

4.1.18 EGL as support for OpenGL

Wayland uses [EGL™](#) to interface OpenGL with the underlying native platform window system. OpenGL-using FLTK apps are therefore linked to `libwayland-egl.so` and `libEGL.so` in addition to `libGL.so` and `libGLU.so`.

EGL is initialized calling member function `Fl_Wayland_Gl_Window_Driver::init()` once, the first time the `Fl_Wayland_Gl_Window_Driver` c'tor runs. That is done with calls to `eglGetDisplay()`, `eglInitialize()`, and `eglBindAPI()`.

Member function `Fl_Wayland_Gl_Window_Driver::find()` calls `eglChooseConfig()` to filter the set of GL configurations that match the `Fl_Gl_Window`'s `mode()`, and puts in the returned `Fl_Gl_Choice` object the first matching configuration. The filtering gets done with bits `EGL_WINDOW_BIT`, to support the creation of window surfaces, and `EGL_OPENGL_BIT`, to support the creation of OpenGL contexts.

EGL needs 2 more objects created for each `Fl_Gl_Window`. They have types `struct wl_egl_window` and `EGLSurface`, and are created by member function `Fl_Wayland_Gl_Window_Driver::make_current_before()` which runs at the beginning of `Fl_Gl_Window::make_current()`. The first argument of the call to `wl_egl_window_create()` therein has type `struct wl_surface *` and is what connects EGL with the targeted Wayland window.

EGL creates with `eglCreateContext()` an object of type `EGLContext` via member function `Fl_Wayland_Gl_Window_Driver::create_gl_context()` called by `Fl_Gl_Window::make_current()`.

Types `EGLContext` and `GLContext` are 2 names for the same object. The call to `eglCreateContext()` is made asking for a GL context of version at least 2. This does not prevent from obtaining contexts of higher versions, namely above 3.2, which are compatible with version 2 (the so-called compatibility profile) under all tested Linux systems.

FLTK function `Fl_Gl_Window::make_current()` calls overridden function `Fl_Wayland_Gl_Window_Driver::set_gl_context()` which calls EGL function `eglMakeCurrent()` when the cached context changes.

FLTK calls function `Fl_Wayland_Gl_Window_Driver::swap_buffers()` each time it wants a GL context to be sent to the display. This function contains some pure GL code to emulate an overlay buffer to support `Fl_Gl_Window` objects overriding their `draw_overlay()` member function. Then, it calls function `eglSwapBuffers()`.

The overridden `Fl_Wayland_Gl_Window_Driver::resize()` function is implemented with calls to `wl_egl_window_get_attached_size()` and `wl_egl_window_resize()`.

Class `Fl_Wayland_Gl_Plugin` exists to allow `libfltk` to call functions from `libfltk_gl`, `libwayland-egl.so` or `libEGL.so` and without having `libfltk` force linking any FLTK app with these GL-related libraries. For example, `Fl_Wayland_Window_Driver::flush()` needs to call `Fl_Gl_Window::valid(0)`.

4.1.19 FLTK-defined, Wayland-specific types

struct `wld_window`

Defined in `Fl_Wayland_Window_Driver.H`. One such record is created for each `show()`'n `Fl_Window` by `Fl_Wayland_Window_Driver::makeWindow()`. Function `fl_wl_xid(Fl_Window*)` returns a pointer to the struct `wld_window` of its argument.

```
struct wld_window {
    Fl_Window *fl_win;
    struct wl_list outputs; // linked list of displays where part or whole of window maps
    struct wl_surface *wl_surface; // the window's surface
    struct wl_callback *frame_cb; // non-NULL until Wayland can process new surface commit
    struct Fl_Wayland_Graphics_Driver::wld_buffer *buffer; // see wld\_buffer
    struct xdg_surface *xdg_surface;
    enum Fl_Wayland_Window_Driver::kind kind; // DECORATED or POPUP or SUBWINDOW or UNFRAMED
    union {
        struct libdecor_frame *frame; // for DECORATED windows
        struct wl_subsurface *subsurface; // for SUBWINDOW windows
        struct xdg_popup *xdg_popup; // for POPUP windows
        struct xdg_toplevel *xdg_toplevel; // for UNFRAMED windows
    };
    struct custom_cursor_ {
        struct wl_cursor *wl_cursor;
        const Fl_RGB_Image *rgb;
        int hotx, hoty;
    } *custom_cursor; // non-null when using custom cursor
    int configured_width; // used when negotiating window size with the compositor
    int configured_height;
    int floating_width; // helps restoring size after un-maximizing
    int floating_height;
    int state; // indicates whether window is fullscreen, maximized. Used otherwise for POPUPS
    bool covered; // specially for Mutter and issue #878
}
```

struct `Fl_Wayland_Graphics_Driver::draw_buffer`

Defined in file `Fl_Wayland_Graphics_Driver.H`. One such record is created when an `Fl_Image_Surface` object is created. One such record is also embedded inside each struct `Fl_Wayland_Graphics_Driver::wld_buffer` record (see [wld_buffer](#)).

```
struct Fl_Wayland_Graphics_Driver::draw_buffer {
    unsigned char *buffer; // address of the beginning of the Cairo image surface's byte array
    cairo_t *cairo; // used when drawing to the Cairo image surface
    size_t data_size; // of buffer and wl_buffer, in bytes
    int stride; // bytes per line
    int width; // in pixels
};
```

FLTK gives offscreen buffers the platform-dependent type `Fl_Offscreen` which is in fact member `cairo_` of struct `Fl_Wayland_Graphics_Driver::draw_buffer`. Thus, a variable with type `Fl_Offscreen` needs be cast to type `cairo_t*`. Static member function `struct draw_buffer *offscreen_↵buffer(Fl_Offscreen)` of class `Fl_Wayland_Graphics_Driver` returns the `draw_buffer` record corresponding to an `Fl_Offscreen` value.

struct `Fl_Wayland_Graphics_Driver::wld_buffer`

Defined in file `Fl_Wayland_Graphics_Driver.H`. One such record is created by `Fl_Wayland_↵Graphics_Driver::create_wld_buffer()` when an `Fl_Window` is `show()`'n or resized, when a custom

cursor shape is created, or when text is dragged.

```
struct Fl_Wayland_Graphics_Driver::wld_buffer {
    struct draw_buffer draw_buffer; // see draw_buffer
    struct wl_list link; // links all buffers from the same wl_shm_pool
    struct wl_buffer *wl_buffer; // the Wayland buffer
    void *data; // address of the beginning of the Wayland buffer's byte array
    struct wl_shm_pool *shm_pool; // pter to wl_shm_pool from which this wl_buffer comes
    bool draw_buffer_needs_commit; // true when draw_buffer has been modified but not yet committed
    bool in_use; // true while being committed
    bool released; // true after buffer_release() was called
};
```

struct Fl_Wayland_Screen_Driver::output

Defined in Fl_Wayland_Screen_Driver.H. One such record is created for each display of the system by function registry_handle_global() when it receives a "wl_output" interface. These records are kept in a linked list of them all, and an identifier of this linked list is stored in member outputs of the unique Fl_Wayland_Screen_Driver object FLTK uses. Thus,

```
Fl_Wayland_Screen_Driver *scr_driver = (Fl_Wayland_Screen_Driver*)Fl::screen_driver();
struct wl_list list_of_all_displays = scr_driver->outputs;
```

gives access, the Wayland way, to the linked list of displays in the system.

```
struct Fl_Wayland_Screen_Driver::output { // one record for each display
    uint32_t id; // an identifier of the display
    int x, y; // logical position of the top-left of display
    int width; // nber of horizontal pixels
    int height; // nber of vertical pixels
    float dpi; // at this point, always 96.
    struct wl_output *wl_output; // the Wayland object for this display
    int wld_scale; // Wayland scale factor
    float gui_scale; // FLTK scale factor
    bool done; // true means record members have been initialized
    struct wl_list link; // links these records together
};
```

It's possible to get the FLTK-defined record associated to a display from the Wayland-associated object for the same display, say struct wl_output *wl_output, by this call: (struct Fl_Wayland_Screen_Driver::output *)wl_output_get_user_data(wl_output).

struct Fl_Wayland_Screen_Driver::seat

Defined in file Fl_Wayland_Screen_Driver.H. One record is created by function registry_handle_global() when it receives a "wl_seat" or wl_data_device_manager_interface.name interface. A pointer to this struct is stored in member seat of the client's unique Fl_Wayland_Screen_Driver object.

```
struct Fl_Wayland_Screen_Driver::seat {
    struct wl_seat *wl_seat;
    struct wl_pointer *wl_pointer;
    struct wl_keyboard *wl_keyboard;
    uint32_t keyboard_enter_serial;
    struct wl_surface *keyboard_surface;
    struct wl_list pointer_outputs;
    struct wl_cursor_theme *cursor_theme;
    struct wl_cursor *default_cursor;
    struct wl_surface *cursor_surface;
    struct wl_surface *pointer_focus;
    int pointer_scale;
    uint32_t serial;
    uint32_t pointer_enter_serial;
    struct wl_data_device_manager *data_device_manager;
    struct wl_data_device *data_device;
    struct wl_data_source *data_source;
    struct xkb_state *xkb_state;
```

```

struct xkb_context *xkb_context;
struct xkb_keymap *xkb_keymap;
struct xkb_compose_state *xkb_compose_state;
char *name;
struct zwf_text_input_v3 *text_input;
};

```

4.1.20 Documentation resources

The Wayland book	Extensive introduction to Wayland programming written by the author of the <i>sway</i> compositor, unfortunately unachieved.
Wayland Explorer	Documentation of all Wayland protocols, both stable and unstable. A language-independent syntax is used which makes function names usable from C or C++ not always obvious. Some useful functions seem undocumented here for an unclear reason.
Wayland Protocol Specification	Documentation for all functions of the Wayland core protocol.
Wayland clipboard and drag & drop	Detailed explanation of how clipboard and drag-and-drop work under Wayland.
Wayland and input methods	Blog article introducing to the issue of text input methods under Wayland.
Input Method Hub	Entry page for input method support giving newcomers a first understanding of what input methods are and how they are implemented in Wayland.

4.2 Developer info for bundled libs

This chapter details the procedure to update the libraries which are bundled inside FLTK.

4.2.1 Introduction

This file is mainly intended for FLTK developers and contains information about the current versions of all bundled libraries and about how to upgrade these bundled libraries.

Starting with FLTK 1.4.0 the bundled libraries jpeg, png, and zlib use "symbol prefixing" with the prefix 'ftk_' for all external symbols to distinguish the bundled libraries from existing system libraries and to avoid runtime errors.

User code compiled correctly with the header files provided by the bundled image libraries need not be changed.

The nanosvg library is not affected.

4.2.2 Current status

Current versions of bundled libraries (as of December 5, 2023):

Library	Version/git commit	Release date	FLTK Version
jpeg	jpeg-9e	2022-01-16	1.4.0
nanosvg	7aeda550a8 [1]	2023-12-02	1.4.0
png	libpng-1.6.40	2023-06-21	1.4.0
zlib	zlib-1.3	2023-08-18	1.4.0
libdecor	060fe761 [2]	2023-12-01	1.4.0

Previous versions of bundled libraries (FLTK 1.3.x):

Library	Version	Release date	FLTK Version
jpeg	jpeg-9e	2022-01-16	1.3.9
png	libpng-1.6.40	2023-06-21	1.3.9
zlib	zlib-1.3	2023-08-18	1.3.9
jpeg	jpeg-9d	2020-01-12	1.3.6 - 1.3.8
png	libpng-1.6.37	2019-04-14	1.3.6 - 1.3.8
zlib	zlib-1.2.11	2017-01-15	1.3.6 - 1.3.8

```
[1] Git commit in branch 'fltk' of https://github.com/fltk/nanosvg
    See also git tag 'fltk_yyyy-mm-dd' where yyyy-mm-dd == "Release date"
    and file nanosvg/README.txt.
[2] Git commit in https://gitlab.freedesktop.org/libdecor/libdecor
```

General information:

FLTK does not include the entire library distributions. We only provide the source files necessary to build the FLTK library and some README and/or CHANGELOG files. There are no test programs or other contributed files.

We use our own build files, hence a few files MUST NOT be upgraded when the library source files are upgraded. We strive to keep changes to the library source files as small as possible. Patching library code to work with FLTK should be a rare exception. Symbol prefixing with prefix 'fltk_' is one such exception to the rule.

If patches are necessary all changes in the library files should be marked with "FLTK" in a comment so a developer who upgrades the library later is aware of changes in the source code for FLTK. Look for 'FLTK' and/or 'fltk_' to find the differences.

Additional comments should be added to show the rationale, i.e. why a particular change was necessary. If applicable, add a reference to a Software Trouble Report, GitHub Issue or Pull Request (PR) like "STR 3456", "Issue #123", or "PR #234".

4.2.3 How to update the bundled libraries

It is generally advisable to use a graphical merge program. I'm using 'meld' under Linux, but YMMV.

Do not add any source files unless they are required to build the library.

Some config header files may be pre-generated in the FLTK sources. These header files should be left untouched, but it may be necessary to update these files if new items were added to the new library version. In this case the new header should be pre-generated on a Linux system with default options unless otherwise mentioned below for a specific library. Currently there are no known exceptions.

Merging source files:

Please check if some source and header files contain "FLTK" comments and/or 'fltk_' symbol prefixing to be aware of necessary merges. It is also good to download the distribution tar ball or Git source files of the previous version and to run a (graphical) diff or merge tool on the previous version and the bundled version of FLTK to see the "previous" differences.

Files that were not patched in previous versions should be copied to the new version w/o changes. Files that had FLTK specific patches must be merged manually. FLTK patches should be verified (if still necessary) and should be kept in the new source files.

Source and header files that have been added in the new library version should be added in FLTK as well if they are necessary to build the library. A simple "trial and error" should be sufficient to find files that need to be added. Added files must be added to FLTK's build files as well, usually to both 'Makefile' and 'CMakeLists.txt' to be used in configure/make and in CMake based builds, respectively.

Upgrade order:

There is only one dependency between all bundled libraries: libpng depends on zlib. Hence zlib should be upgraded first, then all other libs can be upgraded in arbitrary order.

Tests after merge:

Tests should be done on as many platforms as possible, both with autotools (configure/make) and CMake. Windows (Visual Studio) and macOS (Xcode) builds need CMake to generate the IDE files.

Upgrade notes for specific libraries:

The following chapters contain informations about specific files and how they are upgraded. Since the changes in all bundled libraries are not known in advance this information may change in the future. Please verify that no other changes are necessary.

4.2.4 zlib:

Website: <https://zlib.net/>

Download: See website and follow links.

Repository: git clone <https://github.com/madler/zlib.git>

zlib should be upgraded first because libpng depends on zlib.

Download the latest zlib sources, 'cd' to /path-to/zlib and run

```
$ ./configure --zprefix
```

This creates the header file 'zconf.h' with definitions to enable the standard 'z_' symbol prefix.

Unfortunately zlib requires patching some source and header files to convert this 'z_' prefix to 'ftk_z_' to be more specific. As of this writing (Nov. 2021) three files need symbol prefix patches:

- gzread.c
- zconf.h
- zlib.h

You may want to compare these files and/or the previous version to find out which changes are required. The general rule is to change all occurrences of 'z_' to 'ftk_z_' but there *are* exceptions.

The following files need special handling:

- CMakeLists.txt: Keep FLTK version, update manually if necessary.
- Makefile: Same as CMakeLists.txt.
- gzread.c: Merge changes (see above, manual merge recommended).
- zconf.h: Merge changes (see above, manual merge recommended).
- zlib.h: Merge changes (see above, manual merge recommended).
- makedepend: Keep this file.

Run 'make depend' in the zlib folder on a Linux system after the upgrade to update this file.

4.2.5 png:

Website: <http://libpng.org/pub/png/libpng.html>

Download: See website and follow links.

Repository: git clone <https://git.code.sf.net/p/libpng/code> libpng

libpng should be upgraded after zlib because it depends on zlib.

Download the latest libpng sources, 'cd' to /path-to/libpng and run

```
$ ./configure --with-libpng-prefix=ftk_
$ make
```

This creates the header files 'pnglibconf.h' and 'pngprefix.h' with the 'ftk_' symbol prefix.

The following files need special handling:

- CMakeLists.txt: Keep FLTK version, update manually if necessary.
- Makefile: Same as CMakeLists.txt.
- pnglibconf.h: Generate on a Linux system and merge (see above).
- pngprefix.h: Generate on a Linux system and merge (see above).
- makedepend: Keep this file.
- png.c: Keep a change labelled with "FLTK"
- pngerror.c: Keep two changes labelled with "FLTK"

Run 'make depend' in the png folder on a Linux system after the upgrade to update this file.

4.2.6 jpeg:

Website: <https://ijg.org/>

Download: See website and follow links.

Repository: N/A

Download the latest jpeg-xy sources on a Linux (or Unix) system, 'cd' to /path-to/jpeg-xy and run

```
$ ./configure
$ make [-jN]
```

This builds the library and should create the static library file '.libs/libjpeg.a'.

Execute the following command to extract the libjpeg symbol names used to build the 'prefixed' libfltk_jpeg library:

```
$ nm --extern-only --defined-only .libs/libjpeg.a | awk '{print $3}' \
  | sed '/^$/d' | sort -u | awk '{print "#define \"$1\" fltk_\"$1\"}' \
  > fltk_jpeg_prefix.h
```

This creates the header file 'fltk_jpeg_prefix.h' with the '# define' statements using the 'fltk_' symbol prefix.

The following files need special handling:

- CMakeLists.txt: Keep FLTK version, update manually if necessary.
- Makefile: Same as CMakeLists.txt.
- fltk_jpeg_prefix.h: Generate on a Linux system and merge (see above).
- jconfig.h: keep changes flagged with

```
/* FLTK */
```

Note: more to come...

- makedepend: Keep this file.

Run 'make depend' in the jpeg folder on a Linux system after the upgrade to update this file.

4.2.7 nanosvg:

Website: <https://github.com/memononen/nanosvg>

Download: See website and follow links.

Repository: git clone <https://github.com/memononen/nanosvg.git>

FLTK Fork: git clone <https://github.com/fltk/nanosvg.git>

FLTK has its own GitHub fork of the original repository (see above).

The intention is to update this fork from time to time so the FLTK specific patches are up-to-date with the original library. Hopefully the FLTK patches will be accepted upstream at some time in the future so we no longer need our own patches. AlbrechtS, 04 Feb 2018.

Update (Feb 22, 2021): The upstream library is officially no longer maintained (see README.md) although updates appear from time to time.

Use this fork (branch 'fltk') to get the nanosvg library with FLTK specific patches:

```
$ git clone https://github.com/fltk/nanosvg.git nanosvg-fltk
$ cd nanosvg-fltk
$ git checkout fltk
$ cd src
$ cp nanosvg.h nanosvgrast.h /path/to/fltk-1.4/nanosvg/
```

This library does not have its own build files since it is a header-only library. The headers are included in FLTK where necessary.

The following files need special handling:

nanosvg.h: Merge or download from FLTK's fork (see above).

nanosvgrast.h: Merge or download from FLTK's fork (see above).

Maintaining branch 'fltk' in FLTK's fork of nanosvg (fltk/nanosvg):

Only maintainers with write access on fltk/nanosvg can do this. Others can fork our fltk/nanosvg fork in their own GitHub account and either open a PR on fltk/nanosvg or tell us about their changes in fltk.development.

Use something similar to the following commands to update FLTK's fork of nanosvg to the latest version. Commands are only examples, you may need to change more or less, depending on the outstanding updates.

Step 1: clone the fltk/nanosvg fork, set the remote 'upstream', and update the 'master' branch:

```
$ cd /to/your/dev/dir
$ git clone https://github.com/fltk/nanosvg.git nanosvg-fltk
$ cd nanosvg-fltk
$ git remote add upstream https://github.com/memononen/nanosvg
$ git checkout master
$ git pull upstream master
```


Note: the 'master' branch must never be changed, i.e. it must always be the same as 'upstream/master'. Never commit your own (FLTK specific) changes to branch 'master'.

Step 2: rebase branch 'fltk' on the new master (upstream/master), fix potential conflicts, and tag the new branch.

It is important to keep the individual FLTK specific patches intact (one commit per patch) because this will preserve the history and the committer and make it easier to skip single patches when they are accepted upstream.

```
$ git checkout fltk
$ git rebase upstream/master
```

At this point you may need to fix conflicts! Do whatever is necessary to update the branch 'fltk'.

Now 'git tag' the 'fltk' branch for later reference.

Hint: use 'git show <any-older-tag-name>' to see its contents. I like to write a summary of commits in the tag comment.

```
$ git tag -a fltk_yyyy-mm-dd fltk
```

Replace 'yyyy-mm-dd' with the current date and add a comment when asked for it (your editor will open an empty file).

Step 3: at this point it is recommended to copy the changed header files to your working copy of the FLTK library and test the changes. If anything is wrong, go back, fix the bugs and change the git tag (delete and create a new one).

Step 4: push the new branch 'fltk' and the tag to the fltk/nanosvg repository:

```
$ git push -f origin fltk
$ git push origin fltk_yyyy-mm-dd
```

Step 5: copy the changed files to your working copy of the FLTK repository (if not done already), update this file accordingly, and commit/push the update to the fltk/fltk repository.

4.2.8 libdecor:

Website: <https://gitlab.freedesktop.org/libdecor/libdecor>

Download: See website and follow links.

Repository: git clone <https://gitlab.freedesktop.org/libdecor/libdecor.git>

libdecor is used by the Wayland/X11 hybrid platform to draw window titlebars when FLTK apps run as Wayland clients and the running Wayland compositor uses client-side decoration. In the future, when libdecor will have made its way into Linux packages, FLTK will use the system version of libdecor. libdecor will remain as an FLTK bundle to support Linux configurations where the libdecor package is not available or not installed.

FLTK uses libdecor source files without any modification. This part of the libdecor source tree is copied to directory libdecor/ of the FLTK source tree:

```
LICENSE
README.md
src/    ... and files below except meson.build files
```

Furthermore, directory libdecor/build/ of the FLTK source tree does not originate from the libdecor source tree but contains 3 FLTK-created files. File build/Makefile may need changes if a libdecor update adds or renames source files.

4.3 Developer Information

This chapter describes FLTK development and documentation.

Example

```
/** \file
    Fl_Clock, Fl_Clock_Output widgets. */

/**
    \class Fl_Clock_Output
    \brief This widget can be used to display a program-supplied time.

    The time shown on the clock is not updated. To display the current time,
    use Fl_Clock instead.

    \image html clock.png
    \image latex clock.png "" width=10cm
    \image html round_clock.png
    \image latex clock.png "" width=10cm
```

```

\image html round_clock.png "" width=10cm */

/**
 Returns the displayed time.
 Returns the time in seconds since the UNIX epoch (January 1, 1970).
 \see value(ulong)
 */
ulong value() const {return value_;}

/**
 Set the displayed time.
 Set the time in seconds since the UNIX epoch (January 1, 1970).
 \param[in] v seconds since epoch
 \see value()
 */
void Fl_Clock_Output::value(ulong v) {
 [...]
}

/**
 Create an Fl_Clock widget using the given position, size, and label string.
 The default boxtype is \c FL_NO_BOX.
 \param[in] X, Y, W, H position and size of the widget
 \param[in] L widget label, default is no label
 */
Fl_Clock::Fl_Clock(int X, int Y, int W, int H, const char *L)
 : Fl_Clock_Output(X, Y, W, H, L) {}

/**
 Create an Fl_Clock widget using the given boxtype, position, size, and
 label string.
 \param[in] t boxtype
 \param[in] X, Y, W, H position and size of the widget
 \param[in] L widget label, default is no label
 */
Fl_Clock::Fl_Clock(uchar t, int X, int Y, int W, int H, const char *L)
 : Fl_Clock_Output(X, Y, W, H, L) {
 type(t);
 box(t==FL_ROUND_CLOCK ? FL_NO_BOX : FL_UP_BOX);
}

```

Note

From Duncan: (will be removed later, just for now as a reminder)

I've just added comments for the `fl_color_chooser()` functions, and in order to keep them and the general Function Reference information for them together, I created a new doxygen group, and used `\ingroup` in the three comment blocks. This creates a new Modules page (which may not be what we want) with links to it from the File Members and [Fl_Color_Chooser.H](#) pages. It needs a bit more experimentation on my part unless someone already knows how this should be handled. (Maybe we can add it to a `functions.dox` file that defines a functions group and do that for all of the function documentation?)

Update: the trick is not to create duplicate entries in a new group, but to move the function information into the doxygen comments for the class, and use the navigation links provided. Simply using `\relatesalso` as the first doxygen command in the function's comment puts it in the appropriate place. There is no need to have `\defgroup` and `\ingroup` as well, and indeed they don't work. So, to summarize:

```

Gizmo.H
/** \class Gizmo
 A gizmo that does everything
 */
class Gizmo {
 etc
};
extern int popup_gizmo(...);

Gizmo.cxx:
/** \relatesalso Gizmo
 Pops up a gizmo dialog with a Gizmo in it
 */
int popup_gizmo(...);

```

Comments Within Doxygen Comment Blocks

You can use HTML comment statements to embed comments in doxygen comment blocks. These comments will not be visible in the generated document.

```
The following text is a developer comment.
<!-- *** This *** is *** invisible *** -->
This will be visible again.
```

will be shown as:

```
The following text is a developer comment.
<!-- *** This *** is *** invisible *** -->
This will be visible again.
```

Different Headlines

You can use HTML tags `<H1>` ... `<H4>` for headlines with different sizes. As of doxygen 1.8.x there must not be more than three spaces at the beginning of the line for this to work. Currently (doxygen 1.8.6) there seems to be no difference in the font sizes of `<H3>` and `<H4>` in the pdf output, whereas the html output uses different font sizes.

```
<H1>Headline in big text (H1)</H1>
<H2>Headline in big text (H2)</H2>
<H3>Headline in big text (H3)</H3>
<H4>Headline in big text (H4)</H4>
```

Headline in big text (H1)

Headline in big text (H2)

Headline in big text (H3)

Headline in big text (H4)

4.3.1 Non-ASCII Characters

Doxygen understands many HTML quoting characters like `"`, `ü`, `ç`, `Ç`, but not all HTML quoting characters.

This will appear in the document:

```
Doxygen understands many HTML quoting characters like
&quot;; &uuml;; &ccedil;; &Ccedil;; but not all HTML quoting characters.
```

For further informations about HTML quoting characters see

<http://www.doxygen.org/manual/htmlcmds.html>

Alternatively you can use **UTF-8** encoding within Doxygen comments.

4.3.2 Document Structure

- `\page` creates a named page
- `\section` creates a named section within that page
- `\subsection` creates a named subsection within the current section
- `\subsubsection` creates a named subsubsection within the current subsection

All these statements take a "name" as their first argument, and a title as their second argument. The title can contain spaces.

The page, section, and subsection titles are formatted in blue color and a size like "`<H1>`", "`<H2>`", and "`<H3>`", and "`<H4>`", respectively.

By **FLTK documentation convention**, a file like this one with a doxygen documentation chapter has the name "`<chapter>.dox`". The `\page` statement at the top of the page is "`\page <chapter> This is the title`". Sections within a documentation page must be called "`<chapter>_<section>`", where "`<chapter>`" is the name part of the file, and "`<section>`" is a unique section name within the page that can be referenced in links. The same for subsections and subsubsections.

These doxygen page and section commands work only in special documentation chapters, not within normal source or header documentation blocks. However, links **from** normal (e.g. class) documentation **to** documentation sections **do work**.

This page has

`\page development I - Developer Information`

at its top.

This section is

`\section development_structure Document Structure`

The following section is

`\section development_links Creating Links`

4.3.3 Creating Links

Links to other documents and external links can be embedded with

- `doxygen \ref` links to other `doxygen \page`, `\section`, `\subsection` and `\anchor` locations
 - HTML links without markup - `doxygen` creates "http://..." links automatically
 - standard, non-Doxygen, HTML links
- see chapter `\ref unicode` creates a link to the named chapter `unicode` that has been created with a `\page` statement.
 - For further informations about quoting see <http://www.doxygen.org/manual/htmlcmds.html>
 - see `FLTK Library` creates a standard HTML link

appears as:

- see chapter [Unicode and UTF-8 Support](#) creates a link to the named chapter `unicode` that has been created with a `\page` statement.
- For further informations about quoting see <http://www.doxygen.org/manual/htmlcmds.html>
- see [FLTK Library](#) creates a standard HTML link

4.3.4 Paragraph Layout

There is no real need to use HTML `<P>` and `</P>` tags within the text to tell `doxygen` to start or stop a paragraph. In most cases, when `doxygen` encounters a blank line or some, but not all, `\commands` in the text it knows that it has reached the start or end of a paragraph. `Doxygen` also offers the `\par` command for special paragraph handling. It can be used to provide a paragraph title and also to indent a paragraph. Unfortunately `\par` won't do what you expect if you want to have `doxygen` links and sometimes `html` tags don't work either.

```
\par Normal Paragraph with title

This paragraph will have a title, but because there is a blank line
between the \par and the text, it will have the normal layout.

\par Indented Paragraph with title
This paragraph will also have a title, but because there is no blank
line between the \par and the text, it will be indented.

\par
It is also possible to have an indented paragraph without title.
This is how you indent subsequent paragraphs.

\par No link to Fl_Widget::draw()
Note that the paragraph title is treated as plain text.
Doxygen type links will not work.
HTML characters and tags may or may not work.

Fl_Widget::draw() links and &quot;html&quot; tags work<br>
\par
Use a single line ending with <br> for complicated paragraph titles.
```

The above code produces the following paragraphs:

Normal Paragraph with title

This paragraph will have a title, but because there is a blank line between the `\par` and the text, it will have the normal layout.

Indented Paragraph with title

This paragraph will also have a title, but because there is no blank line between the `\par` and the text, it will be indented.

It is also possible to have an indented paragraph without title. This is how you indent subsequent paragraphs.

No link to `Fl_Widget::draw()`

Note that the paragraph title is treated as plain text. Doxygen type links will not work. HTML characters and tags may or may not work.

[Fl_Widget::draw\(\)](#) links and "html" tags work

Use a single line ending with `
` for complicated paragraph titles.

4.3.5 Navigation Elements

Each introduction (tutorial) page ends with navigation elements. These elements must only be included in the html documentation, therefore they must be separated with `\htmlonly` and `\endhtmlonly`.

The following code gives the navigation bar at the bottom of this page:

```
\htmlonly
<hr>
<table summary="navigation bar" width="100%" border="0">
<tr>
  <td width="45%" align="LEFT">
    <a class="el" href="migration_1_4.html">
      [Prev]
      Migrating Code from FLTK 1.3 to 1.4
    </a>
  </td>
  <td width="10%" align="CENTER">
    <a class="el" href="index.html">[Index]</a>
  </td>
  <td width="45%" align="RIGHT">
    <a class="el" href="license.html">
      Software License
      [Next]
    </a>
  </td>
</tr>
</table>
\endhtmlonly
```


Chapter 5

Todo List

Page [Adding and Extending Widgets](#)

Clarify [FI_Window::damage\(uchar\)](#) handling - seems confused/wrong? ORing value doesn't match setting behavior in [FI_Widget.H](#)!

Member [FI::now](#) (double offset=0)

[FI::system_driver\(\)->gettime\(\)](#) was implemented for the Forms library and has a limited resolution (on Windows: milliseconds). On POSIX platforms it uses [gettimeofday\(\)](#) with microsecond resolution. A new function could use a better resolution on Windows with its multimedia timers which requires a new dependency: [winmm.lib](#) (dll). This could be a future improvement, maybe set as a build option or generally (requires Win95 or 98?).

Member [FI_Browser::scrollbar_width](#) () const

This method should eventually be removed in 1.4+

Member [FI_Browser::scrollbar_width](#) (int width)

This method should eventually be removed in 1.4+

Class [FI_Chart](#)

Refactor [FI_Chart::type\(\)](#) information.

Member [FI_File_Input::errorcolor](#) (FI_Color c)

Remove [FI_File_Input::errorcolor\(FI_Color\)](#) in FLTK 1.5.0 or higher.

Member [FI_File_Input::errorcolor](#) () const

Remove [FI_File_Input::errorcolor\(\)](#) in FLTK 1.5.0 or higher.

Member [fl_filename_list](#) (const char *d, struct dirent **l, FI_File_Sort_F *s=fl_numericsort)

should support returning OS error messages

Class [FI_Grid](#)

This (relative group coordinates of nested groups of [FI_Grid](#)) needs explanation and maybe an example.

Member [FI_Grid::clear_layout](#) ()

[FI_Grid::clear\(\)](#) needs to be implemented as documented above!

Member [FI_Grid::debug](#) (int level=127)

Add more information about cells and children.

Control output by using `level`.

Member [FI_Grid::FI_Grid](#) (int X, int Y, int W, int H, const char *L=0)

More documentation of [FI_Grid](#) constructor?

Member [FI_Grid::layout](#) ()

Document when and why to call [layout\(\)](#) w/o args. See [FI_Flex::layout\(\)](#)

Member [FI_Grid::layout](#) (int rows, int cols, int margin=-1, int gap=-1)

Document when and why to call [layout\(\)](#) w/o args. See [FI_Flex::layout\(\)](#)

Member `FI_Group::delete_child` (int n)

Reimplementation of `FI_Group::delete_child(int)` in more FLTK subclasses. This is not yet complete.

Member `fl_height` (int font, int size)

In the future, when the XFT issues are resolved, this function should simply return the 'size' value.

Member `FI_Help_View::find` (const char *s, int p=0)

complex HTML entities for Unicode code points > 0x80 are currently treated like one byte (not character!) and do not (yet) match correctly ("`<`" matches "`<`" but "`€`" doesn't match "`€`", and "`ü`" doesn't match "`ü`")

Member `FI_Input_::handle_mouse` (int, int, int, int, int keepmark=0)

Add comment and parameters

Member `FI_Input_::handletext` (int e, int, int, int, int)

Add comment and parameters

Struct `FI_Label`

There is an aspiration that the `FI_Label` type will become a widget by itself. That way we will be avoiding a lot of code duplication by handling labels in a similar fashion to widgets containing text. We also provide an easy interface for very complex labels, containing html or vector graphics. However, this re-factoring is not in place in this release.

Member `FI_Menu_::add` (const char *, int shortcut, FI_Callback *, void *=0, int=0)

Raw integer shortcut needs examples. Dependent on responses to <https://www.fltk.org/newsgroups.php?gfltk.coredev+v:10086> and results of STR#2344

Class `FI_Native_File_Chooser`

Improve documentation about selection of native file choosers on X11/Wayland.

Member `FI_Shortcut`

Discuss and decide whether we can "shift" these special keyboard flags to the upper byte to enable full 21-bit Unicode characters (U+0000 . . . U+10FFFF) plus the keyboard indicator bits as this was originally intended. This would be possible if we could rely on **all** programs being coded with symbolic names and not hard coded bit values.

Member `FI_Terminal::scrollbar`

Support scrollbar_left/right() - See `FI_Browser_::scrollbar` docs

Member `FI_Text_Display::extend_range_for_styles` (int *start, int *end)

Unicode?

Member `FI_Text_Display::handle_vline` (int mode, int lineStart, int lineLen, int leftChar, int rightChar, int topClip, int bottomClip, int leftClip, int rightClip) const

we need to handle hidden hyphens and tabs here!

we handle all styles and selections

we must provide code to get pixel positions of the middle of a character as well

Member `FI_Text_Display::overstrike` (const char *text)

Unicode? Find out exactly what we do here and simplify.

Member `FI_Text_Display::position_to_linecol` (int pos, int *lineNum, int *column) const

a column number makes little sense in the UTF-8/variable font width environment. We will have to further define what exactly we want to return. Please check the functions that call this particular function.

Member `FI_Text_Display::scroll` (int topLineNum, int horizOffset)

Column numbers make little sense here.

Member `FI_Text_Display::scrollbar_width` (int width)

This method should eventually be removed

Member `FI_Text_Display::scrollbar_width` () const

This method should eventually be removed.

Member `Fl_Text_Display::shortcut` (int s)

FIXME : get set methods pointing on `shortcut_` have no effects as `shortcut_` is unused in this class and derived!

Member `Fl_Text_Display::shortcut` () const

FIXME : get set methods pointing on `shortcut_` have no effects as `shortcut_` is unused in this class and derived!

Member `Fl_Text_Display::wrapped_column` (int row, int column) const

What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one? Function `TextDXYToUnconstrainedPosition` does not exist (nedit port?)

Unicode?

Member `Fl_Text_Display::wrapped_row` (int row) const

What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one? Function `TextDXYToUnconstrainedPosition` does not exist (nedit port?)

Member `Fl_Tiled_Image::Fl_Tiled_Image` (Fl_Image *i, int W=0, int H=0)

Fix `Fl_Tiled_Image` as background image for widgets and windows and fix the implementation of `Fl::scheme(const char *)`.

Member `Fl_Tree::handle` (int e) FL_OVERRIDE

add `Fl_Widget_Tracker` (see `Fl_Browser_cxx::handle()`)

Member `Fl_Tree::is_scrollbar` (Fl_Widget *w)

should be const

Member `Fl_Tree::show_self` ()

should be const

Member `Fl_Window::show` () FL_OVERRIDE

Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

Page `FLTK Basics`

This section needs a major rework. Add a chapter "Building FLTK with CMake".

Page `Handling Events`

Add details on how to detect repeating keys, since on some X servers a repeating key will generate both `FL_↔` `KEYUP` and `FL_KEYDOWN`, such that to tell if a key is held, you need `Fl::event_key(int)` to detect if the key is being held down during `FL_KEYUP` or not.

Page `Unicode and UTF-8 Support`

Verify 16/24 bit Unicode limit for different character sets? OksiD's code appears limited to 16-bit whereas the FLTK2 code appears to handle a wider set. What about illegal characters? See comments in `fl_utf8fromwc()` and `fl_utf8toUtf16()`.

Work through the code and this documentation to harmonize the `[OksiID]` and `[fltk2]` functions.

FLTK 1.3 and later supports the full Unicode range (21 bits), but there are a few exceptions, for instance binary shortcut values in menus (`Fl_Shortcut`) can only be used with characters from the BMP (16 bits). This may be extended in a future FLTK version.

Chapter 6

Deprecated List

Member `Fl::release ()`

Use `Fl::grab(0)` instead.

Member `Fl::set_idle (Fl_Old_Idle_Handler cb)`

This method is obsolete - use the `add_idle()` method instead.

Member `Fl::version ()`

Use `int Fl::api_version()` instead.

Member `fl_ask (const char *fmt,...)`

`fl_ask()` is deprecated since it uses "Yes" and "No" for the buttons which does not conform to the current FLTK Human Interface Guidelines. Use `fl_choice()` with the appropriate verbs instead.

Member `Fl_Browser::position () const`

"in 1.4.0 - use `vposition()` instead"

Member `Fl_Browser::position (int pos)`

"in 1.4.0 - use `vposition(pos)` instead"

Member `Fl_Browser::scrollbar_width () const`

Use `scrollbar_size()` instead.

Member `Fl_Browser::scrollbar_width (int width)`

Use `scrollbar_size()` instead.

Member `fl_clip (int x, int y, int w, int h)`

Please use `fl_push_clip(int x, int y, int w, int h)` instead. `fl_clip(int, int, int, int)` will be removed in FLTK 1.5.

Member `Fl_File_Input::errorcolor () const`

Will be removed in FLTK 1.5.0 or higher.

Member `Fl_File_Input::errorcolor (Fl_Color c)`

Will be removed in FLTK 1.5.0 or higher.

Member `fl_find (Window xid)`

Kept in the X11, Windows, and macOS platforms for compatibility with FLTK versions before 1.4. Please use `fl_x11_find(Window)`, `fl_wl_find(struct wld_window*)`, `fl_win32_find(HWND)` or `fl_mac_find(FLWindow*)` with FLTK 1.4.0 and above.

Member `Fl_GIF_Image::Fl_GIF_Image (const char *imagename, const unsigned char *data)`

Please use `Fl_GIF_Image(const char *imagename, const unsigned char *data, const size_t length)` instead.

Member `Fl_Group::focus (Fl_Widget *W)`

This is for backwards compatibility only. You should use `W->take_focus()` instead.

Member `Fl_Group::sizes ()`

Deprecated since 1.4.0. Please use `bounds()` instead.

Member `Fl_Image::draw_scaled` (int X, int Y, int W, int H)

Only for API compatibility with FLTK 1.3.4.

Member `Fl_Image::label` (`Fl_Menu_Item *m`)

Please use `Fl_Menu_Item::image()` instead.

Member `Fl_Image::label` (`Fl_Widget *w`)

Please use `Fl_Widget::image()` or `Fl_Widget::deimage()` instead.

Member `Fl_Image_Surface::highres_image` ()

Use `image()` instead.

Member `Fl_Input::position` (int p)

"in 1.4.0 - use `insert_position(p)` instead"

Member `Fl_Input::position` (int p, int m)

"in 1.4.0 - use `insert_position(p, m)` or `Fl_Widget::position(x, y)` instead"

Member `Fl_Input::position` () const

"in 1.4.0 - use `insert_position()` instead"

Member `Fl_Menu_Item::check` ()

Please use `Fl_Menu_Item::set()` instead. This method will be removed in FLTK 1.5.0 or later.

Member `Fl_Menu_Item::checked` () const

Please use `Fl_Menu_Item::value()` instead. This method will be removed in FLTK 1.5.0 or later.

Member `Fl_Menu_Item::uncheck` ()

Please use `Fl_Menu_Item::clear()` instead. This method will be removed in FLTK 1.5.0 or later.

Member `Fl_Multi_Label::label` (`Fl_Menu_Item *`)

since 1.4.0: please use `Fl_Menu_Item::label(Fl_Multi_Label *)`

Member `Fl_Preferences::Fl_Preferences` (const char *path, const char *vendor, const char *application)

"in 1.4.0 - use `Fl_Preferences(path, vendor, application, flags)` instead"

Member `Fl_Text_Display::scrollbar_width` (int width)

Use `scrollbar_size()` instead.

Member `Fl_Text_Display::scrollbar_width` () const

Use `scrollbar_size()` instead.

Member `Fl_Text_Selection::position` (int *startpos, int *endpos) const

"in 1.4.0 - use `selected(startpos, endpos)` instead"

Member `Fl_Tile::position` (int oldx, int oldy, int newx, int newy)

"in 1.4.0 - use `move_intersection(p)` instead"

Member `Fl_Tree::first_visible` ()

in 1.3.3 ABI – use `first_visible_item()` instead.

Member `Fl_Tree::item_clicked` (`Fl_Tree_Item *val`)

in 1.3.3 ABI – use `callback_item()` instead.

Member `Fl_Tree::item_clicked` ()

in 1.3.3 ABI – use `callback_item()` instead.

Member `Fl_Tree::last_visible` ()

in 1.3.3 – use `last_visible_item()` instead.

Member `Fl_Tree_Item::Fl_Tree_Item (const Fl_Tree_Prefs &prefs)`

in 1.3.3 ABI – you must use `Fl_Tree_Item(Fl_Tree*)` for proper horizontal scrollbar behavior.

Member `Fl_Tree_Item::next_displayed (Fl_Tree_Prefs &prefs)`

in 1.3.3 for confusing name, use `next_visible()` instead

Member `Fl_Tree_Item::prev_displayed (Fl_Tree_Prefs &prefs)`

in 1.3.3 for confusing name, use `prev_visible()`

Member `FL_VERSION`

This `double` version number is retained for compatibility with existing program code. New code should use `int FL_API_VERSION` instead. `FL_VERSION` is deprecated because comparisons of floating point values may fail due to rounding errors. However, there are currently no plans to remove this deprecated constant.

Member `Fl_Widget::color2 (unsigned a)`

Use `selection_color(unsigned)` instead.

Member `Fl_Widget::color2 () const`

Use `selection_color()` instead.

Member `Fl_Window::free_position ()`

please use `force_position(0)` instead

Member `Fl_Window::icon () const`

in 1.3.3

Member `Fl_Window::icon (const void *ic)`

in 1.3.3 in favor of platform-independent methods `Fl_Window::icon(const Fl_RGB_Image *icon)` and `Fl_Window::icons(const Fl_RGB_Image *icons[], int count)`.

Page `Operating System Issues`

Kept for compatibility with FLTK versions before 1.4. Use preferentially `fl_x11_xid(const Fl_Window *)` with versions 1.4 and above.

Kept for compatibility with FLTK versions before 1.4. Use preferentially `fl_x11_find(Window)` with versions 1.4 and above.

Chapter 7

Topic Index

7.1 Topics

Here is a list of all topics with brief descriptions:

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Chapter 8

Hierarchical Index

8.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

FI_Grid::Cell	389
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FI_Glut_StrokeFont	808
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FI_Help_Block	864
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FI_Bitmap	446
FI_XBM_Image	1952
FI_Pixmap	1195
FI_GIF_Image	781
FI_Anim_GIF_Image	431
FI_XPM_Image	1955
FI_RGB_Image	1311
FI_BMP_Image	452
FI_ICO_Image	930
FI_JPEG_Image	1011
FI_PNG_Image	1207
FI_PNM_Image	1211
FI_SVG_Image	1483
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FI_Multi_Label	1117
FI_Native_File_Chooser	1140
FI_Plugin	1200
FI_Device_Plugin	640
FI_Preferences	1231
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FI_Rect	1291
FI_Scroll::FI_Region_LRTB	1293
FI_Scroll::FI_Region_XYWH	1293
FI_Scheme	1343
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FI_Multi_Browser	Subclass of FI_Browser which lets the user select any set of the lines	1104
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FI_Output	This widget displays a piece of text	1155
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FI_Pack	This widget was designed to add the functionality of compressing and aligning widgets	1179
FI_Paged_Device	Represents page-structured drawing surfaces	1189
FI_Pixmap	Supports caching and drawing of colormap (pixmap) images, including transparency	1195
FI_Plugin	FI_Plugin allows link-time and run-time integration of binary modules	1200
FI_Plugin_Manager	FI_Plugin_Manager manages link-time and run-time plugin binaries	1201
FI_PNG_Image	Supports loading, caching, and drawing of Portable Network Graphics (PNG) image files	1207
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FI_Positioner	This class is provided for Forms compatibility	1214
FI_PostScript_File_Device	To send graphical output to a PostScript file	1222
FI_Preferences	FI_Preferences store user settings between application starts	1231
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FI_Repeat_Button	The FI_Repeat_Button is a subclass of FI_Button that generates a callback when it is pressed and then repeatedly generates callbacks as long as it is held down	1294
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FI_RGB_Image	Supports caching and drawing of full-color images with 1 to 4 channels of color information	1311
FI_Roller	"dolly" control commonly used to move 3D objects	1318
FI_Round_Button	Buttons generate callbacks when they are clicked by the user	1327
FI_Round_Clock	A clock widget of type <code>FL_ROUND_CLOCK</code>	1335
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FI_Scroll	This container widget lets you maneuver around a set of widgets much larger than your window	1354
FI_Scrollbar	Displays a slider with arrow buttons at the ends of the scrollbar	1370
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FI_Secret_Input	Subclass of FI_Input that displays its input as a string of placeholders	1381
FI_Select_Browser	The class is a subclass of FI_Browser which lets the user select a single item, or no items by clicking on the empty space	1391
FI_Shared_Image	This class supports caching, loading, and drawing of image files	1404
FI_Shortcut_Button	A button that allows the user to type a key combination to create shortcuts	1415
FI_Simple_Counter	This widget creates a counter with only 2 arrow buttons	1424
FI_Single_Window	This is the same as FI_Window	1432
FI_Slider	Sliding knob inside a box	1444
FI_Spinner	This widget is a combination of a numerical input widget and repeat buttons	1454
FI_Spinner::FI_Spinner_Input	1467
FI_Surface_Device	A drawing surface that's susceptible to receive graphical output	1477
FI_SVG_File_Surface	A drawing surface producing a Scalable Vector Graphics (SVG) file	1480
FI_SVG_Image	Supports loading, caching and drawing of scalable vector graphics (SVG) images	1483
FI_Sys_Menu_Bar	A class to create and modify menus that appear on macOS in the menu bar at the top of the screen	1491
FI_Table	A table of widgets or other content	1506
FI_Table_Row	A table with row selection capabilities	1532
FI_Tabs	Container widget that displays a set of tabs, with each tab representing a different child widget	1547

FI_Terminal	Terminal widget supporting Unicode/utf-8, ANSI/xterm escape codes with full RGB color control	1568
FI_Text_Buffer	This class manages Unicode text displayed in one or more FI_Text_Display widgets	1607
FI_Text_Display	Rich text display widget	1625
FI_Text_Editor	This is the FLTK text editor widget	1672
FI_Text_Selection	This is an internal class for FI_Text_Buffer to manage text selections	1695
FI_Tile	Lets you resize its children by dragging the border between them	1698
FI_Tiled_Image	This class supports tiling of images over a specified area	1716
FI_Timeout	The internal class FI_Timeout handles all timeout related functions	1720
FI_Timer	This is provided only to emulate the Forms Timer widget	1727
FI_Toggle_Button	The toggle button is a push button that needs to be clicked once to toggle on, and one more time to toggle off	1735
FI_Tooltip	Tooltip support for all FLTK widgets	1743
FI_Tree	Tree widget	1748
FI_Tree_Item	Tree widget item	1796
FI_Tree_Item_Array	Manages an array of FI_Tree_Item pointers	1818
FI_Tree_Prefs	Tree widget's preferences	1821
FI_Valuator	Controls a single floating-point value and provides a consistent interface to set the value, range, and step, and insures that callbacks are done the same for every object	1826
FI_Value_Input	Displays a numeric value	1836
FI_Value_Output	Displays a floating point value	1848
FI_Value_Slider	FI_Slider widget with a box displaying the current value	1858
FI_Widget	FI_Widget is the base class for all widgets in FLTK	1868
FI_Widget_Surface	A surface on which any FLTK widget can be drawn	1908
FI_Widget_Tracker	This class should be used to control safe widget deletion	1912
FI_Window	This widget produces an actual window	1913
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FI_XBM_Image	Supports loading, caching, and drawing of X Bitmap (XBM) bitmap files	1952
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FI_XPM_Image	Supports loading, caching, and drawing of X Pixmap (XPM) images, including transparency	1955
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FI_ICO_Image::IconDirEntry Windows ICONDIRENTRY structure	1959
FI_Text_Editor::Key_Binding Simple linked list item associating a key/state to a function	1960
FI_Terminal::Margin	1960
FI_Preferences::Name 'Name' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly	1960
FI_Preferences::Node	1961
FI_Paged_Device::page_format Width, height and name of a page format	1962
FI_Terminal::PartialUtf8Buf	1963
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FI_Text_Display::Style_Table_Entry This structure associates the color, font, and font size of a string to draw with an attribute mask matching attr	1966
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Chapter 10

File Index

10.1 File List

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FI_BMP_Image.H	2021
FI_Box.H	FI_Box widget	2022
FI_Browser.H	2022
FI_Browser_.H	2024
FI_Button.H	2026
FI_Cairo.H	Cairo is currently supported for the following platforms: Windows, macOS, Unix/Linux (X11 + Wayland)	2027
FI_Cairo_Window.H	FI_Cairo_Window, an FLTK window incorporating a Cairo draw callback	2028
fl_callback_macros.H	This file provides macros for easy function and method callbacks with multiple type safe arguments	2029
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Chapter 11

Topic Documentation

11.1 Callback Function Typedefs

Typedefs defined in [<FL/FI.H>](#) for callback or handler functions passed as function parameters.

Typedefs

- typedef void(* **FI_Abort_Handler**) (const char *format,...)
Signature of set_abort functions passed as parameters.
- typedef int(* **FI_Args_Handler**) (int argc, char **argv, int &i)
Signature of args functions passed as parameters.
- typedef void(* **FI_Atclose_Handler**) ([FI_Window](#) *window, void *data)
Signature of set_atclose functions passed as parameters.
- typedef void(* **FI_Awake_Handler**) (void *data)
Signature of some wakeup callback functions passed as parameters.
- typedef void() **FI_Box_Draw_F**(int x, int y, int w, int h, [FI_Color](#) color)
Signature of some box drawing functions passed as parameters.
- typedef void(* **FI_Clipboard_Notify_Handler**) (int source, void *data)
Signature of add_clipboard_notify functions passed as parameters.
- typedef int(* [FI_Event_Dispatch](#)) (int event, [FI_Window](#) *w)
Signature of event_dispatch functions passed as parameters.
- typedef int(* **FI_Event_Handler**) (int event)
Signature of add_handler functions passed as parameters.
- typedef void(* **FI_FD_Handler**) ([FL_SOCKET](#) fd, void *data)
Signature of add_fd functions passed as parameters.
- typedef void(* **FI_Idle_Handler**) (void *data)
Signature of add_idle callback functions passed as parameters.
- typedef void() **FI_Label_Draw_F**(const [FI_Label](#) *label, int x, int y, int w, int h, [FI_Align](#) align)
Signature of some label drawing functions passed as parameters.
- typedef void() **FI_Label_Measure_F**(const [FI_Label](#) *label, int &width, int &height)
Signature of some label measurement functions passed as parameters.
- typedef void(* **FI_Old_Idle_Handler**) ()
Signature of set_idle callback functions passed as parameters.
- typedef int(* **FI_System_Handler**) (void *event, void *data)
Signature of add_system_handler functions passed as parameters.
- typedef void(* [FI_Timeout_Handler](#)) (void *data)
Signature of timeout callback functions passed as parameters.

11.1.1 Detailed Description

Typedefs defined in <FL/Fl.H> for callback or handler functions passed as function parameters.

FLTK uses callback functions as parameters for some function calls, e.g. to set up global event handlers ([Fl::add_handler\(\)](#)), to add a timeout handler ([Fl::add_timeout\(\)](#)), and many more.

The typedefs defined in this group describe the function parameters used to set up or clear the callback functions and should also be referenced to define the callback function to handle such events in the user's code.

See also

[Fl::add_handler\(\)](#), [Fl::add_timeout\(\)](#), [Fl::repeat_timeout\(\)](#), [Fl::remove_timeout\(\)](#) and others

11.1.2 Typedef Documentation

11.1.2.1 Fl_Event_Dispatch

```
typedef int(* Fl_Event_Dispatch) (int event, Fl_Window *w)
```

Signature of event_dispatch functions passed as parameters.

See also

[Fl::event_dispatch\(Fl_Event_Dispatch\)](#)

11.1.2.2 Fl_Timeout_Handler

```
typedef void(* Fl_Timeout_Handler) (void *data)
```

Signature of timeout callback functions passed as parameters.

Please see [Fl::add_timeout\(\)](#) for details.

11.2 Windows handling functions

Windows and standard dialogs handling declared in <FL/Fl.H>

Functions

- static void [Fl::default_atclose](#) ([Fl_Window](#) *, void *)
Default callback for window widgets.
- static [Fl_Window](#) * [Fl::first_window](#) ()
Returns the first top-level window in the list of shown() windows.
- static void [Fl::first_window](#) ([Fl_Window](#) *)
Sets the window that is returned by [first_window\(\)](#).
- static [Fl_Window](#) * [Fl::grab](#) ()
Returns the window that currently receives all events.
- static void [Fl::grab](#) ([Fl_Window](#) *)
Selects the window to grab.
- static [Fl_Window](#) * [Fl::modal](#) ()
Returns the top-most [modal\(\)](#) window currently shown.
- static [Fl_Window](#) * [Fl::next_window](#) (const [Fl_Window](#) *)
Returns the next top-level window in the list of shown() windows.
- static void [Fl::set_abort](#) ([Fl_Abort_Handler](#) f)
For back compatibility, sets the void [Fl::fatal](#) handler callback.
- static void [Fl::set_atclose](#) ([Fl_Atclose_Handler](#) f)
For back compatibility, sets the [Fl::atclose](#) handler callback.

Variables

- static void(* [Fl::atclose](#))([Fl_Window](#) *, void *)
Back compatibility: default window callback handler.

11.2.1 Detailed Description

Windows and standard dialogs handling declared in <FL/FL.H>

11.2.2 Function Documentation

11.2.2.1 default_atclose()

```
void Fl::default_atclose (
    Fl_Window * window,
    void * v ) [static]
```

Default callback for window widgets.

It hides the window and then calls the default widget callback.

11.2.2.2 first_window() [1/2]

```
Fl_Window * Fl::first_window ( ) [static]
```

Returns the first top-level window in the list of shown() windows.

If a modal() window is shown this is the top-most modal window, otherwise it is the most recent window to get an event.

11.2.2.3 first_window() [2/2]

```
void Fl::first_window (
    Fl_Window * window ) [static]
```

Sets the window that is returned by first_window().

The window is removed from wherever it is in the list and inserted at the top. This is not done if Fl::modal() is on or if the window is not shown(). Because the first window is used to set the "parent" of modal windows, this is often useful.

11.2.2.4 grab() [1/2]

```
static Fl_Window * Fl::grab ( ) [inline], [static]
```

Returns the window that currently receives all events.

Returns

The window that currently receives all events, or NULL if event grabbing is currently OFF.

11.2.2.5 grab() [2/2]

```
void Fl::grab (
    Fl_Window * win ) [static]
```

Selects the window to grab.

This is used when pop-up menu systems are active.

Send all events to the passed window no matter where the pointer or focus is (including in other programs). The window *does not have to be shown()*, this lets the handle() method of a "dummy" window override all event handling and allows you to map and unmap a complex set of windows (under both X and Windows *some* window must be mapped because the system interface needs a window id).

If grab() is on it will also affect show() of windows by doing system-specific operations (on X it turns on override-redirect). These are designed to make menus popup reliably and faster on the system.

To turn off grabbing do Fl::grab(0).

Be careful that your program does not enter an infinite loop while grab() is on. On X this will lock up your screen!

To avoid this potential lockup, all newer operating systems seem to limit mouse pointer grabbing to the time during which a mouse button is held down. Some OS's may not support grabbing at all.

11.2.2.6 modal()

```
static Fl_Window * Fl::modal ( ) [inline], [static]
```

Returns the top-most modal() window currently shown.

This is the most recently shown() window with `modal()` true, or NULL if there are no `modal()` windows shown(). The `modal()` window has its `handle()` method called for all events, and no other windows will have `handle()` called (`grab()` overrides this).

11.2.2.7 next_window()

```
Fl_Window * Fl::next_window (
    const Fl_Window * window ) [static]
```

Returns the next top-level window in the list of shown() windows. You can use this call to iterate through all the windows that are shown().

Parameters

in	<code>window</code>	must be shown and not NULL
----	---------------------	----------------------------

11.2.2.8 set_atclose()

```
static void Fl::set_atclose (
    Fl_Atclose_Handler f ) [inline], [static]
```

For back compatibility, sets the `Fl::atclose` handler callback. You can now simply change the callback for the window instead.

See also

[Fl_Window::callback\(Fl_Callback*\)](#)

11.2.3 Variable Documentation

11.2.3.1 atclose

```
void(* Fl::atclose)(Fl_Window *, void *)=default_atclose [static], [default]
```

Back compatibility: default window callback handler.

See also

[Fl::set_atclose\(\)](#)

11.3 Events handling functions

`Fl` class events handling API declared in `<FL/Fl.H>`

Functions

- static void `Fl::add_handler (Fl_Event_Handler h)`
Install a function to parse unrecognized events.
- static void `Fl::add_system_handler (Fl_System_Handler h, void *data)`
Install a function to intercept system events.
- static `Fl_Widget * Fl::belowmouse ()`
Gets the widget that is below the mouse.
- static void `Fl::belowmouse (Fl_Widget *)`
Sets the widget that is below the mouse.
- static `Fl_Callback_Reason Fl::callback_reason ()`
Give the reason for calling a callback.
- static int `Fl::compose (int &del)`
Any text editing widget should call this for each `FL_KEYBOARD` event.
- static void `Fl::compose_reset ()`
If the user moves the cursor, be sure to call `Fl::compose_reset()`.

- static void `Fl::disable_im ()`
Disables the system input methods facilities.
- static void `Fl::enable_im ()`
Enables the system input methods facilities.
- static int `Fl::event ()`
Returns the last event that was processed.
- static int `Fl::event_alt ()`
Returns non-zero if the Alt key is pressed.
- static int `Fl::event_button ()`
Gets which particular mouse button caused the current event.
- static int `Fl::event_button1 ()`
Returns non-zero if mouse button 1 is currently held down.
- static int `Fl::event_button2 ()`
Returns non-zero if button 2 is currently held down.
- static int `Fl::event_button3 ()`
Returns non-zero if button 3 is currently held down.
- static int `Fl::event_buttons ()`
Returns the mouse buttons state bits; if non-zero, then at least one button is pressed now.
- static int `Fl::event_clicks ()`
Returns non zero if we had a double click event.
- static void `Fl::event_clicks (int i)`
Manually sets the number returned by `Fl::event_clicks()`.
- static void * `Fl::event_clipboard ()`
During an `FL_PASTE` event of non-textual data, returns a pointer to the pasted data.
- static const char * `Fl::event_clipboard_type ()`
Returns the type of the pasted data during an `FL_PASTE` event.
- static int `Fl::event_command ()`
Returns non-zero if the `FL_COMMAND` key is pressed, either `FL_CTRL` or on OSX `FL_META`.
- static int `Fl::event_ctrl ()`
Returns non-zero if the Control key is pressed.
- static `Fl_Event_Dispatch Fl::event_dispatch ()`
Return the current event dispatch function.
- static void `Fl::event_dispatch (Fl_Event_Dispatch d)`
Set a new event dispatch function.
- static int `Fl::event_dx ()`
Returns the current horizontal mouse scrolling associated with the `FL_MOUSEWHEEL` event.
- static int `Fl::event_dy ()`
Returns the current vertical mouse scrolling associated with the `FL_MOUSEWHEEL` event.
- static int `Fl::event_inside (const Fl_Widget *)`
Returns whether or not the mouse event is inside a given child widget.
- static int `Fl::event_inside (int, int, int, int)`
Returns whether or not the mouse event is inside the given rectangle.
- static int `Fl::event_is_click ()`
Returns non-zero if the mouse has not moved far enough and not enough time has passed since the last `FL_PUSH` or `FL_KEYBOARD` event for it to be considered a "drag" rather than a "click".
- static void `Fl::event_is_click (int i)`
Clears the value returned by `Fl::event_is_click()`.
- static int `Fl::event_key ()`
Gets which key on the keyboard was last pushed.
- static int `Fl::event_key (int key)`
Returns true if the given `key` was held down (or pressed) during the last event.

- static int `Fl::event_length ()`
Returns the length of the text in `Fl::event_text()`.
- static int `Fl::event_original_key ()`
Returns the keycode of the last key event, regardless of the NumLock state.
- static int `Fl::event_shift ()`
Returns non-zero if the Shift key is pressed.
- static int `Fl::event_state ()`
Returns the keyboard and mouse button states of the last event.
- static int `Fl::event_state (int mask)`
Returns non-zero if any of the passed event state bits are turned on.
- static const char * `Fl::event_text ()`
Returns the text associated with the current event, including `FL_PASTE` or `FL_DND_RELEASE` events.
- static int `Fl::event_x ()`
Returns the mouse position of the event relative to the `Fl_Window` it was passed to.
- static int `Fl::event_x_root ()`
Returns the mouse position on the screen of the event.
- static int `Fl::event_y ()`
Returns the mouse position of the event relative to the `Fl_Window` it was passed to.
- static int `Fl::event_y_root ()`
Returns the mouse position on the screen of the event.
- static `Fl_Widget *` `Fl::focus ()`
Gets the current `Fl::focus()` widget.
- static void `Fl::focus (Fl_Widget *)`
Sets the widget that will receive `FL_KEYBOARD` events.
- static int `Fl::get_key (int key)`
Returns true if the given `key` is held down now.
- static void `Fl::get_mouse (int &, int &)`
Return where the mouse is on the screen by doing a round-trip query to the server.
- static int `Fl::handle (int, Fl_Window *)`
Handle events from the window system.
- static int `Fl::handle_ (int, Fl_Window *)`
Handle events from the window system.
- static `Fl_Widget *` `Fl::pushed ()`
Gets the widget that is being pushed.
- static void `Fl::pushed (Fl_Widget *)`
Sets the widget that is being pushed.
- static void `Fl::remove_handler (Fl_Event_Handler h)`
Removes a previously added event handler.
- static void `Fl::remove_system_handler (Fl_System_Handler h)`
Removes a previously added system event handler.
- static int `Fl::test_shortcut (Fl_Shortcut)`
Tests the current event, which must be an `FL_KEYBOARD` or `FL_SHORTCUT`, against a shortcut value (described in `Fl_Button`).

Variables

- const char *const `fl_callback_reason_names []`
This is an array of callback reason names you can use to convert font numbers into names.
- const char *const `fl_eventnames []`
This is an array of event names you can use to convert event numbers into names.
- const char *const `fl_fontnames []`
This is an array of font names you can use to convert font numbers into names.

11.3.1 Detailed Description

Fl class events handling API declared in `<FL/Fl.H>`

11.3.2 Function Documentation

11.3.2.1 `add_handler()`

```
void Fl::add_handler (
    Fl_Event_Handler ha ) [static]
```

Install a function to parse unrecognized events.

If FLTK cannot figure out what to do with an event, it calls each of these functions (most recent first) until one of them returns non-zero. If none of them returns non-zero then the event is ignored. Events that cause this to be called are:

- `FL_SHORTCUT` events that are not recognized by any widget. This lets you provide global shortcut keys.
- `FL_SCREEN_CONFIGURATION_CHANGED` events. Under X11, this event requires the `libXrandr.so` shared library to be loadable at run-time and the X server to implement the RandR extension.
- `FL_ZOOM_EVENT` events.
- System events that FLTK does not recognize. See `fl_xevent`.
- *Some* other events when the widget FLTK selected returns zero from its `handle()` method. Exactly which ones may change in future versions, however.

See also

[Fl::remove_handler\(Fl_Event_Handler\)](#)
[Fl::event_dispatch\(Fl_Event_Dispatch d\)](#)
[Fl::handle\(int, Fl_Window*\)](#)

11.3.2.2 `add_system_handler()`

```
void Fl::add_system_handler (
    Fl_System_Handler ha,
    void * data ) [static]
```

Install a function to intercept system events.

FLTK calls each of these functions as soon as a new system event is received. The processing will stop at the first function to return non-zero. If all functions return zero then the event is passed on for normal handling by FLTK.

Each function will be called with a pointer to the system event as the first argument and `data` as the second argument. The system event pointer will always be `void *`, but will point to different objects depending on the platform:

- X11: XEvent
- Windows: MSG
- OS X: NSEvent

Parameters

<i>ha</i>	The event handler function to register
<i>data</i>	User data to include on each call

See also

[Fl::remove_system_handler\(Fl_System_Handler\)](#)

11.3.2.3 belowmouse() [1/2]

```
static Fl_Widget * Fl::belowmouse ( ) [inline], [static]
```

Gets the widget that is below the mouse.

See also

[belowmouse\(Fl_Widget*\)](#)

11.3.2.4 belowmouse() [2/2]

```
void Fl::belowmouse (
    Fl_Widget * o ) [static]
```

Sets the widget that is below the mouse.

This is for highlighting buttons. It is not used to send FL_PUSH or FL_MOVE directly, for several obscure reasons, but those events typically go to this widget. This is also the first widget tried for FL_SHORTCUT events.

If you change the belowmouse widget, the previous one and all parents (that don't contain the new widget) are sent FL_LEAVE events. Changing this does *not* send FL_ENTER to this or any widget, because sending FL_ENTER is supposed to *test* if the widget wants the mouse (by it returning non-zero from [handle\(\)](#)).

11.3.2.5 callback_reason()

```
Fl_Callback_Reason Fl::callback_reason ( ) [static]
```

Give the reason for calling a callback.

Returns

the reason for the current callback

See also

[Fl_Widget::when\(\)](#), [Fl_Widget::do_callback\(\)](#), [Fl_Widget::callback\(\)](#)

11.3.2.6 compose()

```
int Fl::compose (
    int & del ) [static]
```

Any text editing widget should call this for each FL_KEYBOARD event.

Use of this function is very simple.

If *true* is returned, then it has modified the [Fl::event_text\(\)](#) and [Fl::event_length\(\)](#) to a set of *bytes* to insert (it may be of zero length!). It will also set the "del" parameter to the number of *bytes* to the left of the cursor to delete, this is used to delete the results of the previous call to [Fl::compose\(\)](#).

If *false* is returned, the keys should be treated as function keys, and del is set to zero. You could insert the text anyways, if you don't know what else to do.

Text editing widgets can preferentially call [fl_set_spot\(\)](#) to indicate the window coordinates of the bottom of the current insertion point and the line height. This way, auxiliary windows that help choosing among alternative characters with some text input methods appear just below or above the insertion point. If widgets don't do that, such auxiliary windows appear at the widget's bottom.

On some platforms, text input can involve marked text, that is, temporary text replaced by other text during the input process. This occurs, e.g., under Wayland or macOS when using dead keys or when entering CJK characters. Text editing widgets should preferentially signal marked text, usually underlining it. Widgets can use `int Fl::compose_state` after having called [Fl::compose\(int&\)](#) to obtain the length in bytes of marked text that always finishes at the current insertion point. Widgets should also call `void fl_reset_spot()` when processing FL_UNFOCUS events. The [Fl_Input](#) and [Fl_Text_Editor](#) widgets underline marked text. If none of this is done by a user-defined text editing widget, text input will work, but will not signal to the user what text is marked.

Finally, text editing widgets should call `set_flag(MAC_USE_ACCENTS_MENU)`; in their constructor if they want to use, on the macOS platform, the feature introduced with Mac OS 10.7 "Lion" where pressing and holding certain keys on the keyboard opens a diacritic marks popup window.

Note

For compatibility with FLTK 1.3, text editing widgets can call `Fl::insertion_point_location(int x, int y, int height)` and `Fl::reset_marked_text()` only under the macOS platform to indicate/reset the coordinates of the current insertion point. This is deprecated in version 1.4 because redundant with the platform-independent `fl_set_spot()` and `fl_reset_spot()` functions.

11.3.2.7 compose_reset()

```
void Fl::compose_reset ( ) [static]
```

If the user moves the cursor, be sure to call `Fl::compose_reset()`.

The next call to `Fl::compose()` will start out in an initial state. In particular it will not set "del" to non-zero. This call is very fast so it is ok to call it many times and in many places.

11.3.2.8 disable_im()

```
void Fl::disable_im ( ) [static]
```

Disables the system input methods facilities.

See also

[enable_im\(\)](#)

11.3.2.9 enable_im()

```
void Fl::enable_im ( ) [static]
```

Enables the system input methods facilities.

This is the default.

See also

[disable_im\(\)](#)

11.3.2.10 event()

```
static int Fl::event ( ) [inline], [static]
```

Returns the last event that was processed.

This can be used to determine if a callback is being done in response to a keypress, mouse click, etc.

11.3.2.11 event_button()

```
static int Fl::event_button ( ) [inline], [static]
```

Gets which particular mouse button caused the current event.

This returns garbage if the most recent event was not a `FL_PUSH` or `FL_RELEASE` event.

Return values

<code>FL_LEFT_MOUSE</code>	
<code>FL_MIDDLE_MOUSE</code>	
<code>FL_RIGHT_MOUSE.</code>	

See also

[Fl::event_buttons\(\)](#)

11.3.2.12 event_button1()

```
static int Fl::event_button1 ( ) [inline], [static]
```

Returns non-zero if mouse button 1 is currently held down.
For more details, see [Fl::event_buttons\(\)](#).

11.3.2.13 event_button2()

```
static int Fl::event_button2 ( ) [inline], [static]
```

Returns non-zero if button 2 is currently held down.
For more details, see [Fl::event_buttons\(\)](#).

11.3.2.14 event_button3()

```
static int Fl::event_button3 ( ) [inline], [static]
```

Returns non-zero if button 3 is currently held down.
For more details, see [Fl::event_buttons\(\)](#).

11.3.2.15 event_buttons()

```
static int Fl::event_buttons ( ) [inline], [static]
```

Returns the mouse buttons state bits; if non-zero, then at least one button is pressed now.
This function returns the button state at the time of the event. During an FL_RELEASE event, the state of the released button will be 0. To find out, which button caused an FL_RELEASE event, you can use [Fl::event_button\(\)](#) instead.

Returns

a bit mask value like { [FL_BUTTON1] | [FL_BUTTON2] | [FL_BUTTON3] }

11.3.2.16 event_clicks() [1/2]

```
static int Fl::event_clicks ( ) [inline], [static]
```

Returns non zero if we had a double click event.

Return values

<i>Non-zero</i>	if the most recent FL_PUSH or FL_KEYBOARD was a "double click".
<i>N-1</i>	for N clicks. A double click is counted if the same button is pressed again while event_is_click() is true.

11.3.2.17 event_clicks() [2/2]

```
static void Fl::event_clicks (
    int i ) [inline], [static]
```

Manually sets the number returned by [Fl::event_clicks\(\)](#).
This can be used to set it to zero so that later code does not think an item was double-clicked.

Parameters

in	<i>i</i>	corresponds to no double-click if 0, i+1 mouse clicks otherwise
----	----------	---

See also

int [event_clicks\(\)](#)

11.3.2.18 event_clipboard()

```
static void * Fl::event_clipboard ( ) [inline], [static]
```

During an FL_PASTE event of non-textual data, returns a pointer to the pasted data.
The returned data is an [Fl_RGB_Image *](#) when the result of [Fl::event_clipboard_type\(\)](#) is [Fl::clipboard_image](#).

11.3.2.19 event_clipboard_type()

```
static const char * Fl::event_clipboard_type ( ) [inline], [static]
```

Returns the type of the pasted data during an FL_PASTE event.

This type can be [Fl::clipboard_plain_text](#) or [Fl::clipboard_image](#).

11.3.2.20 event_dispatch()

```
void Fl::event_dispatch (
    Fl_Event_Dispatch d ) [static]
```

Set a new event dispatch function.

The event dispatch function is called after native events are converted to FLTK events, but before they are handled by FLTK. If the dispatch function `Fl_Event_Dispatch d` is set, it is up to the dispatch function to call [Fl::handle_\(int, Fl_Window*\)](#) or to ignore the event.

The dispatch function itself must return 0 if it ignored the event, or non-zero if it used the event. If you call [Fl::handle_\(\)](#), then this will return the correct value.

The event dispatch can be used to handle exceptions in FLTK events and callbacks before they reach the native event handler:

```
int myHandler(int e, Fl_Window *w) {
    try {
        return Fl::handle_(e, w);
    } catch ( ) {
        ...
    }
}

main() {
    Fl::event_dispatch(myHandler);
    ...
    Fl::run();
}
```

Parameters

<i>d</i>	new dispatch function, or NULL
----------	--------------------------------

See also

[Fl::add_handler\(Fl_Event_Handler\)](#)

[Fl::handle\(int, Fl_Window*\)](#)

[Fl::handle_\(int, Fl_Window*\)](#)

11.3.2.21 event_dx()

```
static int Fl::event_dx ( ) [inline], [static]
```

Returns the current horizontal mouse scrolling associated with the FL_MOUSEWHEEL event.

Right is positive.

11.3.2.22 event_dy()

```
static int Fl::event_dy ( ) [inline], [static]
```

Returns the current vertical mouse scrolling associated with the FL_MOUSEWHEEL event.

Down is positive.

11.3.2.23 event_inside() [1/2]

```
int Fl::event_inside (
    const Fl_Widget * o ) [static]
```

Returns whether or not the mouse event is inside a given child widget.

Returns non-zero if the current [Fl::event_x\(\)](#) and [Fl::event_y\(\)](#) put it inside the given child widget's bounding box.

This method can only be used to check whether the mouse event is inside a **child** widget of the window that handles the event, and there must not be an intermediate subwindow (i.e. the widget must not be inside a subwindow of the current window). However, it is valid if the widget is inside a nested [Fl_Group](#).

You must not use it with the window itself as the `o` argument in a window's `handle()` method.

Note

The mentioned restrictions are necessary, because this method does not transform coordinates of child widgets, and thus the given widget `o` must be within the *same* window that is handling the current event. Otherwise the results are undefined.

You should always call this rather than doing your own comparison so you are consistent about edge effects.

See also

[Fl::event_inside\(int, int, int, int\)](#)

Parameters

<code>in</code>	<code>o</code>	child widget to be tested
-----------------	----------------	---------------------------

Returns

non-zero, if mouse event is inside the widget

11.3.2.24 event_inside() [2/2]

```
int Fl::event_inside (
    int xx,
    int yy,
    int ww,
    int hh ) [static]
```

Returns whether or not the mouse event is inside the given rectangle.

Returns non-zero if the current [Fl::event_x\(\)](#) and [Fl::event_y\(\)](#) put it inside the given arbitrary bounding box.

You should always call this rather than doing your own comparison so you are consistent about edge effects.

To find out, whether the event is inside a child widget of the current window, you can use [Fl::event_inside\(const Fl_Widget *\)](#).

Parameters

<code>in</code>	<code>xx,yy,ww,hh</code>	bounding box
-----------------	--------------------------	--------------

Returns

non-zero, if mouse event is inside

11.3.2.25 event_is_click() [1/2]

```
static int Fl::event_is_click ( ) [inline], [static]
```

Returns non-zero if the mouse has not moved far enough and not enough time has passed since the last `FL_PUSH` or `FL_KEYBOARD` event for it to be considered a "drag" rather than a "click".

You can test this on `FL_DRAG`, `FL_RELEASE`, and `FL_MOVE` events.

11.3.2.26 event_is_click() [2/2]

```
static void Fl::event_is_click (
    int i ) [inline], [static]
```

Clears the value returned by [Fl::event_is_click\(\)](#).

Useful to prevent the *next* click from being counted as a double-click or to make a popup menu pick an item with a single click. Don't pass non-zero to this.

11.3.2.27 event_key() [1/2]

```
static int Fl::event_key ( ) [inline], [static]
```

Gets which key on the keyboard was last pushed.

The returned integer 'key code' is not necessarily a text equivalent for the keystroke. For instance: if someone presses '5' on the numeric keypad with numlock on, [Fl::event_key\(\)](#) may return the 'key code' for this key, and NOT the character '5'. To always get the '5', use [Fl::event_text\(\)](#) instead.

Returns

an integer 'key code', or 0 if the last event was not a key press or release.

See also

int [event_key\(int\)](#), [event_text\(\)](#), [compose\(int&\)](#).

11.3.2.28 event_key() [2/2]

```
int Fl::event_key (
    int key ) [static]
```

Returns true if the given *key* was held down (or pressed) *during* the last event.

This is constant until the next event is read from the server.

[Fl::get_key\(int\)](#) returns true if the given key is held down *now*. Under X this requires a round-trip to the server and is *much* slower than [Fl::event_key\(int\)](#).

Keys are identified by the *unshifted* values. FLTK defines a set of symbols that should work on most modern machines for every key on the keyboard:

- All keys on the main keyboard producing a printable ASCII character use the value of that ASCII character (as though shift, ctrl, and caps lock were not on). The space bar is 32.
- All keys on the numeric keypad producing a printable ASCII character use the value of that ASCII character plus FL_KP (e.g., FL_KP + '4', FL_KP + '/'). The highest possible value is FL_KP_Last so you can range-check to see if something is on the keypad.
- All numbered function keys use the number on the function key plus FL_F. The highest possible number is FL_F_Last, so you can range-check a value.
- Buttons on the mouse are considered keys, and use the button number (where the left button is 1) plus FL_Button.
- All other keys on the keypad have a symbol: FL_Escape, FL_BackSpace, FL_Tab, FL_Enter, FL_Print, FL_Scroll_Lock, FL_Pause, FL_Insert, FL_Home, FL_Page_Up, FL_Delete, FL_End, FL_Page_Down, FL_Left, FL_Up, FL_Right, FL_Down, FL_Iso_Key, FL_Shift_L, FL_Shift_R, FL_Control_L, FL_Control_R, FL_Caps_Lock, FL_Alt_L, FL_Alt_R, FL_Meta_L, FL_Meta_R, FL_Menu, FL_Num_Lock, FL_KP_Enter. Be careful not to confuse these with the very similar, but all-caps, symbols used by [Fl::event_state\(\)](#).

On X [Fl::get_key\(FL_Button+n\)](#) does not work.

On Windows [Fl::get_key\(FL_KP_Enter\)](#) and [Fl::event_key\(FL_KP_Enter\)](#) do not work.

11.3.2.29 event_length()

```
static int Fl::event_length ( ) [inline], [static]
```

Returns the length of the text in [Fl::event_text\(\)](#).

There will always be a nul at this position in the text. However there may be a nul before that if the keystroke translates to a nul character or you paste a nul character.

11.3.2.30 event_original_key()

```
static int Fl::event_original_key ( ) [inline], [static]
```

Returns the keycode of the last key event, regardless of the NumLock state.

If NumLock is deactivated, FLTK translates events from the numeric keypad into the corresponding arrow key events. [event_key\(\)](#) returns the translated key code, whereas [event_original_key\(\)](#) returns the keycode before NumLock translation.

11.3.2.31 event_state() [1/2]

```
static int Fl::event_state ( ) [inline], [static]
```

Returns the keyboard and mouse button states of the last event.

This is a bitfield of what shift states were on and what mouse buttons were held down during the most recent event.

The legal event state bits are:

- FL_SHIFT
- FL_CAPS_LOCK
- FL_CTRL
- FL_ALT
- FL_NUM_LOCK
- FL_META
- FL_SCROLL_LOCK
- FL_BUTTON1
- FL_BUTTON2
- FL_BUTTON3

X servers do not agree on shift states, and FL_NUM_LOCK, FL_META, and FL_SCROLL_LOCK may not work. The values were selected to match the XFree86 server on Linux. In addition there is a bug in the way X works so that the shift state is not correctly reported until the first event *after* the shift key is pressed or released.

11.3.2.32 event_state() [2/2]

```
static int Fl::event_state (
    int mask ) [inline], [static]
```

Returns non-zero if any of the passed event state bits are turned on.

Use `mask` to pass the event states you're interested in. The legal event state bits are defined in [Fl::event_state\(\)](#).

11.3.2.33 event_text()

```
static const char * Fl::event_text ( ) [inline], [static]
```

Returns the text associated with the current event, including FL_PASTE or FL_DND_RELEASE events.

This can be used in response to FL_KEYUP, FL_KEYDOWN, FL_PASTE, and FL_DND_RELEASE.

When responding to FL_KEYUP/FL_KEYDOWN, use this function instead of [Fl::event_key\(\)](#) to get the text equivalent of keystrokes suitable for inserting into strings and text widgets.

The returned string is guaranteed to be NULL terminated. However, see [Fl::event_length\(\)](#) for the actual length of the string, in case the string itself contains NULLs that are part of the text data.

Returns

A NULL terminated text string equivalent of the last keystroke.

11.3.2.34 event_x_root()

```
static int Fl::event_x_root ( ) [inline], [static]
```

Returns the mouse position on the screen of the event.

To find the absolute position of an [Fl_Window](#) on the screen, use the difference between [event_x_root\(\)](#), [event_y_root\(\)](#) and [event_x\(\)](#), [event_y\(\)](#).

11.3.2.35 event_y_root()

```
static int Fl::event_y_root ( ) [inline], [static]
```

Returns the mouse position on the screen of the event.

To find the absolute position of an [Fl_Window](#) on the screen, use the difference between [event_x_root\(\)](#), [event_y_root\(\)](#) and [event_x\(\)](#), [event_y\(\)](#).

11.3.2.36 focus() [1/2]

```
static Fl_Widget * Fl::focus ( ) [inline], [static]
```

Gets the current [Fl::focus\(\)](#) widget.

See also

[Fl::focus\(Fl_Widget*\)](#)

11.3.2.37 focus() [2/2]

```
void Fl::focus (
    Fl_Widget * o ) [static]
```

Sets the widget that will receive FL_KEYBOARD events.

Use this function inside the `handle(int)` member function of a widget of yours to give focus to the widget, for example when it receives the FL_FOCUS or the FL_PUSH event. Otherwise, use [Fl_Widget::take_focus\(\)](#) to give focus to a widget;

If you change [Fl::focus\(\)](#), the previous widget and all parents (that don't contain the new widget) are sent FL_↔ UNFOCUS events. Changing the focus does *not* send FL_FOCUS to this or any widget, because sending FL_↔ FOCUS is supposed to *test* if the widget wants the focus (by it returning non-zero from [handle\(\)](#)).

Widgets can set the NEEDS_KEYBOARD flag to indicate that a keyboard is essential for the widget to function. Touchscreen devices will be sent a request to show an on-screen keyboard if no hardware keyboard is connected.

See also

[Fl_Widget::take_focus\(\)](#)

[Fl_Widget::needs_keyboard\(\) const](#)

[Fl_Widget::needs_keyboard\(bool\)](#)

11.3.2.38 get_key()

```
int Fl::get_key (
    int key ) [static]
```

Returns true if the given `key` is held down *now*.

Under X this requires a round-trip to the server and is *much* slower than [Fl::event_key\(int\)](#).

See also

[event_key\(int\)](#)

11.3.2.39 get_mouse()

```
void Fl::get_mouse (
    int & x,
    int & y ) [static]
```

Return where the mouse is on the screen by doing a round-trip query to the server.

You should use [Fl::event_x_root\(\)](#) and [Fl::event_y_root\(\)](#) if possible, but this is necessary if you are not sure if a mouse event has been processed recently (such as to position your first window). If the display is not open, this will open it.

11.3.2.40 handle()

```
int Fl::handle (
    int e,
    Fl_Window * window ) [static]
```

Handle events from the window system.

This is called from the native event dispatch after native events have been converted to FLTK notation. This function calls [Fl::handle_\(int, Fl_Window*\)](#) unless the user sets a dispatch function. If a user dispatch function is set, the user must make sure that [Fl::handle_\(\)](#) is called, or the event will be ignored.

Parameters

<i>e</i>	the event type (Fl::event_number() is not yet set)
<i>window</i>	the window that caused this event

Returns

0 if the event was not handled

See also

[Fl::add_handler\(Fl_Event_Handler\)](#)

[Fl::event_dispatch\(Fl_Event_Dispatch\)](#)

11.3.2.41 handle_()

```
int Fl::handle_ (
    int e,
    Fl_Window * window ) [static]
```

Handle events from the window system.

This function is called from the native event dispatch, unless the user sets another dispatch function. In that case, the user dispatch function must decide when to call [Fl::handle_\(int, Fl_Window*\)](#)

Callbacks can set `FL_REASON_CLOSED` and `FL_REASON_CANCELLED`.

Parameters

<i>e</i>	the event type (Fl::event_number() is not yet set)
<i>window</i>	the window that caused this event

Returns

0 if the event was not handled

See also

[Fl::event_dispatch\(Fl_Event_Dispatch\)](#)

11.3.2.42 pushed() [1/2]

```
static Fl_Widget * Fl::pushed ( ) [inline], [static]
```

Gets the widget that is being pushed.

See also

void [pushed\(Fl_Widget*\)](#)

11.3.2.43 pushed() [2/2]

```
void Fl::pushed (
    Fl_Widget * o ) [static]
```

Sets the widget that is being pushed.

`FL_DRAG` or `FL_RELEASE` (and any more `FL_PUSH`) events will be sent to this widget.

If you change the pushed widget, the previous one and all parents (that don't contain the new widget) are sent `FL_RELEASE` events. Changing this does *not* send `FL_PUSH` to this or any widget, because sending `FL_PUSH` is supposed to *test* if the widget wants the mouse (by it returning non-zero from [handle\(\)](#)).

11.3.2.44 remove_handler()

```
void Fl::remove_handler (
    Fl_Event_Handler ha ) [static]
```

Removes a previously added event handler.

See also

[Fl::handle\(int, Fl_Window*\)](#)

11.3.2.45 remove_system_handler()

```
void Fl::remove_system_handler (
    Fl_System_Handler ha ) [static]
```

Removes a previously added system event handler.

Parameters

<i>ha</i>	The event handler function to remove
-----------	--------------------------------------

See also

[Fl::add_system_handler\(Fl_System_Handler\)](#)

11.3.2.46 test_shortcut()

```
int Fl::test_shortcut (
    Fl_Shortcut shortcut ) [static]
```

Tests the current event, which must be an FL_KEYBOARD or FL_SHORTCUT, against a shortcut value (described in [Fl_Button](#)).

Not to be confused with [Fl_Widget::test_shortcut\(\)](#).

Returns

non-zero if there is a match.

11.3.3 Variable Documentation**11.3.3.1 fl_callback_reason_names**

```
const char* const fl_callback_reason_names[]
```

Initial value:

```
=
{
    "FL_REASON_UNKNOWN",
    "FL_REASON_SELECTED",
    "FL_REASON_DESELECTED",
    "FL_REASON_RESELECTED",
    "FL_REASON_OPENED",
    "FL_REASON_CLOSED",
    "FL_REASON_DRAGGED",
    "FL_REASON_CANCELLED",
    "FL_REASON_CHANGED",
    "FL_REASON_GOT_FOCUS",
    "FL_REASON_LOST_FOCUS",
    "FL_REASON_RELEASED",
    "FL_REASON_ENTER_KEY",
    NULL, NULL, NULL,
    NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL,
    NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL,
    "FL_REASON_USER", "FL_REASON_USER+1", "FL_REASON_USER+2", "FL_REASON_USER+3",
}
```

This is an array of callback reason names you can use to convert font numbers into names.

The array gets defined inline wherever your `#include <FL/names.h>` appears.

11.3.3.2 fl_eventnames

```
const char* const fl_eventnames[]
```

This is an array of event names you can use to convert event numbers into names.

The array gets defined inline wherever your '#include <FL/names.h>' appears.

Example:

```
#include <FL/names.h>           // array will be defined here
int MyClass::handle(int e) {
    printf("Event was %s (%d)\n", fl_eventnames[e], e);
    // ..resulting output might be e.g. "Event was FL_PUSH (1)"..
    [..]
}
```

11.3.3.3 fl_fontnames

```
const char* const fl_fontnames[]
```

Initial value:

```
=
{
    "FL_HELVETICA",
    "FL_HELVETICA_BOLD",
    "FL_HELVETICA_ITALIC",
    "FL_HELVETICA_BOLD_ITALIC",
    "FL_COURIER",
    "FL_COURIER_BOLD",
    "FL_COURIER_ITALIC",
    "FL_COURIER_BOLD_ITALIC",
    "FL_TIMES",
    "FL_TIMES_BOLD",
    "FL_TIMES_ITALIC",
    "FL_TIMES_BOLD_ITALIC",
    "FL_SYMBOL",
    "FL_SCREEN",
    "FL_SCREEN_BOLD",
    "FL_ZAPF_DINGBATS",
}
```

This is an array of font names you can use to convert font numbers into names.

The array gets defined inline wherever your '#include <FL/names.h>' appears.

Example:

```
#include <FL/names.h>           // array will be defined here
int MyClass::my_callback(Fl_Widget *w, void*) {
    int fnum = w->labelfont();
    // Resulting output might be e.g. "Label's font is FL_HELVETICA (0)"
    printf("Label's font is %s (%d)\n", fl_fontnames[fnum], fnum);
    // ..resulting output might be e.g. "Label's font is FL_HELVETICA (0)"..
    [..]
}
```

11.4 Selection & Clipboard functions

FLTK global copy/cut/paste functions declared in <FL/Fl.H>

Functions

- static void **Fl::add_clipboard_notify** (**Fl_Clipboard_Notify_Handler** h, void *data=0)

FLTK will call the registered callback whenever there is a change to the selection buffer or the clipboard.
- static int **Fl::clipboard_contains** (const char *type)

Returns non 0 if the clipboard contains data matching type.
- static void **Fl::copy** (const char *stuff, int len, int destination=0, const char *type=**Fl::clipboard_plain_text**)

Copies the data pointed to by stuff to the selection buffer (destination is 0), the clipboard (destination is 1), or both (destination is 2).
- static int **Fl::dnd** ()

Initiate a Drag And Drop operation.
- static void **Fl::paste** (**Fl_Widget** &receiver)

Backward compatibility only.
- static void **Fl::paste** (**Fl_Widget** &receiver, int source, const char *type=**Fl::clipboard_plain_text**)

Pastes the data from the selection buffer (source is 0) or the clipboard (source is 1) into receiver.
- static void **Fl::remove_clipboard_notify** (**Fl_Clipboard_Notify_Handler** h)

Stop calling the specified callback when there are changes to the selection buffer or the clipboard.

- static void `Fl::selection` (`Fl_Widget` &owner, const char *, int len)
Changes the current selection.
- static `Fl_Widget * Fl::selection_owner` ()
back-compatibility only: Gets the widget owning the current selection
- static void `Fl::selection_owner` (`Fl_Widget *`)
Back-compatibility only: The single-argument call can be used to move the selection to another widget or to set the owner to NULL, without changing the actual text of the selection.
- static int `Fl::selection_to_clipboard` ()
Returns the current selection_to_clipboard mode.
- static void `Fl::selection_to_clipboard` (int mode)
Copies selections on X11 directly to the clipboard if enabled.

Variables

- static char const *const `Fl::clipboard_image` = "image"
Denotes image data.
- static char const *const `Fl::clipboard_plain_text` = "text/plain"
Denotes plain textual data.

11.4.1 Detailed Description

FLTK global copy/cut/paste functions declared in <[FL/Fl.H](#)>

11.4.2 Function Documentation

11.4.2.1 add_clipboard_notify()

```
void Fl::add_clipboard_notify (
    Fl_Clipboard_Notify_Handler h,
    void * data = 0 ) [static]
```

FLTK will call the registered callback whenever there is a change to the selection buffer or the clipboard. The source argument indicates which of the two has changed. Only changes by other applications are reported.

Example:

```
void clip_callback(int source, void *data) {
    if ( source == 0 ) printf("CLIP CALLBACK: selection buffer changed\n");
    if ( source == 1 ) printf("CLIP CALLBACK: clipboard changed\n");
}
[..]
int main() {
    [..]
    Fl::add_clipboard_notify(clip_callback);
    [..]
}
```

Note

Some systems require polling to monitor the clipboard and may therefore have some delay in detecting changes.

11.4.2.2 clipboard_contains()

```
int Fl::clipboard_contains (
    const char * type ) [static]
```

Returns non 0 if the clipboard contains data matching `type`.

The clipboard can contain both text and image data; in that situation this function returns non 0 to both requests. This function is *not* meant to check whether the clipboard is empty. This function does not allow to query the selection buffer because FLTK allows to copy/paste non-textual data only from/to the clipboard.

Parameters

<code>type</code>	can be Fl::clipboard_plain_text or Fl::clipboard_image .
-------------------	--

11.4.2.3 copy()

```
void Fl::copy (
    const char * stuff,
    int len,
    int destination = 0,
    const char * type = Fl::clipboard_plain_text ) [static]
```

Copies the data pointed to by `stuff` to the selection buffer (`destination` is 0), the clipboard (`destination` is 1), or both (`destination` is 2).

Copying to both is only relevant on X11, on other platforms it maps to the clipboard (1). `len` is the number of relevant bytes in `stuff`. `type` is always [Fl::clipboard_plain_text](#). The selection buffer is used for middle-mouse pastes and for drag-and-drop selections. The clipboard is used for traditional copy/cut/paste operations.

Note

This function is, at present, intended only to copy UTF-8 encoded textual data. To copy graphical data, use the [Fl_Copy_Surface](#) class. The `type` argument may allow in the future to copy other kinds of data. Copies data to the selection buffer, the clipboard, or both.

The `destination` can be:

- 0: selection buffer (see note below)
- 1: clipboard
- 2: both

The selection buffer exists only on the X11 platform and is used for middle-mouse pastes and for drag-and-drop selections. The clipboard is used for traditional copy/cut/paste operations. On all other platforms the selection buffer (`destination = 0`) is mapped to the clipboard, i.e. on platforms other than X11 all `destination`s are equivalent and the data is always copied to the clipboard.

Note

Please see [Fl::selection_to_clipboard\(\)](#) to enable duplication of the selection buffer to the clipboard on X11, i.e. if `destination = 0` (selection buffer) **and** [Fl::selection_to_clipboard\(\)](#) is enabled, then the data is copied to both the selection buffer and the clipboard. This makes the X11 behavior similar to other platforms but keeps the selection buffer for X11 specific inter process communication.

`type` should always be [Fl::clipboard_plain_text](#) which is the default. Other values are ignored and reserved for future extensions.

Note

This function is, at present, intended only to copy UTF-8 encoded textual data. To copy graphical data, use the [Fl_Copy_Surface](#) class. The `type` argument may allow to copy other kinds of data in the future.

Parameters

in	<code>stuff</code>	text data to be copied
in	<code>len</code>	the number of relevant bytes in <code>stuff</code>
in	<code>destination</code>	0 = selection, 1 = clipboard, 2 = both (see description)
in	<code>type</code>	usually plain text (see description)

11.4.2.4 dnd()

```
int Fl::dnd ( ) [static]
```

Initiate a Drag And Drop operation.

The selection buffer should be filled with relevant data before calling this method. FLTK will then initiate the system wide drag and drop handling. Dropped data will be marked as *text*.

Create a selection first using: `Fl::copy(const char *stuff, int len, 0)`

11.4.2.5 paste() [1/2]

```
void Fl::paste (
    Fl_Widget & receiver ) [static]
```

Backward compatibility only.

This calls `Fl::paste(receiver, 0)`;

See also

[Fl::paste\(Fl_Widget &receiver, int clipboard, const char* type\)](#)

11.4.2.6 paste() [2/2]

```
void Fl::paste (
    Fl_Widget & receiver,
    int source,
    const char * type = Fl::clipboard_plain_text ) [static]
```

Pastes the data from the selection buffer (`source` is 0) or the clipboard (`source` is 1) into `receiver`.

The selection buffer (`source` is 0) is used for middle-mouse pastes and for drag-and-drop selections. The clipboard (`source` is 1) is used for copy/cut/paste operations.

If `source` is 1, the optional `type` argument indicates what type of data is requested from the clipboard. At present, [Fl::clipboard_plain_text](#) (requesting text data) and [Fl::clipboard_image](#) (requesting image data) are possible. Set things up so the handle function of the `receiver` widget will be called with an `FL_PASTE` event some time in the future if the clipboard does contain data of the requested type.

The handle function of `receiver` can process the `FL_PASTE` event as follows:

- If the `receiver` widget is known to only receive text data, the text string from the specified `source` is in [Fl::event_text\(\)](#) with UTF-8 encoding, and the number of bytes is in [Fl::event_length\(\)](#). If [Fl::paste\(\)](#) gets called during the drop step of a files-drag-and-drop operation, [Fl::event_text\(\)](#) contains a list of filenames (see [Drag and Drop Events](#)).
- If the `receiver` widget can potentially receive non-text data, use [Fl::event_clipboard_type\(\)](#) to determine what sort of data is being sent. If [Fl::event_clipboard_type\(\)](#) returns [Fl::clipboard_plain_text](#), proceed as above. If it returns [Fl::clipboard_image](#), the pointer returned by [Fl::event_clipboard\(\)](#) can be safely cast to type `Fl_RGB_Image *` to obtain a pointer to the pasted image. If `receiver` accepts the clipboard image, `receiver.handle()` should return 1 and the application should take ownership of this image (that is, delete it after use). Conversely, if `receiver.handle()` returns 0, the application must not use the image.

The receiver should be prepared to be called *directly* by this, or for it to happen *later*, or possibly *not at all*. This allows the window system to take as long as necessary to retrieve the paste buffer (or even to screw up completely) without complex and error-prone synchronization code in FLTK.

Platform details for image data:

- Unix/Linux platform: Clipboard images in PNG or BMP formats are recognized. Requires linking with the `fltk_images` library.
- Windows platform: Both bitmap and vectorial (Enhanced metafile) data from clipboard can be pasted as image data.
- Mac OS X platform: Both bitmap (TIFF) and vectorial (PDF) data from clipboard can be pasted as image data.

11.4.2.7 selection()

```
void Fl::selection (
    Fl_Widget & owner,
    const char * text,
    int len ) [static]
```

Changes the current selection.

The block of text is copied to an internal buffer by FLTK (be careful if doing this in response to an FL_PASTE as this may be the same buffer returned by [event_text\(\)](#)). The [selection_owner\(\)](#) widget is set to the passed owner.

11.4.2.8 selection_owner() [1/2]

```
static Fl_Widget * Fl::selection_owner ( ) [inline], [static]
```

back-compatibility only: Gets the widget owning the current selection

See also

Fl_Widget* [selection_owner\(Fl_Widget*\)](#)

11.4.2.9 selection_owner() [2/2]

```
void Fl::selection_owner (
    Fl_Widget * owner ) [static]
```

Back-compatibility only: The single-argument call can be used to move the selection to another widget or to set the owner to NULL, without changing the actual text of the selection.

FL_SELECTIONCLEAR is sent to the previous selection owner, if any.

Copying the buffer every time the selection is changed is obviously wasteful, especially for large selections. An interface will probably be added in a future version to allow the selection to be made by a callback function. The current interface will be emulated on top of this.

11.4.2.10 selection_to_clipboard() [1/2]

```
static int Fl::selection_to_clipboard ( ) [inline], [static]
```

Returns the current [selection_to_clipboard](#) mode.

See also

void [selection_to_clipboard\(int\)](#)

11.4.2.11 selection_to_clipboard() [2/2]

```
static void Fl::selection_to_clipboard (
    int mode ) [inline], [static]
```

Copies selections on X11 directly to the clipboard if enabled.

This method can be called on all platforms. Other platforms than X11 are not affected by this feature.

If this is switched on (`mode = 1`), [Fl::copy\(\)](#) copies all data to the clipboard regardless of its `destination` argument. If the destination is 0 (selection buffer) data is copied to both the selection buffer and the clipboard.

Drag and drop is also affected since drag-and-drop data is copied to the selection buffer.

You can use this to make the experience of data selection and copying more like that on other platforms (Windows, macOS, and even Wayland).

The default operation mode is the standard X11 behavior (disabled).

Note

This feature is experimental and enabling it may have unexpected side effects. It is your own responsibility if you enable it.

Since

1.4.0

Parameters

in	mode	1 = enable selection_to_clipboard, 0 = disable selection_to_clipboard
----	------	---

See also

[copy\(const char *, int, int, const char *\)](#)

11.5 Screen functions

[Fl](#) global screen functions declared in `<FL/Fl.H>`.

Functions

- static int **Fl::h** ()
Returns the height in pixels of the main screen work area.
- static void **Fl::keyboard_screen_scaling** (int value)
Controls the possibility to scale all windows by ctrl+/-/0/ or cmd+/-/0/.
- static int **Fl::screen_count** ()
Gets the total count of available screens.
- static void **Fl::screen_dpi** (float &h, float &v, int n=0)
Gets the screen resolution in dots-per-inch for the given screen.
- static int **Fl::screen_num** (int x, int y)
Gets the screen number of a screen that contains the specified screen position x, y.
- static int **Fl::screen_num** (int x, int y, int w, int h)
Gets the screen number for the screen which intersects the most with the rectangle defined by x, y, w, h.
- static float **Fl::screen_scale** (int n)
Current value of the GUI scaling factor for screen number n (n [0, Fl::screen_count()-1]).
- static void **Fl::screen_scale** (int n, float factor)
Sets the value of the GUI scaling factor for screen number n (n [0, Fl::screen_count()-1]).
- static int **Fl::screen_scaling_supported** ()
See if scaling factors are supported by this platform.
- static void **Fl::screen_work_area** (int &X, int &Y, int &W, int &H)
Gets the bounding box of the work area of the screen that contains the mouse pointer.
- static void **Fl::screen_work_area** (int &X, int &Y, int &W, int &H, int mx, int my)
Gets the bounding box of the work area of a screen that contains the specified screen position mx, my.
- static void **Fl::screen_work_area** (int &X, int &Y, int &W, int &H, int n)
Gets the bounding box of the work area of the given screen.
- static void **Fl::screen_xywh** (int &X, int &Y, int &W, int &H)
Gets the bounding box of a screen that contains the mouse pointer.
- static void **Fl::screen_xywh** (int &X, int &Y, int &W, int &H, int mx, int my)
Gets the bounding box of a screen that contains the specified screen position mx, my.
- static void **Fl::screen_xywh** (int &X, int &Y, int &W, int &H, int mx, int my, int mw, int mh)
Gets the screen bounding rect for the screen which intersects the most with the rectangle defined by mx, my, mw, mh.
- static void **Fl::screen_xywh** (int &X, int &Y, int &W, int &H, int n)
Gets the screen bounding rect for the given screen.
- static int **Fl::w** ()
Returns the width in pixels of the main screen work area.
- static int **Fl::x** ()
Returns the leftmost x coordinate of the main screen work area.
- static int **Fl::y** ()
Returns the topmost y coordinate of the main screen work area.

11.5.1 Detailed Description

[Fl](#) global screen functions declared in `<FL/Fl.H>`.

FLTK supports high-DPI screens using a screen scaling factor. The scaling factor is initialized by the library to a value based on information obtained from the OS. If this initial value is not satisfactory, the `FLTK_SCALING↵_FACTOR` environment variable can be set to a value FLTK will multiply to the OS-given value. The 2 variants of functions [Fl::screen_scale\(\)](#) allow to programmatically get and set scaling factor values. The scaling factor value can be further changed at runtime by typing `ctrl+/-/0/` (`cmd+/-/0/` under macOS). FLTK sends the `FL_ZOOM_EVENT` when the factor value is changed, to which a callback can be associated with [Fl::add_handler\(\)](#). By default, FLTK displays the new scaling factor value in a yellow, transient window. This can be changed with option [Fl::OPTION_SHOW_SCALING](#).

11.5.2 Function Documentation

11.5.2.1 keyboard_screen_scaling()

```
void Fl::keyboard_screen_scaling (
    int value ) [static]
```

Controls the possibility to scale all windows by `ctrl+/-/0/` or `cmd+/-/0/`.

This function **should** be called before [fl_open_display\(\)](#) runs. If it is not called, the default is to handle these keys for window scaling.

Note

This function can currently only be used to switch the internal handler **off**, i.e. `value` must be 0 (zero) - all other values result in undefined behavior and are reserved for future extension.

Parameters

<code>value</code>	0 to stop recognition of <code>ctrl+/-/0/</code> (or <code>cmd+/-/0/</code> under macOS) keys as window scaling.
--------------------	--

11.5.2.2 screen_count()

```
int Fl::screen_count ( ) [static]
```

Gets the total count of available screens.

Note

Screen numbers range from 0 to [Fl::screen_count\(\)](#)-1 in the FLTK API.

11.5.2.3 screen_dpi()

```
void Fl::screen_dpi (
    float & h,
    float & v,
    int n = 0 ) [static]
```

Gets the screen resolution in dots-per-inch for the given screen.

Parameters

<code>out</code>	<code>h,v</code>	horizontal and vertical resolution
<code>in</code>	<code>n</code>	the screen number (0 to Fl::screen_count() - 1)

See also

void [screen_xywh](#)(int &x, int &y, int &w, int &h, int mx, int my)

11.5.2.4 screen_num() [1/2]

```
int Fl::screen_num (
    int x,
    int y ) [static]
```

Gets the screen number of a screen that contains the specified screen position *x*, *y*.

Parameters

in	<i>x,y</i>	the absolute screen position
----	------------	------------------------------

Returns

a screen number [0 , [Fl::screen_count\(\)](#)-1]

Attention

When the running system contains screens with different scaling factor values, this API may become ambiguous because a given value pair (*x*, *y*) may belong to distinct screens. In that situation, other APIs should be preferred, e.g., [Fl_Window::screen_num\(\)](#) and [Fl::screen_scale\(int\)](#).

11.5.2.5 screen_num() [2/2]

```
int Fl::screen_num (
    int x,
    int y,
    int w,
    int h ) [static]
```

Gets the screen number for the screen which intersects the most with the rectangle defined by *x*, *y*, *w*, *h*.

Parameters

in	<i>x,y,w,h</i>	the rectangle to search for intersection with
----	----------------	---

Returns

a screen number [0 , [Fl::screen_count\(\)](#)-1]

11.5.2.6 screen_scale()

```
void Fl::screen_scale (
    int n,
    float factor ) [static]
```

Sets the value of the GUI scaling factor for screen number *n* (*n* [0 , [Fl::screen_count\(\)](#)-1]).

Also sets the scale factor value of all windows mapped to screen number *n*, if any.

11.5.2.7 screen_scaling_supported()

```
int Fl::screen_scaling_supported ( ) [static]
```

See if scaling factors are supported by this platform.

Returns

0 if scaling factors are not supported by this platform, 1 if a single scaling factor value is shared by all screens, 2 if each screen can have its own scaling factor value.

See also

[Fl::screen_scale\(int\)](#)

11.5.2.8 screen_work_area() [1/3]

```
void Fl::screen_work_area (
    int & X,
    int & Y,
    int & W,
    int & H ) [static]
```

Gets the bounding box of the work area of the screen that contains the mouse pointer.

Parameters

out	<i>X,Y,W,H</i>	the work area bounding box
-----	----------------	----------------------------

See also

void [screen_work_area\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

11.5.2.9 screen_work_area() [2/3]

```
void Fl::screen_work_area (
    int & X,
    int & Y,
    int & W,
    int & H,
    int mx,
    int my ) [static]
```

Gets the bounding box of the work area of a screen that contains the specified screen position *mx*, *my*.

Parameters

out	<i>X,Y,W,H</i>	the work area bounding box
in	<i>mx,my</i>	the absolute screen position

11.5.2.10 screen_work_area() [3/3]

```
void Fl::screen_work_area (
    int & X,
    int & Y,
    int & W,
    int & H,
    int n ) [static]
```

Gets the bounding box of the work area of the given screen.

Parameters

out	<i>X,Y,W,H</i>	the work area bounding box
in	<i>n</i>	the screen number (0 to Fl::screen_count() - 1)

See also

void [screen_xywh\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

Note

Like all quantities accessible via public APIs of FLTK, values of *x*,*y*,*w*,*h* are given in FLTK units, that is, in drawing units divided by the scaling factor of screen *n*.

11.5.2.11 screen_xywh() [1/4]

```
void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H ) [static]
```

Gets the bounding box of a screen that contains the mouse pointer.

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
-----	----------------	---------------------------------------

See also

void [screen_xywh\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

11.5.2.12 screen_xywh() [2/4]

```
void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H,
    int mx,
    int my ) [static]
```

Gets the bounding box of a screen that contains the specified screen position *mx*, *my*.

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
in	<i>mx,my</i>	the absolute screen position

11.5.2.13 screen_xywh() [3/4]

```
void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H,
    int mx,
    int my,
    int mw,
    int mh ) [static]
```

Gets the screen bounding rect for the screen which intersects the most with the rectangle defined by *mx*, *my*, *mw*, *mh*.

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
in	<i>mx,my,mw,mh</i>	the rectangle to search for intersection with

See also

void [screen_xywh\(int &X, int &Y, int &W, int &H, int n\)](#)

11.5.2.14 screen_xywh() [4/4]

```
void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H,
    int n ) [static]
```

Gets the screen bounding rect for the given screen.

Under Windows, Mac OS X, and X11 + the Gnome desktop, screen #0 contains the menubar/taskbar

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
in	<i>n</i>	the screen number (0 to Fl::screen_count() - 1)

Note

Like all quantities accessible via public APIs of FLTK, values of *x,y,w,h* are given in FLTK units, that is, in drawing units divided by the scaling factor of screen *n*.

See also

void [screen_xywh\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

11.6 Color & Font functions

fl global color, font functions.

Functions

- [Fl_Color fl_color \(\)](#)
Return the last [fl_color\(\)](#) that was set.
- void [fl_color \(Fl_Color c\)](#)
Set the color for all subsequent drawing operations.
- void [fl_color \(int c\)](#)
for back compatibility - use [fl_color\(Fl_Color c\)](#) instead
- void [fl_color \(uchar r, uchar g, uchar b\)](#)
Set the color for all subsequent drawing operations.
- [Fl_Color fl_color_average \(Fl_Color color1, Fl_Color color2, float weight\)](#)
Returns the weighted average color between the two given colors.
- [Fl_Color fl_contrast \(Fl_Color fg, Fl_Color bg, Fl_Fontsize fs, int context\)](#)
Returns a color that contrasts with the background color.
- void [fl_contrast_function \(Fl_Contrast_Function *f\)](#)
Register a custom contrast function.

- `int fl_contrast_level ()`
Get the contrast level (sensitivity) of the `fl_contrast()` method.
- `void fl_contrast_level (int level)`
Set the contrast level (sensitivity) of the `fl_contrast()` method.
- `int fl_contrast_mode ()`
Return the current contrast algorithm (mode).
- `void fl_contrast_mode (int mode)`
Set the contrast algorithm (mode).
- `int fl_descent ()`
Return the recommended distance above the bottom of a `fl_height()` tall box to draw the text at so it looks centered vertically in that box.
- `Fl_Font fl_font ()`
Return the `face` set by the most recent call to `fl_font()`.
- `void fl_font (Fl_Font face, Fl_Fontsize fsize)`
Sets the current font, which is then used in various drawing routines.
- `int fl_height ()`
Return the recommended minimum line spacing for the current font.
- `int fl_height (int font, int size)`
This function returns the actual height of the specified `font` and `size`.
- `Fl_Color fl_inactive (Fl_Color c)`
Returns the inactive, dimmed version of the given color.
- `const char * fl_latin1_to_local (const char *t, int n=-1)`
Convert text from Windows/X11 latin1 character set to local encoding.
- `double fl_lightness (Fl_Color color)`
Return the perceived lightness of a color.
- `const char * fl_local_to_latin1 (const char *t, int n=-1)`
Convert text from local encoding to Windows/X11 latin1 character set.
- `const char * fl_local_to_mac_roman (const char *t, int n=-1)`
Convert text from local encoding to Mac Roman character set.
- `double fl_luminance (Fl_Color color)`
Return the raw / physical luminance of a color.
- `const char * fl_mac_roman_to_local (const char *t, int n=-1)`
Convert text from Mac Roman character set to local encoding.
- `Fl_Color fl_show_colormap (Fl_Color oldcol)`
Pops up a window to let the user pick a colormap entry.
- `Fl_Fontsize fl_size ()`
Return the `size` set by the most recent call to `fl_font()`.
- `void fl_text_extents (const char *, int &dx, int &dy, int &w, int &h)`
Determine the minimum pixel dimensions of a nul-terminated string using the current `fl_font()`.
- `void fl_text_extents (const char *t, int n, int &dx, int &dy, int &w, int &h)`
Determine the minimum pixel dimensions of a sequence of `n` characters (bytes) using the current `fl_font()`.
- `double fl_width (const char *txt)`
Return the typographical width of a nul-terminated string using the current font face and size.
- `double fl_width (const char *txt, int n)`
Return the typographical width of a sequence of `n` characters using the current font face and size.
- `double fl_width (unsigned int c)`
Return the typographical width of a single character using the current font face and size.
- `static void Fl::free_color (Fl_Color i, int overlay=0)`
Frees the specified color from the colormap, if applicable.
- `static unsigned Fl::get_color (Fl_Color i)`
Returns the RGB value(s) for the given FLTK color index.

- static void `Fl::get_color (Fl_Color i, uchar &red, uchar &green, uchar &blue)`
Returns the RGB value(s) for the given FLTK color index.
- static void `Fl::get_color (Fl_Color i, uchar &red, uchar &green, uchar &blue, uchar &alpha)`
Returns the RGBA value(s) for the given FLTK color index.
- static const char * `Fl::get_font (Fl_Font)`
Gets the string for this face.
- static const char * `Fl::get_font_name (Fl_Font, int *attributes=0)`
Get a human-readable string describing the family of this face.
- static int `Fl::get_font_sizes (Fl_Font, int *&sizep)`
Return an array of sizes in *sizep*.
- static void `Fl::set_color (Fl_Color i, unsigned c)`
Sets an entry in the *fl_color* index table.
- static void `Fl::set_color (Fl_Color, uchar, uchar, uchar)`
Sets an entry in the *fl_color* index table.
- static void `Fl::set_color (Fl_Color, uchar, uchar, uchar, uchar)`
Sets an entry in the *fl_color* index table.
- static void `Fl::set_font (Fl_Font, const char *)`
Changes a face.
- static void `Fl::set_font (Fl_Font, Fl_Font)`
Copies one face to another.
- static `Fl_Font Fl::set_fonts (const char *=0)`
FLTK will open the display, and add every fonts on the server to the face table.

11.6.1 Detailed Description

fl global color, font functions.

These functions are declared in `<FL/Fl.H>` or `<FL/fl_draw.H>`.

11.6.2 Function Documentation

11.6.2.1 fl_color() [1/3]

```
Fl_Color fl_color ( ) [inline]
```

Return the last `fl_color()` that was set.

This can be used for state save/restore.

11.6.2.2 fl_color() [2/3]

```
void fl_color (
    Fl_Color c ) [inline]
```

Set the color for all subsequent drawing operations.

For color-mapped displays, a color cell will be allocated out of `fl_colormap` the first time you use a color. If the colormap fills up then a least-squares algorithm is used to find the closest color. If no valid graphical context (`fl_gc`) is available, the foreground is not set for the current window.

Parameters

in	c	color
----	---	-------

11.6.2.3 fl_color() [3/3]

```
void fl_color (
    uchar r,
    uchar g,
```



```
uchar b ) [inline]
```

Set the color for all subsequent drawing operations.

The closest possible match to the RGB color is used. The RGB color is used directly on TrueColor displays. For colormap visuals the nearest index in the gray ramp or color cube is used. If no valid graphical context (`fl_gc`) is available, the foreground is not set for the current window.

Parameters

in	<i>r,g,b</i>	color components
----	--------------	------------------

11.6.2.4 fl_color_average()

```
Fl_Color fl_color_average (
    Fl_Color color1,
    Fl_Color color2,
    float weight )
```

Returns the weighted average color between the two given colors.

The red, green and blue values are averages using the following formula:

```
color = color1 * weight + color2 * (1 - weight)
```

Thus, a `weight` value of 1.0 will return the first color, while a value of 0.0 will return the second color.

Parameters

in	<i>color1,color2</i>	boundary colors
in	<i>weight</i>	weighting factor

11.6.2.5 fl_contrast()

```
Fl_Color fl_contrast (
    Fl_Color fg,
    Fl_Color bg,
    Fl_Fontsize fs,
    int context )
```

Returns a color that contrasts with the background color.

This will be the foreground color if it contrasts sufficiently with the background color. Otherwise, returns `FL_WHITE` or `FL_BLACK` depending on which color provides the best contrast.

FLTK 1.4.0 uses a different default contrast function than earlier releases (1.3.x) but you can use the old "legacy" contrast function by calling

```
fl_contrast_mode(FL_CONTRAST_LEGACY);
```

early in your main program.

Note

It is a known issue that static initialization using `fl_contrast()` may already have been executed before you call this function in `main()`. You should be aware of this and, if necessary, write your own (static) contrast initialization function. This should rarely be necessary.

You can change the behavior of `fl_contrast()` in several ways:

- Change the "level" (sensitivity) for contrast calculation, see `fl_contrast_level()`. Valid levels are 0 - 100, the default "medium" value is 50. If you raise the level above 50 the overall contrast will generally be higher, i.e. the required contrast to return the foreground color is raised and therefore the calculated color will switch "earlier" to either black or white. In other words, using the following values:
 - 0 will always use the foreground color
 - 50 will use the default, unmodified algorithm
 - 100 will always use black or white

- values larger than 50 may yield slightly better results. Changing the `level` is particularly useful and intended for the "legacy mode" to improve the results partially. Values slightly above 50 (50 - 70) will likely return the best results (50 is the default, as used in FLTK 1.3.x).

Note

Different contrast modes (algorithms) can use their own values and defaults of `fl_contrast_level()`.

- Change the used contrast calculation function. You can either use the old (FLTK 1.3.x) function or use the better but slower function based on the CIELAB (L*a*b*) color model, or you can define your own custom contrast function if you need even better contrast results.

The following contrast functions are available:

- `FL_CONTRAST_LEGACY`, the old FLTK 1.3.x compatible function. This is the fastest function (using integer arithmetic) but it provides worse results in border cases. You may want to use this on embedded or otherwise CPU constrained systems or if you need strict backwards compatibility. For slightly better results you may utilize the new `fl_contrast_level(int)` function (since 1.4.0) to increase the contrast sensitivity. This will provide slightly better results than FLTK 1.3.x and earlier but we recommend to use the new default function:
- `FL_CONTRAST_CIELAB`, based on the CIELAB (L*a*b*) color model. This function is superior regarding the visual contrast perception but may be slower. **This is the default since FLTK 1.4.0.**
- `FL_CONTRAST_CUSTOM`, your own contrast calculation function.

In the future we **may** provide even more (and superior) contrast algorithms.

The new parameters `fs` and `context` (since 1.4.0) are defined for future extensions and are currently not used. Default values are 0.

Note

These new optional parameters must be provided in the custom contrast function which is the reason why they are added now. In the future we may use the fontsize to adjust the calculated contrast, and users defining their own contrast functions may use them in their functions.

Parameters

in	<i>fg</i>	foreground (text) color
in	<i>bg</i>	background color
in	<i>fs</i>	font size (optional, default = 0 == undefined)
in	<i>context</i>	graphical context (optional, default = 0 == text)

Returns

contrasting color: `fg`, `FL_BLACK`, or `FL_WHITE`

See also

[fl_contrast_level\(int\)](#)

[fl_contrast_mode\(int\)](#)

[fl_contrast_function\(\)](#)

11.6.2.6 fl_contrast_function()

```
void fl_contrast_function (
    Fl_Contrast_Function * f )
```

Register a custom contrast function.

Your custom contrast function will be called when `fl_contrast()` is called if and only if you previously registered your function and called `fl_contrast_mode(FL_CONTRAST_CUSTOM)`.

Your custom contrast function must provide the signature

```
Fl_Color my_contrast_function(Fl_Color fg, Fl_Color bg, Fl_Fontsize fs, int context)
```

The arguments are the same as for the full `fl_contrast()` function since FLTK 1.4. You can use the supplied font size `fs` to modify the result. Depending on the caller the `fs` parameter can be 0 (default) or a valid font size.

The `context` parameter is not yet used and will always be 0 unless included in a call to `fl_contrast()`. The value 0 should be interpreted as text. In the future the `context` argument will be used to supply a different context than text (small icons, large icons, etc.). The exact usage is not yet specified.

Your function may also use `fl_contrast_level()` to modify the result accordingly.

Since

1.4.0

See also

[fl_contrast_mode\(int\)](#)

[fl_contrast_level\(int\)](#)

[fl_contrast\(\)](#)

11.6.2.7 fl_contrast_level() [1/2]

```
int fl_contrast_level ( )
```

Get the contrast level (sensitivity) of the `fl_contrast()` method.

This returns the level of the currently selected contrast mode.

Returns

The current contrast level.

See also

[fl_contrast_level\(int level\)](#)

[fl_contrast_mode\(int mode\)](#)

Since

1.4.0

11.6.2.8 fl_contrast_level() [2/2]

```
void fl_contrast_level (
    int level )
```

Set the contrast level (sensitivity) of the `fl_contrast()` method.

This can be used to tune the legacy `fl_contrast()` function to achieve slightly better results. The default value is defined per contrast mode (see below). Values between 50 and 70 are recommended but you can raise it up to 100. Lower values than 50 are probably not useful.

The contrast `level` affects not only the legacy (1.3.x) `fl_contrast()` function but also the new CIELAB contrast mode which is the default since FLTK 1.4.0.

Other contrast modes are currently not affected by the contrast level.

You may use the contrast level if you define your own custom contrast function in mode `FL_CONTRAST_CUSTOM`.

Note

All contrast modes store their own contrast level because the behavior is slightly different. You must change the contrast mode `fl_contrast_mode()` **before** you set or get the contrast level.

The default contrast level is

- 50 in mode `FL_CONTRAST_LEGACY` (compatible with FLTK 1.3.x)
- 55 in mode `FL_CONTRAST_CIELAB`

- 0 (undefined) for all other modes

See the description of [fl_contrast_mode\(int mode\)](#) for more information about the contrast level per mode.

Example:

```
fl_contrast_mode(FL_CONTRAST_LEGACY);
fl_contrast_level(65);
```

A `level` greater than 50 (probably best in the range 50 to 70) may achieve better results of the legacy [fl_contrast\(\)](#) function in some border cases of low contrast between foreground and background colors but we recommend to use the new default algorithm `FL_CONTRAST_CIELAB` unless you need strict backwards compatibility or use a CPU constrained embedded system.

Parameters

<code>in</code>	<code>level</code>	valid range is 0 to 100
-----------------	--------------------	-------------------------

Since

1.4.0

11.6.2.9 fl_contrast_mode() [1/2]

```
int fl_contrast_mode ( )
```

Return the current contrast algorithm (mode).

Returns

Contrast algorithm (mode).

Since

1.4.0

See also

[fl_contrast_mode\(int\)](#)

11.6.2.10 fl_contrast_mode() [2/2]

```
void fl_contrast_mode (
    int mode )
```

Set the contrast algorithm (mode).

You can use one of

- `FL_CONTRAST_NONE` (not recommended: returns the foreground color)
- `FL_CONTRAST_LEGACY` (same as in FLTK 1.3.x)
- `FL_CONTRAST_CIELAB` (default since FLTK 1.4.0)
- `FL_CONTRAST_CUSTOM` (you must define your own contrast algorithm)

If you set `FL_CONTRAST_CUSTOM` you must also register your custom contrast function by calling [fl_contrast_function\(\)](#).

You may set the contrast level [fl_contrast_level\(int\)](#) after setting the contrast mode. This affects the contrast algorithm as described below:

- `FL_CONTRAST_LEGACY`: default level is 50 which is compatible with FLTK 1.3.x and older. This mode is no longer the default and is not recommended because it doesn't take human contrast perception into account and doesn't properly handle sRGB color values. You may get better contrasts if you set the level higher than 50. Values in the range 50 to 70 may be useful. Higher values result in higher contrast, i.e. the algorithm switches "earlier" to black or white mode.
- `FL_CONTRAST_CIELAB`: default level is 55 which appears to be a good value. The higher the level is, the more contrast is to be expected. Values in the range below 55 accept lower contrast and values above 55 switch "earlier" to black or white. Values between 45 and 65 may yield usable contrast experience.

Parameters

<code>in</code>	<code>mode</code>	if invalid, FL_CONTRAST_CIELAB will be selected
-----------------	-------------------	---

Since

1.4.0

See also

[fl_contrast_function\(FL_Contrast_Function *\)](#)[fl_contrast_level\(int\)](#)**11.6.2.11 fl_font()** [1/2]`Fl_Font fl_font () [inline]`Return the `face` set by the most recent call to [fl_font\(\)](#).

This can be used to save/restore the font.

11.6.2.12 fl_font() [2/2]

```
void fl_font (
    Fl_Font face,
    Fl_Fontsize fsize )
```

Sets the current font, which is then used in various drawing routines.

You may call this outside a draw context if necessary to measure text, for instance by calling [fl_width\(\)](#), [fl_measure\(\)](#), or [fl_text_extents\(\)](#), but on X this will open the display.The font is identified by a `face` and a `size`. The size of the font is measured in pixels and not "points". Lines should be spaced `size` pixels apart or more.**11.6.2.13 fl_height()** [1/2]`int fl_height () [inline]`

Return the recommended minimum line spacing for the current font.

You can also use the value of `size` passed to [fl_font\(\)](#).**11.6.2.14 fl_height()** [2/2]

```
int fl_height (
    int font,
    int size )
```

This function returns the actual height of the specified `font` and `size`.

Normally the font height should always be 'size', but with the advent of XFT, there are (currently) complexities that seem to only be solved by asking the font what its actual font height is. (See STR#2115)

This function was originally undocumented in 1.1.x, and was used only by [Fl_Text_Display](#). We're now documenting it in 1.3.x so that apps that need precise height info can get it with this function.

Returns

the height of the font in pixels.

Todo In the future, when the XFT issues are resolved, this function should simply return the 'size' value.**11.6.2.15 fl_latin1_to_local()**

```
const char * fl_latin1_to_local (
    const char * t,
    int n = -1 )
```

Convert text from Windows/X11 latin1 character set to local encoding.

Parameters

in	<i>t</i>	character string (latin1 encoding)
in	<i>n</i>	optional number of characters (bytes) to convert (default is all)

Returns

pointer to internal buffer containing converted characters

11.6.2.16 fl_lightness()

```
double fl_lightness (
    Fl_Color color )
```

Return the perceived lightness of a color.

This function calculates the perceived lightness of `Fl_Color color`.

The returned lightness value `Lstar` according to the CIELAB (L*a*b*) color model is almost linear with respect to human perception. It is in the range 0 (black) to 100 (white).

The result values of two colors can be compared directly and the difference is their perceived contrast.

Parameters

in	<i>color</i>	Fl_Color value
----	--------------	----------------

Returns

perceived lightness (0 .. 100)

Since

1.4.0

11.6.2.17 fl_local_to_latin1()

```
const char * fl_local_to_latin1 (
    const char * t,
    int n = -1 )
```

Convert text from local encoding to Windows/X11 latin1 character set.

Parameters

in	<i>t</i>	character string (local encoding)
in	<i>n</i>	optional number of characters (bytes) to convert (default is all)

Returns

pointer to internal buffer containing converted characters

11.6.2.18 fl_local_to_mac_roman()

```
const char * fl_local_to_mac_roman (
    const char * t,
    int n = -1 )
```

Convert text from local encoding to Mac Roman character set.

Parameters

in	<i>t</i>	character string (local encoding)
in	<i>n</i>	optional number of characters to convert (default is all)

Returns

pointer to internal buffer containing converted characters

11.6.2.19 fl_luminance()

```
double fl_luminance (
    Fl_Color color )
```

Return the raw / physical luminance of a color.

This function calculates the physical luminance of `Fl_Color color`.

The returned luminance value (aka Y) is the physical luminance of the `Fl_Color color`.

The result is in the range 0.0 (black) to 1.0 (white).

Note

This is probably not what you want if you are interested in perceived contrast or lightness calculation because the luminance Y is **not** linear with respect to human perception.

See [fl_lightness\(Fl_Color\)](#) for a function that returns the perceived lightness of a color which can be used directly for contrast calculation.

Parameters

in	<i>color</i>	Fl_Color value
----	--------------	----------------

Returns

Raw (physical) luminance (0.0 .. 1.0)

Since

1.4.0

See also

[fl_lightness\(Fl_Color\)](#)

11.6.2.20 fl_mac_roman_to_local()

```
const char * fl_mac_roman_to_local (
    const char * t,
    int n = -1 )
```

Convert text from Mac Roman character set to local encoding.

Parameters

in	<i>t</i>	character string (Mac Roman encoding)
in	<i>n</i>	optional number of characters to convert (default is all)

Returns

pointer to internal buffer containing converted characters

11.6.2.21 fl_show_colormap()

```
Fl_Color fl_show_colormap (
    Fl_Color oldcol )
```

Pops up a window to let the user pick a colormap entry.



Figure 11.1 fl_show_colormap

Parameters

in	<i>oldcol</i>	color to be highlighted when grid is shown.
----	---------------	---

Return values

<i>Fl_Color</i>	value of the chosen colormap entry.
-----------------	-------------------------------------

See also

[Fl_Color_Chooser](#)

11.6.2.22 fl_size()

```
Fl_Fontsize fl_size ( ) [inline]
```

Return the *size* set by the most recent call to [fl_font\(\)](#).

This can be used to save/restore the font.

11.6.2.23 fl_text_extents() [1/2]

```
void fl_text_extents (
    const char * c,
    int & dx,
    int & dy,
    int & w,
    int & h )
```

Determine the minimum pixel dimensions of a nul-terminated string using the current [fl_font\(\)](#).

Usage: given a string "txt" drawn using `fl_draw(txt, x, y)` you would determine its pixel extents on the display using `fl_text_extents(txt, dx, dy, wo, ho)` such that a bounding box that exactly fits around the text could be drawn with `fl_rect(x+dx, y+dy, wo, ho)`. Note the dx, dy values hold the offset of the first "colored in" pixel of the string, from the draw origin.

Note the desired font and font size must be set with [fl_font\(\)](#) before calling this function.

This differs slightly from [fl_measure\(\)](#) in that the dx/dy values are also returned.

No FLTK symbol expansion will be performed.

Example use:

```
int dx, dy, W, H;
fl_font(FL_HELVETICA, 12); // set font face+size first
fl_text_extents("Some text", dx, dy, W, H); // get width and height of string
printf("text's width=%d, height=%d\n", W, H);
```

11.6.2.24 fl_text_extents() [2/2]

```
void fl_text_extents (
    const char * t,
    int n,
    int & dx,
    int & dy,
    int & w,
    int & h ) [inline]
```

Determine the minimum pixel dimensions of a sequence of n characters (bytes) using the current [fl_font\(\)](#).

Note

The string length is measured in bytes, not (UTF-8) characters.

See also

[fl_text_extents\(const char*, int& dx, int& dy, int& w, int& h\)](#)

11.6.2.25 fl_width()

```
double fl_width (
    unsigned int c ) [inline]
```

Return the typographical width of a single character using the current font face and size.

Note

If a valid `fl_gc` is NOT found then it uses the first window `gc`, or the screen `gc` if no fltk window is available when called.

11.6.2.26 free_color()

```
void Fl::free_color (
    Fl_Color i,
    int overlay = 0 ) [static]
```

Frees the specified color from the colormap, if applicable.

If overlay is non-zero then the color is freed from the overlay colormap.

11.6.2.27 `get_color()` [1/3]

```
unsigned Fl::get_color (
    Fl_Color i ) [static]
```

Returns the RGB value(s) for the given FLTK color index.

This form returns the RGB values packed in a 32-bit unsigned integer with the red value in the upper 8 bits, the green value in the next 8 bits, and the blue value in bits 8-15. The lower 8 bits will always be 0.

11.6.2.28 `get_color()` [2/3]

```
void Fl::get_color (
    Fl_Color i,
    uchar & red,
    uchar & green,
    uchar & blue ) [static]
```

Returns the RGB value(s) for the given FLTK color index.

This form returns the red, green, and blue values separately in referenced variables.

See also

unsigned [get_color\(Fl_Color c\)](#)

11.6.2.29 `get_color()` [3/3]

```
void Fl::get_color (
    Fl_Color i,
    uchar & red,
    uchar & green,
    uchar & blue,
    uchar & alpha ) [static]
```

Returns the RGBA value(s) for the given FLTK color index.

This form returns the red, green, blue, and alpha values separately in referenced variables.

See also

unsigned [get_color\(Fl_Color c\)](#)

11.6.2.30 `get_font()`

```
const char * Fl::get_font (
    Fl_Font fnum ) [static]
```

Gets the string for this face.

This string is different for each face. Under X this value is passed to XListFonts to get all the sizes of this face.

11.6.2.31 `get_font_name()`

```
const char * Fl::get_font_name (
    Fl_Font fnum,
    int * attributes = 0 ) [static]
```

Get a human-readable string describing the family of this face.

This is useful if you are presenting a choice to the user. There is no guarantee that each face has a different name. The return value points to a static buffer that is overwritten each call.

The integer pointed to by `attributes` (if the pointer is not zero) is set to zero, `FL_BOLD` or `FL_ITALIC` or `FL_↔_BOLD | FL_ITALIC`. To locate a "family" of fonts, search forward and back for a set with non-zero attributes, these faces along with the face with a zero attribute before them constitute a family.

11.6.2.32 `get_font_sizes()`

```
int Fl::get_font_sizes (
    Fl_Font fnum,
    int *& sizes ) [static]
```

Return an array of sizes in `sizep`.

The return value is the length of this array. The sizes are sorted from smallest to largest and indicate what sizes can be given to `fl_font()` that will be matched exactly (`fl_font()` will pick the closest size for other sizes). A zero in the first location of the array indicates a scalable font, where any size works, although the array may list sizes that work "better" than others. Warning: the returned array points at a static buffer that is overwritten each call. Under X this will open the display.

11.6.2.33 `set_color()` [1/3]

```
void Fl::set_color (
    Fl_Color i,
    unsigned c ) [static]
```

Sets an entry in the `fl_color` index table.

You can set it to any 8-bit RGB color. The color is not allocated until `fl_color(i)` is used.

11.6.2.34 `set_color()` [2/3]

```
void Fl::set_color (
    Fl_Color i,
    uchar red,
    uchar green,
    uchar blue ) [static]
```

Sets an entry in the `fl_color` index table.

You can set it to any 8-bit RGB color. The color is not allocated until `fl_color(i)` is used.

11.6.2.35 `set_color()` [3/3]

```
void Fl::set_color (
    Fl_Color i,
    uchar red,
    uchar green,
    uchar blue,
    uchar alpha ) [static]
```

Sets an entry in the `fl_color` index table.

You can set it to any 8-bit RGBA color.

Note

The color transparency is effective under the Wayland, hybrid Wayland/X11 and macOS platforms, whereas it has no effect under the X11 and Windows platforms. It's also effective for widgets added to an [FL_GI_Window](#).

Version

1.4

11.6.2.36 `set_font()`

```
void Fl::set_font (
    Fl_Font fnum,
    const char * name ) [static]
```

Changes a face.

Parameters

<i>fnum</i>	The font number to be assigned a new face
<i>name</i>	Name of the font to assign. The string pointer is simply stored, the string is not copied, so the string must be in static memory. The exact name to be used depends on the platform :

- Windows, X11, Xft: use the family name prefixed by one character to indicate the desired font variant. Characters ' ', 'I', 'B', 'P' denote plain, italic, bold, and bold-italic variants, respectively. For example, string "IGabriola" is to be used to denote the "Gabriola italic" font. The "Oblique" suffix, in whatever case, is to be treated as "italic", that is, prefix the family name with 'I'.
- Other platforms, i.e., X11 + Pango, Wayland, macOS: use the full font name as returned by function [Fl::get_font_name\(\)](#) or as listed by applications test/fonts or test/utf8. No prefix is to be added.

11.6.2.37 set_fonts()

```
Fl_Font Fl::set_fonts (
    const char * xstarname = 0 ) [static]
```

FLTK will open the display, and add every fonts on the server to the face table.

It will attempt to put "families" of faces together, so that the normal one is first, followed by bold, italic, and bold italic. The only argument to this function is somewhat obsolete since FLTK and most underlying operating systems move to support Unicode. For completeness, following is the original documentation and a few updates:

On X11, the optional argument is a string to describe the set of fonts to add. Passing NULL will select only fonts that have the ISO8859-1 character set (and are thus usable by normal text). Passing "-*" will select all fonts with any encoding as long as they have normal X font names with dashes in them. Passing "*" will list every font that exists (on X this may produce some strange output). Other values may be useful but are system dependent.

With the Xft option on Linux, this parameter is ignored.

With Windows, NULL selects fonts with ANSI_CHARSET encoding and non-NULL selects all fonts.

On macOS, this parameter is ignored.

The return value is how many faces are in the table after this is done.

11.7 Drawing functions

FLTK global graphics and GUI drawing functions.

Enumerations

- enum {
 - [FL_SOLID](#) = 0 , [FL_DASH](#) = 1 , [FL_DOT](#) = 2 , [FL_DASHDOT](#) = 3 ,
 - [FL_DASHDOTDOT](#) = 4 , [FL_CAP_FLAT](#) = 0x100 , [FL_CAP_ROUND](#) = 0x200 , [FL_CAP_SQUARE](#) = 0x300 ,
 - [FL_JOIN_MITER](#) = 0x1000 , [FL_JOIN_ROUND](#) = 0x2000 , [FL_JOIN_BEVEL](#) = 0x3000 }

Functions

- int [fl_add_symbol](#) (const char *name, void(*drawit)([Fl_Color](#)), int scalable)
 - Adds a symbol to the system.*
- int [fl_antialias](#) ()
 - Return whether line drawings are currently antialiased.*
- void [fl_antialias](#) (int state)
 - Turn antialiased line drawings ON or OFF, if supported by platform.*
- void [fl_arc](#) (double x, double y, double r, double start, double end)
 - Add a series of points to the current path on the arc of a circle.*
- void [fl_arc](#) (int x, int y, int w, int h, double a1, double a2)
 - Draw ellipse sections using integer coordinates.*
- void [fl_begin_complex_polygon](#) ()
 - Start drawing a complex filled polygon.*
- void [fl_begin_line](#) ()
 - Start drawing a list of lines.*
- void [fl_begin_loop](#) ()
 - Start drawing a closed sequence of lines.*
- void [fl_begin_offscreen](#) ([Fl_Offscreen](#) ctx)

- Send all subsequent drawing commands to this offscreen buffer.*

 - void `fl_begin_points` ()

Start drawing a list of points.
- void `fl_begin_polygon` ()
- Start drawing a convex filled polygon.*
- char `fl_can_do_alpha_blending` ()
- Check whether platform supports true alpha blending for RGBA images.*
- `FL_RGB_Image * fl_capture_window` (`FL_Window *win`, int x, int y, int w, int h)
- Captures the content of a rectangular zone of a mapped window.*
- void `fl_chord` (int x, int y, int w, int h, double a1, double a2)
- fl_chord declaration is a place holder - the function does not yet exist*
- void `fl_circle` (double x, double y, double r)
- fl_circle(x,y,r) is equivalent to fl_arc(x,y,r,0,360), but may be faster.*
- void `fl_clip` (int x, int y, int w, int h)
- Intersect the current clip region with a rectangle and push this new region onto the stack (deprecated).*
- int `fl_clip_box` (int x, int y, int w, int h, int &X, int &Y, int &W, int &H)
- Intersect a rectangle with the current clip region and return the bounding box of the result.*
- `FL_Region fl_clip_region` ()
- Return the current clipping region.*
- void `fl_clip_region` (`FL_Region r`)
- Replace the top of the clipping stack with a clipping region of any shape.*
- void `fl_copy_offscreen` (int x, int y, int w, int h, `FL_Offscreen` pixmap, int srcx, int srcy)
- Copy a rectangular area of the given offscreen buffer into the current drawing destination.*
- `FL_Offscreen fl_create_offscreen` (int w, int h)
- Creation of an offscreen graphics buffer.*
- void `fl_cursor` (`FL_Cursor`)
- Sets the cursor for the current window to the specified shape and colors.*
- void `fl_cursor` (`FL_Cursor`, `FL_Color` fg, `FL_Color` bg=`FL_WHITE`)
- void `fl_curve` (double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)
- Add a series of points on a Bézier curve to the path.*
- void `fl_delete_offscreen` (`FL_Offscreen` ctx)
- Deletion of an offscreen graphics buffer.*
- void `fl_draw` (const char *str, int n, int x, int y)
- Draws starting at the given x, y location a UTF-8 string of length n bytes.*
- void `fl_draw` (const char *str, int x, int y)
- Draw a nul-terminated UTF-8 string starting at the given x, y location.*
- void `fl_draw` (const char *str, int x, int y, int w, int h, `FL_Align` align, `FL_Image *img=0`, int draw_symbols=1)
- Fancy string drawing function which is used to draw all the labels.*
- void `fl_draw` (const char *str, int x, int y, int w, int h, `FL_Align` align, void(*callthis)(const char *, int, int, int), `FL_Image *img=0`, int draw_symbols=1)
- The same as fl_draw(const char*,int,int,int,int,FL_Align,FL_Image*,int) with the addition of the callthis parameter, which is a pointer to a text drawing function such as fl_draw(const char*, int, int, int) to do the real work.*
- void `fl_draw` (int angle, const char *str, int n, int x, int y)
- Draw at the given x, y location a UTF-8 string of length n bytes rotating angle degrees counter-clockwise.*
- void `fl_draw` (int angle, const char *str, int x, int y)
- Draw a nul-terminated UTF-8 string starting at the given x, y location and rotating angle degrees counter-clockwise.*
- void `fl_draw_arrow` (`FL_Rect` bb, `FL_Arrow_Type` t, `FL_Orientation` o, `FL_Color` color)
- Draw an "arrow like" GUI element for the selected scheme.*
- void `fl_draw_box` (`FL_Boxtype`, int x, int y, int w, int h, `FL_Color`)
- Draws a box using given type, position, size and color.*
- void `fl_draw_check` (`FL_Rect` bb, `FL_Color` col)

- Draw a check mark inside the given bounding box.*

 - void **fl_draw_circle** (int x, int y, int d, **FL_Color** color)
- Draw a potentially small, filled circle using a given color.*

 - void **fl_draw_image** (const **uchar** *buf, int X, int Y, int W, int H, int D=3, int L=0)
- Draw an 8-bit per color RGB or luminance image.*

 - void **fl_draw_image** (FL_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=3)
- Draw an image using a callback function to generate image data.*

 - void **fl_draw_image_mono** (const **uchar** *buf, int X, int Y, int W, int H, int D=1, int L=0)
- Draw a gray-scale (1 channel) image.*

 - void **fl_draw_image_mono** (FL_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=1)
- Draw a gray-scale image using a callback function to generate image data.*

 - int **fl_draw_pixmap** (char *const *data, int x, int y, **FL_Color** bg=FL_GRAY)
- Draw XPM image data, with the top-left corner at the given position.*

 - int **fl_draw_pixmap** (const char *const *data, int x, int y, **FL_Color** bg=FL_GRAY)
- Draw XPM image data, with the top-left corner at the given position.*

 - void **fl_draw_radio** (int x, int y, int d, **FL_Color** color)
- Draw a round check mark (circle) of a radio button.*

 - int **fl_draw_symbol** (const char *label, int x, int y, int w, int h, **FL_Color**)
- Draw the named symbol in the given rectangle using the given color.*

 - void **fl_end_complex_polygon** ()
- End complex filled polygon, and draw.*

 - void **fl_end_line** ()
- End list of lines, and draw.*

 - void **fl_end_loop** ()
- End closed sequence of lines, and draw.*

 - void **fl_end_offscreen** ()
- Quit sending drawing commands to the current offscreen buffer.*

 - void **fl_end_points** ()
- End list of points, and draw.*

 - void **fl_end_polygon** ()
- End convex filled polygon, and draw.*

 - const char * **fl_expand_text** (const char *from, char *buf, int maxbuf, double maxw, int &n, double &width, int wrap, int draw_symbols=0)
- Copy from to buf, replacing control characters with ^X.*

 - void **fl_focus_rect** (int x, int y, int w, int h)
- Draw a dotted rectangle, used to indicate keyboard focus on a widget.*

 - void **fl_frame** (const char *s, int x, int y, int w, int h)
- Draws a series of line segments around the given box.*

 - void **fl_frame2** (const char *s, int x, int y, int w, int h)
- Draws a series of line segments around the given box.*

 - void **fl_gap** ()
- Separate loops of the path.*

 - void **fl_line** (int x, int y, int x1, int y1)
- Draw a line from (x,y) to (x1,y1)*

 - void **fl_line** (int x, int y, int x1, int y1, int x2, int y2)
- Draw a line from (x,y) to (x1,y1) and another from (x1,y1) to (x2,y2)*

 - void **fl_line_style** (int style, int width=0, char *dashes=0)
- Set how to draw lines (the "pen").*

 - void **fl_load_identity** ()
- Set the transformation matrix to identity.*

 - void **fl_load_matrix** (double a, double b, double c, double d, double x, double y)

- Set the current transformation matrix.*

 - void **fl_loop** (int x, int y, int x1, int y1, int x2, int y2)

Outline a 3-sided polygon with lines.

 - void **fl_loop** (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)

Outline a 4-sided polygon with lines.

 - void **fl_measure** (const char *str, int &x, int &y, int draw_symbols=1)

Measure how wide and tall the string will be when printed by the fl_draw() function with align parameter.

 - int **fl_measure_pixmap** (char *const *data, int &w, int &h)

Get the dimensions of a pixmap.

 - int **fl_measure_pixmap** (const char *const *cdata, int &w, int &h)

Get the dimensions of a pixmap.

 - void **fl_mult_matrix** (double a, double b, double c, double d, double x, double y)

Concatenate another transformation onto the current one.

 - int **fl_not_clipped** (int x, int y, int w, int h)

Does the rectangle intersect the current clip region?

 - unsigned int **fl_old_shortcut** (const char *s)

Emulation of XForms named shortcuts.

 - void **fl_overlay_clear** ()

Erase a selection rectangle without drawing a new one.

 - void **fl_overlay_rect** (int x, int y, int w, int h)

Draw a transient dotted selection rectangle.

 - float **fl_override_scale** ()

Removes any GUI scaling factor in subsequent drawing operations.

 - void **fl_pie** (int x, int y, int w, int h, double a1, double a2)

Draw filled ellipse sections using integer coordinates.

 - void **fl_point** (int x, int y)

Draw a single pixel at the given coordinates.

 - void **fl_polygon** (int x, int y, int x1, int y1, int x2, int y2)

Fill a 3-sided polygon.

 - void **fl_polygon** (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)

Fill a 4-sided polygon.

 - void **fl_pop_clip** ()

Restore the previous clip region.

 - void **fl_pop_matrix** ()

Restore the current transformation matrix from the stack.

 - void **fl_push_clip** (int x, int y, int w, int h)

Intersect the current clip region with a rectangle and push this new region onto the stack.

 - void **fl_push_matrix** ()

Save the current transformation matrix on the stack.

 - void **fl_push_no_clip** ()

Push an empty clip region onto the stack so nothing will be clipped.

 - **uchar * fl_read_image** (**uchar** *p, int X, int Y, int W, int H, int alpha=0)

Reads an RGB(A) image from the current window or off-screen buffer.

 - void **fl_rect** (**Fl_Rect** r)

Draw a border inside the given bounding box.

 - void **fl_rect** (int x, int y, int w, int h)

Draw a border inside the given bounding box.

 - void **fl_rect** (int x, int y, int w, int h, **Fl_Color** c)

Draw with passed color a border inside the given bounding box.

 - void **fl_rectf** (**Fl_Rect** bb, **uchar** r, **uchar** g, **uchar** b)

Color a rectangle with "exactly" the passed r, g, b color.

- void **fl_rectf** ([FI_Rect](#) r)
 - Color with current color a rectangle that exactly fills the given bounding box.*
- void **fl_rectf** ([FI_Rect](#) r, [FI_Color](#) c)
 - Color with passed color a rectangle that exactly fills the given bounding box.*
- void **fl_rectf** (int x, int y, int w, int h)
 - Color with current color a rectangle that exactly fills the given bounding box.*
- void **fl_rectf** (int x, int y, int w, int h, [FI_Color](#) c)
 - Color with passed color a rectangle that exactly fills the given bounding box.*
- void **fl_rectf** (int x, int y, int w, int h, [uchar](#) r, [uchar](#) g, [uchar](#) b)
 - Color a rectangle with "exactly" the passed r, g, b color.*
- void **fl_rescale_offscreen** ([FI_Offscreen](#) &ctx)
 - Adapts an offscreen buffer to a changed value of the scale factor.*
- void **fl_reset_spot** (void)
 - Resets marked text.*
- void **fl_restore_clip** ()
 - Undo any clobbering of the clip region done by your program.*
- void **fl_restore_scale** (float s)
 - Restores the GUI scaling factor and the clipping region in subsequent drawing operations.*
- void **fl_rotate** (double d)
 - Concatenate rotation transformation onto the current one.*
- void **fl_rounded_rect** (int x, int y, int w, int h, int r)
 - Draw a rounded border inside the given bounding box.*
- void **fl_rounded_rectf** (int x, int y, int w, int h, int r)
 - Color with current color a rounded rectangle that exactly fills the given bounding box.*
- void **fl_rtl_draw** (const char *str, int n, int x, int y)
 - Draw a UTF-8 string of length n bytes right to left starting at the given x, y location.*
- void **fl_scale** (double x)
 - Concatenate scaling transformation onto the current one.*
- void **fl_scale** (double x, double y)
 - Concatenate scaling transformation onto the current one.*
- void **fl_scroll** (int X, int Y, int W, int H, int dx, int dy, void(*draw_area)(void *, int, int, int, int), void *data)
 - Scroll a rectangle and draw the newly exposed portions.*
- void **fl_set_spot** (int font, int size, int X, int Y, int W, int H, [FI_Window](#) *win=0)
 - Inform text input methods about the current text insertion cursor.*
- void **fl_set_status** (int X, int Y, int W, int H)
 - Related to text input methods under X11.*
- const char * **fl_shortcut_label** (unsigned int shortcut)
 - Get a human-readable string from a shortcut value.*
- const char * **fl_shortcut_label** (unsigned int shortcut, const char **eom)
 - Get a human-readable string from a shortcut value.*
- double **fl_transform_dx** (double x, double y)
 - Transform distance using current transformation matrix.*
- double **fl_transform_dy** (double x, double y)
 - Transform distance using current transformation matrix.*
- double **fl_transform_x** (double x, double y)
 - Transform coordinate using the current transformation matrix.*
- double **fl_transform_y** (double x, double y)
 - Transform coordinate using the current transformation matrix.*
- void **fl_transformed_vertex** (double xf, double yf)
 - Add coordinate pair to the vertex list without further transformations.*
- void **fl_translate** (double x, double y)

Concatenate translation transformation onto the current one.

- void **fl_vertex** (double x, double y)

Add a single vertex to the current path.

- void **fl_xyline** (int x, int y, int x1)

Draw a horizontal line from (x,y) to (x1,y).

- void **fl_xyline** (int x, int y, int x1, int y2)

Draw a horizontal line from (x,y) to (x1,y), then vertical from (x1,y) to (x1,y2).

- void **fl_xyline** (int x, int y, int x1, int y2, int x3)

Draw a horizontal line from (x,y) to (x1,y), then a vertical from (x1,y) to (x1,y2) and then another horizontal from (x1,y2) to (x3,y2).

- void **fl_yxline** (int x, int y, int y1)

Draw a vertical line from (x,y) to (x,y1)

- void **fl_yxline** (int x, int y, int y1, int x2)

Draw a vertical line from (x,y) to (x,y1), then a horizontal from (x,y1) to (x2,y1).

- void **fl_yxline** (int x, int y, int y1, int x2, int y3)

Draw a vertical line from (x,y) to (x,y1), then a horizontal from (x,y1) to (x2,y1), then another vertical from (x2,y1) to (x2,y3).

11.7.1 Detailed Description

FLTK global graphics and GUI drawing functions.

These functions are declared in [<FL/fl_draw.H>](#), and in [<FL/platform.H>](#) for offscreen buffer-related ones.

11.7.2 Enumeration Type Documentation

11.7.2.1 anonymous enum

anonymous enum

Enumerator

FL_SOLID	line style: _____
FL_DASH	line style: _ _ _ _ _
FL_DOT	line style:
FL_DASHDOT	line style: _ . _ . _ .
FL_DASHDOTDOT	line style: _ . . _ . .
FL_CAP_FLAT	cap style: end is flat
FL_CAP_ROUND	cap style: end is round
FL_CAP_SQUARE	cap style: end wraps end point
FL_JOIN_MITER	join style: line join extends to a point
FL_JOIN_ROUND	join style: line join is rounded
FL_JOIN_BEVEL	join style: line join is tidied

11.7.3 Function Documentation

11.7.3.1 fl_add_symbol()

```
int fl_add_symbol (
    const char * name,
    void(*) (Fl_Color) drawit,
    int scalable )
```

Adds a symbol to the system.

Parameters

in	<i>name</i>	name of symbol (without the "@")
in	<i>drawit</i>	function to draw symbol
in	<i>scalable</i>	set to 1 if <i>drawit</i> uses scalable vector drawing

Returns

1 on success, 0 on failure

11.7.3.2 `fl_antialias()`

```
void fl_antialias (
    int state ) [inline]
```

Turn antialiased line drawings ON or OFF, if supported by platform.

Currently, only the Windows platform allows to change whether line drawings are antialiased. Turning it OFF may accelerate heavy drawing operations.

11.7.3.3 `fl_arc()` [1/2]

```
void fl_arc (
    double x,
    double y,
    double r,
    double start,
    double end ) [inline]
```

Add a series of points to the current path on the arc of a circle.

You can get elliptical paths by using `scale` and `rotate` before calling `fl_arc()`.

Parameters

in	<i>x,y,r</i>	center and radius of circular arc
in	<i>start,end</i>	angles of start and end of arc measured in degrees counter-clockwise from 3 o'clock. If <i>end</i> is less than <i>start</i> then it draws the arc in a clockwise direction.

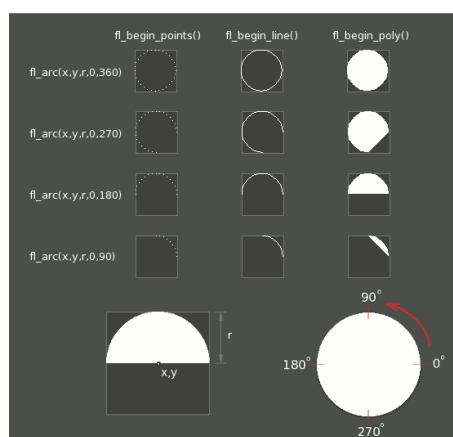


Figure 11.2 `fl_arc(x,y,r,a1,a2)`

Examples:

```
// Draw an arc of points
fl_begin_points();
fl_arc(100.0, 100.0, 50.0, 0.0, 180.0);
fl_end_points();

// Draw arc with a line
```

```

fl_begin_line();
fl_arc(200.0, 100.0, 50.0, 0.0, 180.0);
fl_end_line();

// Draw filled arc
fl_begin_polygon();
fl_arc(300.0, 100.0, 50.0, 0.0, 180.0);
fl_end_polygon();

```

11.7.3.4 fl_arc() [2/2]

```

void fl_arc (
    int x,
    int y,
    int w,
    int h,
    double a1,
    double a2 ) [inline]

```

Draw ellipse sections using integer coordinates.

These functions match the rather limited circle drawing code provided by X and Windows. The advantage over using `fl_arc` with floating point coordinates is that they are faster because they often use the hardware, and they draw much nicer small circles, since the small sizes are often hard-coded bitmaps.

If a complete circle is drawn it will fit inside the passed bounding box. The two angles are measured in degrees counter-clockwise from 3 o'clock and are the starting and ending angle of the arc, `a2` must be greater or equal to `a1`.

`fl_arc()` draws a series of lines to approximate the arc. Notice that the integer version of `fl_arc()` has a different number of arguments than the double version `fl_arc(double x, double y, double r, double start, double end)`

Parameters

in	<code>x,y,w,h</code>	bounding box of complete circle
in	<code>a1,a2</code>	start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. <code>a2</code> must be greater than or equal to <code>a1</code> .

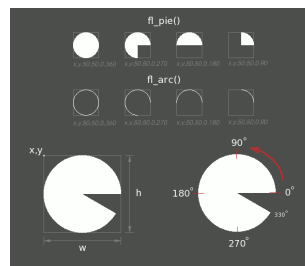


Figure 11.3 `fl_pie()` and `fl_arc()`

11.7.3.5 fl_begin_complex_polygon()

```

void fl_begin_complex_polygon ( ) [inline]

```

Start drawing a complex filled polygon.

The polygon may be concave, may have holes in it, or may be several disconnected pieces. Call `fl_gap()` to separate loops of the path.

To outline the polygon, use `fl_begin_loop()` and replace each `fl_gap()` with `fl_end_loop();fl_begin_loop()` pairs.

Note

For portability, you should only draw polygons that appear the same whether "even/odd" or "non-zero" winding rules are used to fill them. Holes should be drawn in the opposite direction to the outside loop.

11.7.3.6 fl_begin_offscreen()

```
void fl_begin_offscreen (
    Fl_Offscreen ctx )
```

Send all subsequent drawing commands to this offscreen buffer.

Parameters

<code>ctx</code>	the offscreen buffer.
------------------	-----------------------

Note

The `ctx` argument must have been created by `fl_create_offscreen()`.

11.7.3.7 fl_begin_points()

```
void fl_begin_points ( ) [inline]
```

Start drawing a list of points.

Points are added to the list with `fl_vertex()`.

11.7.3.8 fl_can_do_alpha_blending()

```
char fl_can_do_alpha_blending ( ) [inline]
```

Check whether platform supports true alpha blending for RGBA images.

Returns

1 if true alpha blending supported by platform

0 not supported so FLTK will use screen door transparency

11.7.3.9 fl_capture_window()

```
Fl_RGB_Image * fl_capture_window (
    Fl_Window * win,
    int x,
    int y,
    int w,
    int h )
```

Captures the content of a rectangular zone of a mapped window.

Parameters

<code>win</code>	a mapped <code>Fl_Window</code> (derived types including <code>Fl_Gl_Window</code> are also possible)
<code>x,y,w,h</code>	window area to be captured. Intersecting sub-windows are captured too.

Returns

The captured pixels as an `Fl_RGB_Image`. The raw and drawing sizes of the image can differ. Returns NULL when capture was not successful. The image depth may differ between platforms.

Version

1.4

11.7.3.10 fl_circle()

```
void fl_circle (
    double x,
```

```
double y,
double r ) [inline]
```

`fl_circle(x,y,r)` is equivalent to `fl_arc(x,y,r,0,360)`, but may be faster.

Parameters

in	<i>x,y,r</i>	center and radius of circle
----	--------------	-----------------------------

Note

`fl_circle()` is best used as part of the [Drawing Complex Shapes](#) API, that is, flanked by `fl_begin_XXX()` and `fl_end_XXX()` calls where XXX can be 'loop' or 'polygon' to draw, respectively a circle or a disk. Transformation functions (e.g., `fl_scale(double, double)`) can be also used for `fl_circle()` to draw empty or filled ellipses. It must be the *only* thing in the path: if you want a circle as part of a complex polygon you must use `fl_arc()`. Nevertheless, `fl_circle()` can also be used by itself to draw circles.

11.7.3.11 fl_clip()

```
void fl_clip (
    int x,
    int y,
    int w,
    int h ) [inline]
```

Intersect the current clip region with a rectangle and push this new region onto the stack (deprecated).

Parameters

in	<i>x,y,w,h</i>	position and size
----	----------------	-------------------

Deprecated Please use `fl_push_clip(int x, int y, int w, int h)` instead. `fl_clip(int, int, int, int)` will be removed in FLTK 1.5.

11.7.3.12 fl_clip_box()

```
int fl_clip_box (
    int x,
    int y,
    int w,
    int h,
    int & X,
    int & Y,
    int & W,
    int & H ) [inline]
```

Intersect a rectangle with the current clip region and return the bounding box of the result.

Returns non-zero if the resulting rectangle is different to the original. The given rectangle (*x*, *y*, *w*, *h*) *should* be entirely inside its window, otherwise the result may be unexpected, i.e. this function *may* not clip the rectangle to the window coordinates and size. In particular *x* and *y* *should* not be negative.

The resulting bounding box can be used to limit the necessary drawing to this rectangle.

Example:

```
void MyGroup::draw() {
    int X = 0, Y = 0, W = 0, H = 0;
    int ret = fl_clip_box(x(), y(), w(), h(), X, Y, W, H);
    if (ret == 0) { // entire group is visible (not clipped)
        // full drawing code here
    } else { // parts of this group are clipped
        // partial drawing code here (uses X, Y, W, and H to test)
    }
}
```

W and H are set to zero if the rectangle is completely outside the clipping region. In this case X and Y are undefined and should not be used. Possible values are (0, 0), (x, y), or anything else (platform dependent).

Note

This function is platform-dependent. If the given rectangle is not entirely inside the window, the results are not guaranteed to be the same on all platforms.

Parameters

in	<i>x,y,w,h</i>	position and size of rectangle
out	<i>X,Y,W,H</i>	position and size of resulting bounding box.

Returns

Non-zero if the resulting rectangle is different to the original.

See also

[fl_not_clipped\(\)](#)

11.7.3.13 fl_clip_region() [1/2]

```
Fl_Region fl_clip_region ( ) [inline]
```

Return the current clipping region.

Note

This function is mostly intended for internal use by the FLTK library when drawing to the display. Its return value can be always NULL if the current drawing surface is not the display.

11.7.3.14 fl_clip_region() [2/2]

```
void fl_clip_region (
    Fl_Region r ) [inline]
```

Replace the top of the clipping stack with a clipping region of any shape.

Fl_Region is an operating system specific type.

Note

This function is mostly intended for internal use by the FLTK library when drawing to the display. Its effect can be null if the current drawing surface is not the display.

Parameters

in	<i>r</i>	clipping region
----	----------	-----------------

11.7.3.15 fl_copy_offscreen()

```
void fl_copy_offscreen (
    int x,
    int y,
    int w,
    int h,
    Fl_Offscreen pixmap,
    int srcx,
```

```
int srcy ) [inline]
```

Copy a rectangular area of the given offscreen buffer into the current drawing destination.

Parameters

<i>x,y</i>	position where to draw the copied rectangle
<i>w,h</i>	size of the copied rectangle
<i>pixmap</i>	offscreen buffer containing the rectangle to copy
<i>srcx,srcy</i>	origin in offscreen buffer of rectangle to copy

11.7.3.16 fl_create_offscreen()

```
Fl_Offscreen fl_create_offscreen (
    int w,
    int h )
```

Creation of an offscreen graphics buffer.

Parameters

<i>w,h</i>	width and height in FLTK units of the buffer.
------------	---

Returns

the created graphics buffer.

The pixel size of the created graphics buffer is equal to the number of pixels in an area of the screen containing the current window sized at *w,h* FLTK units. This pixel size varies with the value of the scale factor of this screen.

Note

Work with the `fl_XXX_offscreen()` functions is equivalent to work with an [Fl_Image_Surface](#) object, as follows :

Fl_Offscreen-based approach	Fl_Image_Surface-based approach
<code>Fl_Offscreen off = fl_create_offscreen(w, h)</code>	<code>Fl_Image_Surface *surface = new Fl_Image_Surface(w, h, 1)</code>
<code>fl_begin_offscreen(off)</code>	<code>Fl_Surface_Device::push_current(surface)</code>
<code>fl_end_offscreen()</code>	<code>Fl_Surface_Device::pop_current()</code>
<code>fl_copy_offscreen(x,y,w,h, off, sx,sy)</code>	<code>fl_copy_offscreen(x,y,w,h, surface->offscreen(), sx,sy)</code>
<code>fl_rescale_offscreen(off)</code>	<code>surface->rescale()</code>
<code>fl_delete_offscreen(off)</code>	delete surface

11.7.3.17 fl_cursor()

```
void fl_cursor (
    Fl_Cursor c )
```

Sets the cursor for the current window to the specified shape and colors.

The cursors are defined in the [<FL/Enumerations.H>](#) header file.

11.7.3.18 fl_curve()

```
void fl_curve (
    double X0,
    double Y0,
    double X1,
    double Y1,
```

```

double X2,
double Y2,
double X3,
double Y3 ) [inline]

```

Add a series of points on a Bézier curve to the path.
The curve ends (and two of the points) are at X0,Y0 and X3,Y3.

Parameters

in	X0,Y0	curve start point
in	X1,Y1	curve control point
in	X2,Y2	curve control point
in	X3,Y3	curve end point

11.7.3.19 fl_delete_offscreen()

```

void fl_delete_offscreen (
    Fl_Offscreen ctx )

```

Deletion of an offscreen graphics buffer.

Parameters

ctx	the buffer to be deleted.
-----	---------------------------

Note

The `ctx` argument must have been created by [fl_create_offscreen\(\)](#).

11.7.3.20 fl_draw() [1/4]

```

void fl_draw (
    const char * str,
    int x,
    int y )

```

Draw a nul-terminated UTF-8 string starting at the given `x`, `y` location.

Text is aligned to the left and to the baseline of the font. To align to the bottom, subtract [fl_descent\(\)](#) from `y`. To align to the top, subtract [fl_descent\(\)](#) and add [fl_height\(\)](#). This version of `fl_draw` provides direct access to the text drawing function of the underlying OS. It does not apply any special handling to control characters.

11.7.3.21 fl_draw() [2/4]

```

void fl_draw (
    const char * str,
    int x,
    int y,
    int w,
    int h,
    Fl_Align align,
    Fl_Image * img,
    int draw_symbols )

```

Fancy string drawing function which is used to draw all the labels.

The string is formatted and aligned inside the passed box. Handles `'t'` and `'n'`, expands all other control characters to `'^X'`, and aligns inside or against the edges of the box. See [Fl_Widget::align\(\)](#) for values of `align`. The value `FL_ALIGN_INSIDE` is ignored, as this function always prints inside the box. If `img` is provided and is not `NULL`, the image is drawn above or below the text as specified by the `align` value. The `draw_symbols` argument specifies whether or not to look for symbol names starting with the `'@'` character

11.7.3.22 fl_draw() [3/4]

```
void fl_draw (
    int angle,
    const char * str,
    int n,
    int x,
    int y ) [inline]
```

Draw at the given *x*, *y* location a UTF-8 string of length *n* bytes rotating *angle* degrees counter-clockwise.

Note

When using X11 (Unix, Linux, Cygwin et al.) this needs Xft to work. Under plain X11 (w/o Xft) rotated text is not supported by FLTK. A warning will be issued to stderr at runtime (only once) if you use this method with an angle other than 0.

11.7.3.23 fl_draw() [4/4]

```
void fl_draw (
    int angle,
    const char * str,
    int x,
    int y )
```

Draw a nul-terminated UTF-8 string starting at the given *x*, *y* location and rotating *angle* degrees counter-clockwise.

This version of `fl_draw` provides direct access to the text drawing function of the underlying OS and is supported by all fltk platforms except X11 without Xft.

11.7.3.24 fl_draw_arrow()

```
void fl_draw_arrow (
    Fl_Rect r,
    Fl_Arrow_Type t,
    Fl_Orientation o,
    Fl_Color col )
```

Draw an "arrow like" GUI element for the selected scheme.

In the future this function should be integrated in `Fl_Scheme` as a virtual method, i.e. it would call a method like ...
`Fl_Scheme::current()->draw_arrow(r, t, o, col);`

Parameters

in	<i>r</i>	bounding box
in	<i>t</i>	arrow type
in	<i>o</i>	orientation
in	<i>col</i>	arrow color

Since

1.4.0

11.7.3.25 fl_draw_box()

```
void fl_draw_box (
    Fl_Boxtype t,
    int x,
    int y,
    int w,
    int h,
    Fl_Color c )
```

Draws a box using given type, position, size and color.

Parameters

in	<i>t</i>	box type
in	<i>x,y,w,h</i>	position and size
in	<i>c</i>	color

11.7.3.26 fl_draw_check()

```
void fl_draw_check (
    Fl_Rect bb,
    Fl_Color col )
```

Draw a check mark inside the given bounding box.

The check mark is allowed to fill the entire box but the algorithm used makes sure that a 1-pixel border is kept free if the box is large enough. You need to calculate margins for box borders etc. yourself.

The check mark size is limited (minimum and maximum size) and the check mark is always centered in the given box.

Note

If the box is too small (bad GUI design) the check mark will be drawn over the box borders. This is intentional for better user experience. Otherwise users might not be able to recognize if a box is checked.

The size limits are implementation details and may be changed at any time.

Parameters

in	<i>bb</i>	rectangle that defines the bounding box
in	<i>col</i>	Fl_Color to draw the check mark

Since

1.4.0

11.7.3.27 fl_draw_circle()

```
void fl_draw_circle (
    int x,
    int y,
    int d,
    Fl_Color color )
```

Draw a potentially small, filled circle using a given color.

This function draws a filled circle bounded by rectangle (*x*, *y*, *d*, *d*) using color *color*

This function is the same as `fl_pie(x, y, d, d, 0, 360)` except with some systems that don't draw small circles well. In that situation, the circle diameter *d* is converted from FLTK units to pixels and this function approximates a filled circle by drawing several filled rectangles if the converted diameter is 6 pixels.

The current drawing color `fl_color()` is preserved across the call.

Parameters

in	<i>x,y</i>	coordinates of top left of the bounding box
in	<i>d</i>	diameter == width and height of the bounding box in FLTK units
in	<i>color</i>	the color used to draw the circle

Since

1.4.0

11.7.3.28 fl_draw_image() [1/2]

```
void fl_draw_image (
    const uchar * buf,
    int X,
    int Y,
    int W,
    int H,
    int D = 3,
    int L = 0 ) [inline]
```

Draw an 8-bit per color RGB or luminance image.

Parameters

in	<i>buf</i>	points at the "r" data of the top-left pixel. Color data must be in <i>r, g, b</i> order. Luminance data is only one <i>gray</i> byte.
in	<i>X, Y</i>	position where to put top-left corner of image
in	<i>W, H</i>	size of the image
in	<i>D</i>	delta to add to the pointer between pixels. It may be any value greater than or equal to 1, or it can be negative to flip the image horizontally
in	<i>L</i>	delta to add to the pointer between lines (if 0 is passed it uses $W * D$), and may be larger than $W * D$ to crop data, or negative to flip the image vertically

It is highly recommended that you put the following code before the first `show()` of *any* window in your program to get rid of the dithering if possible:

```
Fl::visual(FL_RGB);
```

Gray scale (1-channel) images may be drawn. This is done if `abs(D)` is less than 3, or by calling `fl_draw_image_mono()`. Only one 8-bit sample is used for each pixel, and on screens with different numbers of bits for red, green, and blue only gray colors are used. Setting `D` greater than 1 will let you display one channel of a color image.

Note:

The X version does not support all possible visuals. If FLTK cannot draw the image in the current visual it will abort. FLTK supports any visual of 8 bits or less, and all common TrueColor visuals up to 32 bits.

11.7.3.29 fl_draw_image() [2/2]

```
void fl_draw_image (
    Fl_Draw_Image_Cb cb,
    void * data,
    int X,
    int Y,
    int W,
    int H,
    int D = 3 ) [inline]
```

Draw an image using a callback function to generate image data.

You can generate the image as it is being drawn, or do arbitrary decompression of stored data, provided it can be decompressed to individual scan lines.

Parameters

in	<i>cb</i>	callback function to generate scan line data
in	<i>data</i>	user data passed to callback function

Parameters

in	<i>X,Y</i>	screen position of top left pixel
in	<i>W,H</i>	image width and height
in	<i>D</i>	data size per pixel in bytes (must be greater than 0)

See also

[fl_draw_image\(const uchar* buf, int X, int Y, int W, int H, int D, int L\)](#)

The callback function `cb` is called with the `void*` `data` user data pointer to allow access to a structure of information about the image, and the `x`, `y`, and `w` of the scan line desired from the image. 0,0 is the upper-left corner of the image, not `x`, `y`. A pointer to a buffer to put the data into is passed. You must copy `w` pixels from scanline `y`, starting at pixel `x`, to this buffer.

Due to cropping, less than the whole image may be requested. So `x` may be greater than zero, the first `y` may be greater than zero, and `w` may be less than `W`. The buffer is long enough to store the entire `W * D` pixels, this is for convenience with some decompression schemes where you must decompress the entire line at once: decompress it into the buffer, and then if `x` is not zero, copy the data over so the `x`'th pixel is at the start of the buffer.

You can assume the `y`'s will be consecutive, except the first one may be greater than zero.

If `D` is 4 or more, you must fill in the unused bytes with zero.

11.7.3.30 fl_draw_image_mono() [1/2]

```
void fl_draw_image_mono (
    const uchar * buf,
    int X,
    int Y,
    int W,
    int H,
    int D = 1,
    int L = 0 ) [inline]
```

Draw a gray-scale (1 channel) image.

See also

[fl_draw_image\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#)

11.7.3.31 fl_draw_image_mono() [2/2]

```
void fl_draw_image_mono (
    Fl_Draw_Image_Cb cb,
    void * data,
    int X,
    int Y,
    int W,
    int H,
    int D = 1 ) [inline]
```

Draw a gray-scale image using a callback function to generate image data.

See also

[fl_draw_image\(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D\)](#)

11.7.3.32 fl_draw_pixmap() [1/2]

```
int fl_draw_pixmap (
    char *const * data,
    int x,
    int y,
    Fl_Color bg = FL_GRAY ) [inline]
```

Draw XPM image data, with the top-left corner at the given position.

See also

[fl_draw_pixmap\(const char* const* data, int x, int y, Fl_Color bg\)](#)

11.7.3.33 fl_draw_pixmap() [2/2]

```
int fl_draw_pixmap (
    const char *const * data,
    int x,
    int y,
    Fl_Color bg = FL_GRAY )
```

Draw XPM image data, with the top-left corner at the given position.

The image is dithered on 8-bit displays so you won't lose color space for programs displaying both images and pixmaps.

Parameters

in	<i>data</i>	pointer to XPM image data
in	<i>x,y</i>	position of top-left corner
in	<i>bg</i>	background color

Returns

0 if there was any error decoding the XPM data.

11.7.3.34 fl_draw_radio()

```
void fl_draw_radio (
    int x,
    int y,
    int d,
    Fl_Color color )
```

Draw a round check mark (circle) of a radio button.

This draws only the round "radio button mark", it does not draw the (also typically round) box of the radio button.

Call this only if the radio button is ON.

This method draws a scheme specific "circle" with a particular light effect if the scheme is gtk+. For all other schemes this function draws a simple, small circle.

The *color* must be chosen by the caller so it has enough contrast with the background.

The bounding box of the circle is the rectangle (*x*, *y*, *d*, *d*).

The current drawing color [fl_color\(\)](#) is preserved across the call.

Parameters

in	<i>x,y</i>	coordinates of top left of the bounding box
in	<i>d</i>	diameter == width and height of the bounding box in FLTK units
in	<i>color</i>	the base color used to draw the circle

Since

1.4.0

11.7.3.35 fl_draw_symbol()

```
int fl_draw_symbol (
    const char * label,
    int x,
```

```

    int y,
    int w,
    int h,
    Fl_Color col )

```

Draw the named symbol in the given rectangle using the given color.

Parameters

in	<i>label</i>	name of symbol
in	<i>x,y</i>	position of symbol
in	<i>w,h</i>	size of symbol
in	<i>col</i>	color of symbol

Returns

1 on success, 0 on failure

11.7.3.36 fl_expand_text()

```

const char * fl_expand_text (
    const char * from,
    char * buf,
    int maxbuf,
    double maxw,
    int & n,
    double & width,
    int wrap,
    int draw_symbols )

```

Copy *from* to *buf*, replacing control characters with ^X.

Stop at a newline or if *maxbuf* characters written to buffer. Also word-wrap if *width* exceeds *maxw*. Returns a pointer to the start of the next line of characters. Sets *n* to the number of characters put into the buffer. Sets *width* to the width of the string in the [current font](#).

11.7.3.37 fl_focus_rect()

```

void fl_focus_rect (
    int x,
    int y,
    int w,
    int h ) [inline]

```

Draw a dotted rectangle, used to indicate keyboard focus on a widget.

This method draws the rectangle in the current color and independent of the [Fl::visible_focus\(\)](#) option. You may need to set the current color with [fl_color\(\)](#) before you call this.

11.7.3.38 fl_frame()

```

void fl_frame (
    const char * s,
    int x,
    int y,
    int w,
    int h )

```

Draws a series of line segments around the given box.

The string *s* must contain groups of 4 letters which specify one of 24 standard grayscale values, where 'A' is black and 'X' is white. The order of each set of 4 characters is: top, left, bottom, right. The result of calling [fl_frame\(\)](#) with a string that is not a multiple of 4 characters in length is undefined. The only difference between this function and [fl_frame2\(\)](#) is the order of the line segments.

Parameters

in	<i>s</i>	sets of 4 grayscale values in top, left, bottom, right order
in	<i>x,y,w,h</i>	position and size

11.7.3.39 fl_frame2()

```
void fl_frame2 (
    const char * s,
    int x,
    int y,
    int w,
    int h )
```

Draws a series of line segments around the given box.

The string *s* must contain groups of 4 letters which specify one of 24 standard grayscale values, where 'A' is black and 'X' is white. The order of each set of 4 characters is: bottom, right, top, left. The result of calling `fl_frame2()` with a string that is not a multiple of 4 characters in length is undefined. The only difference between this function and `fl_frame()` is the order of the line segments.

Parameters

in	<i>s</i>	sets of 4 grayscale values in bottom, right, top, left order
in	<i>x,y,w,h</i>	position and size

11.7.3.40 fl_gap()

```
void fl_gap ( ) [inline]
```

Separate loops of the path.

It is unnecessary but harmless to call `fl_gap()` before the first vertex, after the last vertex, or several times in a row.

11.7.3.41 fl_line_style()

```
void fl_line_style (
    int style,
    int width = 0,
    char * dashes = 0 ) [inline]
```

Set how to draw lines (the "pen").

If you change this it is your responsibility to set it back to the default using `fl_line_style(0)`.

Parameters

in	<i>style</i>	A bitmask which is a bitwise-OR of a line style, a cap style, and a join style. If you don't specify a dash type you will get a solid line. If you don't specify a cap or join type you will get a system-defined default of whatever value is fastest.
in	<i>width</i>	The thickness of the lines in pixels. Zero results in the system defined default, which on both X and Windows is somewhat different and nicer than 1.
in	<i>dashes</i>	A pointer to an array of dash lengths, measured in pixels. The first location is how long to draw a solid portion, the next is how long to draw the gap, then the solid, etc. It is terminated with a zero-length entry. A NULL pointer or a zero-length array results in a solid line. Odd array sizes are not supported and result in undefined behavior.

Note

Because of how line styles are implemented on Win32 systems, you *must* set the line style *after* setting the drawing color. If you set the color after the line style you will lose the line style settings.

The `dashes` array does not work under the (unsupported!) operating systems Windows 95, 98 or Me, since those operating systems do not support complex line styles.

11.7.3.42 fl_load_matrix()

```
void fl_load_matrix (
    double a,
    double b,
    double c,
    double d,
    double x,
    double y ) [inline]
```

Set the current transformation matrix.

Parameters

in	<i>a,b,c,d,x,y</i>	transformation matrix elements
----	--------------------	--------------------------------

11.7.3.43 fl_measure()

```
void fl_measure (
    const char * str,
    int & w,
    int & h,
    int draw_symbols )
```

Measure how wide and tall the string will be when printed by the `fl_draw()` function with `align` parameter.

If the incoming `w` is non-zero it will wrap to that width.

The [current font](#) is used to do the width/height calculations, so unless its value is known at the time `fl_measure()` is called, it is advised to first set the current font with `fl_font()`. With event-driven GUI programming you can never be sure which widget was exposed and redrawn last, nor which font it used. If you have not called `fl_font()` explicitly in your own code, the width and height may be set to unexpected values, even zero!

Note: In the general use case, it's a common error to forget to set `w` to 0 before calling `fl_measure()` when wrap behavior isn't needed.

Parameters

in	<i>str</i>	nul-terminated string
out	<i>w,h</i>	width and height of string in current font
in	<i>draw_symbols</i>	non-zero to enable @symbol handling [default=1]

```
// Example: Common use case for fl_measure()
const char *s = "This is a test";
int wi=0, hi=0; // initialize to zero before calling fl_measure()
fl_font(FL_HELVETICA, 14); // set current font face/size to be used for measuring
fl_measure(s, wi, hi); // returns pixel width/height of string in current font
```

11.7.3.44 fl_measure_pixmap() [1/2]

```
int fl_measure_pixmap (
    char *const * data,
    int & w,
    int & h )
```

Get the dimensions of a pixmap.

An XPM image contains the dimensions in its data. This function returns the width and height.

Parameters

in	<i>data</i>	pointer to XPM image data.
out	<i>w,h</i>	width and height of image

Returns

non-zero if the dimensions were parsed OK

0 if there were any problems

11.7.3.45 fl_measure_pixmap() [2/2]

```
int fl_measure_pixmap (
    const char *const * cdata,
    int & w,
    int & h )
```

Get the dimensions of a pixmap.

See also

[fl_measure_pixmap\(char* const* data, int &w, int &h\)](#)

11.7.3.46 fl_mult_matrix()

```
void fl_mult_matrix (
    double a,
    double b,
    double c,
    double d,
    double x,
    double y ) [inline]
```

Concatenate another transformation onto the current one.

Parameters

in	<i>a,b,c,d,x,y</i>	transformation matrix elements such that $X' = aX + cY + x$ and $Y' = bX + dY + y$
----	--------------------	--

11.7.3.47 fl_not_clipped()

```
int fl_not_clipped (
    int x,
    int y,
    int w,
    int h ) [inline]
```

Does the rectangle intersect the current clip region?

Parameters

in	<i>x,y,w,h</i>	position and size of rectangle
----	----------------	--------------------------------

Returns

non-zero if any of the rectangle intersects the current clip region. If this returns 0 you don't have to draw the object.

Note

Under X this returns 2 if the rectangle is partially clipped and 1 if it is entirely inside the clip region.

See also

[fl_clip_box\(\)](#)

11.7.3.48 fl_old_shortcut()

```
unsigned int fl_old_shortcut (
    const char * s )
```

Emulation of XForms named shortcuts.

Converts ASCII shortcut specifications (eg. "`^c`") into the FLTK integer equivalent (eg. `FL_CTRL+'c'`)

These ASCII characters are used to specify the various keyboard modifier keys:

```
# - Alt
+ - Shift
^ - Control
! - Meta
@ - Command (Ctrl on linux/win, Meta on OSX)
```

These special characters can be combined to form chords of modifier keys. (See 'Remarks' below)

After the optional modifier key prefixes listed above, one can either specify a single keyboard character to use as the shortcut, or a numeric sequence in hex, decimal or octal.

Examples:

```
"c"      -- Uses 'c' as the shortcut
"#^c"    -- Same as FL_ALT|FL_CTRL|'c'
"#^!c"   -- Same as FL_ALT|FL_CTRL|FL_META|'c'
"@c"     -- Same as FL_COMMAND|'c' (see FL_COMMAND for platform specific behavior)
"0x63"   -- Same as "c" (hex 63=='c')
"99"     -- Same as "c" (dec 99=='c')
"0143"   -- Same as "c" (octal 0143=='c')
"^0x63"  -- Same as (FL_CTRL|'c'), or (FL_CTRL|0x63)
"^99"    -- Same as (FL_CTRL|'c'), or (FL_CTRL|99)
"^0143"  -- Same as (FL_CTRL|'c'), or (FL_CTRL|0143)
```

Remarks

Due to XForms legacy, there are some odd things to consider when using the modifier characters.

(1) You can use the special modifier keys for chords *only* if the modifiers are provided in this order: #, +, ^, !, @. Other ordering can yield undefined results.

So for instance, Ctrl-Alt-c must be specified as "`#^c`" (and not "`^#c`"), due to the above ordering rule.

(2) If you want to make a shortcut that uses one of the special modifier characters (as the character being modified), then to avoid confusion, specify the numeric equivalent, e.g.

If you want..	Then use..
'#' as the shortcut..	"0x23" (instead of just "#").
'+' as the shortcut..	"0x2b" (instead of just "+").
'^' as the shortcut..	"0x5e" (instead of just "^").
Alt+ as the shortcut..	"#0x2b" (instead of "#+").
Alt-^ as the shortcut..	"#0x5e" (instead of "#^").
..etc..	

As a general rule that's easy to remember, unless the shortcut key to be modified is a single alpha-numeric character [A-Z,a-z,0-9), it's probably best to use the numeric equivalents.

Don't fix these silly legacy issues in a future release. Nobody is using this anymore.

11.7.3.49 `fl_overlay_clear()`

```
void fl_overlay_clear ( )
```

Erase a selection rectangle without drawing a new one.

See also

[fl_overlay_rect\(int x, int y, int w, int h\)](#)

11.7.3.50 `fl_overlay_rect()`

```
void fl_overlay_rect (
    int x,
    int y,
    int w,
    int h )
```

Draw a transient dotted selection rectangle.

This function saves the current screen content and then draws a dotted selection rectangle into the front screen buffer. If another selection rectangle was drawn earlier, the previous screen graphics are restored first.

To clear the selection rectangle, call [fl_overlay_clear\(\)](#).

The typical (and only) use for this function is to draw a selection rectangle during a mouse drag event sequence without having to redraw the entire content of the widget.

Your event handle should look similar to this (also see `test/mandelbrot.cxx`):

```
int MyWidget::handle(int event) {
    static int ix, iy;
    switch (event) {
        case FL_PUSH:
            ix = Fl::event_x(); iy = Fl::event_y();
            return 1;
        case FL_DRAG:
            this->make_current();
            fl_overlay_rect(ix, iy, ix-Fl::event_x(), iy-Fl::event_y());
            return 1;
        case FL_RELEASE:
            this->make_current();
            fl_overlay_clear();
            // select the element under the rectangle
            return 1;
    }
    return MySuperWidget::handle(event);
}
```

Note

Between drawing an overlay rect and clearing it, the content of the widget must not change.

[fl_overlay_rect\(\)](#) and [fl_overlay_clear\(\)](#) should be called when the actual event occurs, and *not* within `MyWidget::draw()`.

[fl_overlay_rect\(\)](#) and [fl_overlay_clear\(\)](#) should not be mixed with [Fl_Overlay_Window](#). [Fl_Overlay_Window](#) provides an entirely different way of drawing selection outlines and is not limited to rectangles.

Parameters

<code>x,y,w,h</code>	position and size of the overlay rectangle.
----------------------	---

See also

[fl_overlay_clear\(\)](#)

11.7.3.51 `fl_override_scale()`

```
float fl_override_scale ( )
```

Removes any GUI scaling factor in subsequent drawing operations.

This must be matched by a later call to [fl_restore_scale\(\)](#). This function can be used to transiently perform drawing operations that are not rescaled by the current value of the GUI scaling factor. The resulting drawing context has no

clipping region.

Returns

The GUI scaling factor value that was in place when the function started.

11.7.3.52 fl_pie()

```
void fl_pie (
    int x,
    int y,
    int w,
    int h,
    double a1,
    double a2 ) [inline]
```

Draw filled ellipse sections using integer coordinates.

Like `fl_arc()`, but `fl_pie()` draws a filled-in pie slice. This slice may extend outside the line drawn by `fl_arc()`; to avoid this use `w - 1` and `h - 1`.

Parameters

in	<code>x,y,w,h</code>	bounding box of complete circle
in	<code>a1,a2</code>	start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. <code>a2</code> must be greater than or equal to <code>a1</code> .

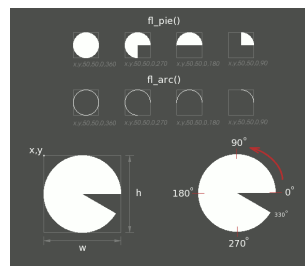


Figure 11.4 `fl_pie()` and `fl_arc()`

11.7.3.53 fl_polygon() [1/2]

```
void fl_polygon (
    int x,
    int y,
    int x1,
    int y1,
    int x2,
    int y2 ) [inline]
```

Fill a 3-sided polygon.

The polygon must be convex.

11.7.3.54 fl_polygon() [2/2]

```
void fl_polygon (
    int x,
    int y,
    int x1,
    int y1,
    int x2,
    int y2,
```

```

    int x3,
    int y3 ) [inline]

```

Fill a 4-sided polygon.

The polygon must be convex.

11.7.3.55 fl_pop_clip()

```
void fl_pop_clip ( ) [inline]
```

Restore the previous clip region.

You must call [fl_pop_clip\(\)](#) once for every time you call [fl_push_clip\(\)](#). Unpredictable results may occur if the clip stack is not empty when you return to FLTK.

11.7.3.56 fl_push_clip()

```
void fl_push_clip (
    int x,
    int y,
    int w,
    int h ) [inline]
```

Intersect the current clip region with a rectangle and push this new region onto the stack.

Parameters

in	<i>x,y,w,h</i>	position and size
----	----------------	-------------------

11.7.3.57 fl_push_matrix()

```
void fl_push_matrix ( ) [inline]
```

Save the current transformation matrix on the stack.

The maximum depth of the stack is 32.

11.7.3.58 fl_read_image()

```
uchar * fl_read_image (
    uchar * p,
    int X,
    int Y,
    int w,
    int h,
    int alpha )
```

Reads an RGB(A) image from the current window or off-screen buffer.

Parameters

in	<i>p</i>	pixel buffer, or NULL to allocate one
in	<i>X,Y</i>	position of top-left of image to read
in	<i>w,h</i>	width and height of image to read
in	<i>alpha</i>	alpha value for image (0 for none)

Returns

pointer to pixel buffer, or NULL if allocation failed.

The *p* argument points to a buffer that can hold the image and must be at least *w***h**3 bytes when reading RGB images, or *w***h**4 bytes when reading RGBA images. If NULL, [fl_read_image\(\)](#) will create an array of the proper size which can be freed using `delete[]`.

The *alpha* parameter controls whether an alpha channel is created and the value that is placed in the alpha channel. If 0, no alpha channel is generated.

See also

[fl_capture_window\(\)](#)

11.7.3.59 fl_rect() [1/3]

```
void fl_rect (
    Fl_Rect r ) [inline]
```

Draw a border *inside* the given bounding box.

This is the same as [fl_rect\(int x, int y, int w, int h\)](#) but with [Fl_Rect r](#) as input argument.

11.7.3.60 fl_rect() [2/3]

```
void fl_rect (
    int x,
    int y,
    int w,
    int h ) [inline]
```

Draw a border *inside* the given bounding box.

This function is meant for quick drawing of simple boxes. The behavior is undefined for line widths that are not 1.

11.7.3.61 fl_rect() [3/3]

```
void fl_rect (
    int x,
    int y,
    int w,
    int h,
    Fl_Color c ) [inline]
```

Draw with passed color a border *inside* the given bounding box.

Warning

The current color is changed to `c` upon return.

11.7.3.62 fl_rectf() [1/4]

```
void fl_rectf (
    Fl_Rect bb,
    uchar r,
    uchar g,
    uchar b ) [inline]
```

Color a rectangle with "exactly" the passed `r, g, b` color.

This is the same as [fl_rectf\(int x, int y, int w, int h, uchar r, uchar g, uchar b\)](#) but with [Fl_Rect bb](#) (bounding box) as argument instead of `(x, y, w, h)`.

See also

[fl_rectf\(int x, int y, int w, int h, uchar r, uchar g, uchar b\)](#)

11.7.3.63 fl_rectf() [2/4]

```
void fl_rectf (
    Fl_Rect r,
    Fl_Color c ) [inline]
```

Color with passed color a rectangle that exactly fills the given bounding box.

Warning

The current color is changed to `c` upon return.

11.7.3.64 fl_rectf() [3/4]

```
void fl_rectf (
    int x,
    int y,
    int w,
    int h,
    Fl_Color c ) [inline]
```

Color with passed color a rectangle that exactly fills the given bounding box.

Warning

The current color is changed to `c` upon return.

11.7.3.65 fl_rectf() [4/4]

```
void fl_rectf (
    int x,
    int y,
    int w,
    int h,
    uchar r,
    uchar g,
    uchar b ) [inline]
```

Color a rectangle with "exactly" the passed `r, g, b` color.

On screens with less than 24 bits of color this is done by drawing a solid-colored block using [fl_draw_image\(\)](#) so that the correct color shade is produced. On other screens, the current color is changed to `fl_color(r, g, b)` upon return.

11.7.3.66 fl_rescale_offscreen()

```
void fl_rescale_offscreen (
    Fl_Offscreen & ctx )
```

Adapts an offscreen buffer to a changed value of the scale factor.

The `ctx` argument must have been created by [fl_create_offscreen\(\)](#) and the calling context must not be between [fl_begin_offscreen\(\)](#) and [fl_end_offscreen\(\)](#). The graphical content of the offscreen is preserved. The current scale factor value is given by `Fl_Graphics_Driver::default_driver().scale()`.

Version

1.4

11.7.3.67 fl_reset_spot()

```
void fl_reset_spot (
    void )
```

Resets marked text.

In many languages, typing a character can involve multiple keystrokes. For example, the Å can be composed of two dots (¨) on top of the character, followed by the letter A (on a Mac with U.S. keyboard, you'd type Alt-U, Shift-A. To inform the user that the dots may be followed by another character, the ¨ is underlined).

Call this function if character composition needs to be aborted for some reason. One such example would be the text input widget losing focus.

11.7.3.68 fl_restore_scale()

```
void fl_restore_scale (
    float s )
```

Restores the GUI scaling factor and the clipping region in subsequent drawing operations.

Parameters

<code>s</code>	Value returned by a previous call to <code>fl_override_scale()</code> .
----------------	---

11.7.3.69 fl_rotate()

```
void fl_rotate (
    double d ) [inline]
```

Concatenate rotation transformation onto the current one.

Parameters

<code>in</code>	<code>d</code>	- rotation angle, counter-clockwise in degrees (not radians)
-----------------	----------------	--

11.7.3.70 fl_rounded_rect()

```
void fl_rounded_rect (
    int x,
    int y,
    int w,
    int h,
    int r ) [inline]
```

Draw a rounded border *inside* the given bounding box.

The radius code is optimized for speed and works best for values between 5 and 15 units.

11.7.3.71 fl_rounded_rectf()

```
void fl_rounded_rectf (
    int x,
    int y,
    int w,
    int h,
    int r ) [inline]
```

Color with current color a rounded rectangle that exactly fills the given bounding box.

The radius code is optimized for speed and works best for values between 5 and 15 units.

11.7.3.72 fl_scale() [1/2]

```
void fl_scale (
    double x ) [inline]
```

Concatenate scaling transformation onto the current one.

Parameters

<code>in</code>	<code>x</code>	scale factor in both x-direction and y-direction
-----------------	----------------	--

11.7.3.73 fl_scale() [2/2]

```
void fl_scale (
    double x,
    double y ) [inline]
```

Concatenate scaling transformation onto the current one.

Parameters

<code>in</code>	<code>x,y</code>	scale factors in x-direction and y-direction
-----------------	------------------	--

11.7.3.74 fl_scroll()

```
void fl_scroll (
    int X,
    int Y,
    int W,
    int H,
    int dx,
    int dy,
    void(*) (void *, int, int, int, int) draw_area,
    void * data )
```

Scroll a rectangle and draw the newly exposed portions.

Parameters

in	<i>X,Y</i>	position of top-left of rectangle
in	<i>W,H</i>	size of rectangle
in	<i>dx,dy</i>	pixel offsets for shifting rectangle
in	<i>draw_area</i>	callback function to draw rectangular areas
in	<i>data</i>	pointer to user data for callback The contents of the rectangular area is first shifted by <i>dx</i> and <i>dy</i> pixels. The <i>draw_area</i> callback is then called for every newly exposed rectangular area.

11.7.3.75 fl_set_spot()

```
void fl_set_spot (
    int font,
    int size,
    int X,
    int Y,
    int W,
    int H,
    Fl_Window * win = 0 )
```

Inform text input methods about the current text insertion cursor.

Parameters

<i>font</i>	Font currently in use in text input.
<i>size</i>	Size of the current font.
<i>X,Y</i>	Position of the bottom of the current text insertion cursor.
<i>W,H</i>	Width and height of the current text insertion cursor.
<i>win</i>	Points to the Fl_Window object containing the current text widget, or NULL.

11.7.3.76 fl_set_status()

```
void fl_set_status (
    int X,
    int Y,
    int W,
    int H )
```

Related to text input methods under X11.

This function is presently used only by the `utf8` test application and only for the X11 platform. This function is apparently not indispensable for text input to work correctly as suggested by other apps that don't use it (e.g., editor).

11.7.3.77 fl_shortcut_label() [1/2]

```
const char * fl_shortcut_label (
    unsigned int shortcut )
```

Get a human-readable string from a shortcut value.

Unparse a shortcut value as used by [Fl_Button](#) or [Fl_Menu_Item](#) into a human-readable string like "Alt+N". This only works if the shortcut is a character key or a numbered function key. If the shortcut is zero then an empty string is returned. The return value points at a static buffer that is overwritten with each call.

Since

FLTK 1.3.4 modifier key names can be localized, but key names can not yet be localized. This may be added to a future FLTK version.

Modifier key names (human-readable shortcut names) can be defined with the following global const char * pointer variables:

- fl_local_ctrl => name of FL_CTRL
- fl_local_alt => name of FL_ALT
- fl_local_shift => name of FL_SHIFT
- fl_local_meta => name of FL_META

```
fl_local_ctrl = "Strg"; // German for "Ctrl"
fl_local_shift = "Umschalt"; // German for "Shift"
```

Note

Due to **random** static initialization order this should always be done from code in main() or called by main() as opposed to static initialization since the default strings in the FLTK library are set by static initializers. Otherwise this **might** result in the wrong order so FLTK's internal initialization overwrites your strings.

The shortcut name will be constructed by adding all modifier names in the order defined above plus the name of the key. A '+' character is added to each modifier name unless it has a trailing '\' or a trailing '+'.
Example:

Example:

Ctrl+Alt+Shift+Meta+F12

The default values for modifier key names are as given above for all platforms except macOS. macOS uses graphical characters that represent the typical macOS modifier names in menus, e.g. cloverleaf, saucepan, etc. You may, however, redefine macOS modifier names as well.

Parameters

in	<i>shortcut</i>	the integer value containing the ASCII character or extended keystroke plus modifiers
----	-----------------	---

Returns

a pointer to a static buffer containing human readable text for the shortcut

11.7.3.78 fl_shortcut_label() [2/2]

```
const char * fl_shortcut_label (
    unsigned int shortcut,
    const char ** eom )
```

Get a human-readable string from a shortcut value.

Parameters

in	<i>shortcut</i>	the integer value containing the ASCII character or extended keystroke plus modifiers
in	<i>eom</i>	if this pointer is set, it will receive a pointer to the end of the modifier text

Returns

a pointer to a static buffer containing human readable text for the shortcut

See also

[fl_shortcut_label\(unsigned int shortcut\)](#)

11.7.3.79 fl_transform_dx()

```
double fl_transform_dx (  
    double x,  
    double y ) [inline]
```

Transform distance using current transformation matrix.

Parameters

in	x,y	coordinate
----	-----	------------

11.7.3.80 fl_transform_dy()

```
double fl_transform_dy (  
    double x,  
    double y ) [inline]
```

Transform distance using current transformation matrix.

Parameters

in	x,y	coordinate
----	-----	------------

11.7.3.81 fl_transform_x()

```
double fl_transform_x (  
    double x,  
    double y ) [inline]
```

Transform coordinate using the current transformation matrix.

Parameters

in	x,y	coordinate
----	-----	------------

11.7.3.82 fl_transform_y()

```
double fl_transform_y (  
    double x,  
    double y ) [inline]
```

Transform coordinate using the current transformation matrix.

Parameters

in	x,y	coordinate
----	-----	------------

11.7.3.83 fl_transformed_vertex()

```
void fl_transformed_vertex (
    double xf,
    double yf ) [inline]
```

Add coordinate pair to the vertex list without further transformations.

Parameters

in	<i>xf,yf</i>	transformed coordinate
----	--------------	------------------------

11.7.3.84 fl_translate()

```
void fl_translate (
    double x,
    double y ) [inline]
```

Concatenate translation transformation onto the current one.

Parameters

in	<i>x,y</i>	translation factor in x-direction and y-direction
----	------------	---

11.7.3.85 fl_vertex()

```
void fl_vertex (
    double x,
    double y ) [inline]
```

Add a single vertex to the current path.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

11.8 Multithreading support functions

fl multithreading support functions declared in <FL/FI.H>

Functions

- static int [Fl::awake](#) ([Fl_Awake_Handler](#) cb, void *message=0)
See void awake(void message=0).*
- static void [Fl::awake](#) (void *message=0)
Sends a message pointer to the main thread, causing any pending [Fl::wait\(\)](#) call to terminate so that the main thread can retrieve the message and any pending redraws can be processed.
- static int [Fl::lock](#) ()
The [lock\(\)](#) method blocks the current thread until it can safely access FLTK widgets and data.
- static void * [Fl::thread_message](#) ()
The [thread_message\(\)](#) method returns the last message that was sent from a child by the [awake\(\)](#) method.
- static void [Fl::unlock](#) ()
The [unlock\(\)](#) method releases the lock that was set using the [lock\(\)](#) method.

11.8.1 Detailed Description

fl multithreading support functions declared in <FL/FI.H>

11.8.2 Function Documentation

11.8.2.1 `awake()` [1/2]

```
int Fl::awake (
    Fl_Awake_Handler func,
    void * data = 0 ) [static]
```

See `void awake(void* message=0)`.

Let the main thread know an update is pending and have it call a specific function.

Registers a function that will be called by the main thread during the next message handling cycle. Returns 0 if the callback function was registered, and -1 if registration failed. Over a thousand `awake` callbacks can be registered simultaneously.

See also

[Fl::awake\(void* message=0\)](#)

11.8.2.2 `awake()` [2/2]

```
void Fl::awake (
    void * msg = 0 ) [static]
```

Sends a message pointer to the main thread, causing any pending `Fl::wait()` call to terminate so that the main thread can retrieve the message and any pending redraws can be processed.

Multiple calls to `Fl::awake()` will queue multiple pointers for the main thread to process, up to a system-defined (typically several thousand) depth. The default message handler saves the last message which can be accessed using the `Fl::thread_message()` function.

In the context of a threaded application, a call to `Fl::awake()` with no argument will trigger event loop handling in the main thread. Since it is not possible to call `Fl::flush()` from a subsidiary thread, `Fl::awake()` is the best (and only, really) substitute.

It's *not* necessary to wrap calls to any form of `Fl::awake()` by `Fl::lock()` and `Fl::unlock()`. Nevertheless, the early, single call to `Fl::lock()` used to initialize threading support is necessary.

Function `Fl::awake()` in all its forms is typically called by worker threads, but it can be used safely by the main thread too, as a means to break the event loop.

See also

[Multithreading](#)

11.8.2.3 `lock()`

```
int Fl::lock ( ) [static]
```

The `lock()` method blocks the current thread until it can safely access FLTK widgets and data.

Child threads should call this method prior to updating any widgets or accessing data. The main thread must call `lock()` to initialize the threading support in FLTK. `lock()` will return non-zero if threading is not available on the platform.

Child threads must call `unlock()` when they are done accessing FLTK.

When the `wait()` method is waiting for input or timeouts, child threads are given access to FLTK. Similarly, when the main thread needs to do processing, it will wait until all child threads have called `unlock()` before processing additional data.

Returns

0 if threading is available on the platform; non-zero otherwise.

See also: [Multithreading](#)

11.8.2.4 `thread_message()`

```
void * Fl::thread_message ( ) [static]
```

The `thread_message()` method returns the last message that was sent from a child by the `awake()` method.

See also: [Multithreading](#)

11.8.2.5 unlock()

```
void Fl::unlock ( ) [static]
```

The `unlock()` method releases the lock that was set using the `lock()` method. Child threads should call this method as soon as they are finished accessing FLTK. See also: [Multithreading](#)

11.9 Safe widget deletion support functions

These functions, declared in `<FL/Fl.H>`, support deletion of widgets inside callbacks.

Functions

- static void `Fl::clear_widget_pointer (Fl_Widget const *w)`
Clears a widget pointer in the watch list.
- static void `Fl::delete_widget (Fl_Widget *w)`
Schedules a widget for deletion at the next call to the event loop.
- static void `Fl::do_widget_deletion ()`
Deletes widgets previously scheduled for deletion.
- static void `Fl::release_widget_pointer (Fl_Widget *&w)`
Releases a widget pointer from the watch list.
- static void `Fl::watch_widget_pointer (Fl_Widget *&w)`
Adds a widget pointer to the widget watch list.

11.9.1 Detailed Description

These functions, declared in `<FL/Fl.H>`, support deletion of widgets inside callbacks.

`Fl::delete_widget()` should be called when deleting widgets or complete widget trees (`Fl_Group`, `Fl_Window`, ...) inside callbacks.

The other functions are intended for internal use. The preferred way to use them is by using the helper class `Fl_Widget_Tracker`.

The following is to show how it works ...

There are three groups of related methods:

1. scheduled widget deletion
 - `Fl::delete_widget()` schedules widgets for deletion
 - `Fl::do_widget_deletion()` deletes all scheduled widgets
2. widget watch list ("smart pointers")
 - `Fl::watch_widget_pointer()` adds a widget pointer to the watch list
 - `Fl::release_widget_pointer()` removes a widget pointer from the watch list
 - `Fl::clear_widget_pointer()` clears a widget pointer *in* the watch list
3. the class `Fl_Widget_Tracker`:
 - the constructor calls `Fl::watch_widget_pointer()`
 - the destructor calls `Fl::release_widget_pointer()`
 - the access methods can be used to test, if a widget has been deleted

See also

[Fl_Widget_Tracker](#).

11.9.2 Function Documentation

11.9.2.1 `clear_widget_pointer()`

```
void Fl::clear_widget_pointer (
    Fl_Widget const * w ) [static]
```

Clears a widget pointer *in* the watch list.

This is called when a widget is destroyed (by its destructor). You should never call this directly.

Note

Internal use only !

This method searches the widget watch list for pointers to the widget and clears each pointer that points to it. Widget pointers can be added to the widget watch list by calling `Fl::watch_widget_pointer()` or by using the helper class `Fl_Widget_Tracker` (recommended).

See also

[Fl::watch_widget_pointer\(\)](#)

class [Fl_Widget_Tracker](#)

11.9.2.2 `delete_widget()`

```
void Fl::delete_widget (
    Fl_Widget * wi ) [static]
```

Schedules a widget for deletion at the next call to the event loop.

Use this method to delete a widget inside a callback function.

To avoid early deletion of widgets, this function should be called toward the end of a callback and only after any call to the event loop (`Fl::wait()`, `Fl::flush()`, `Fl::check()`, `fl_ask()`, etc.).

When deleting groups or windows, you must only delete the group or window widget and not the individual child widgets.

Since

FLTK 1.3.4 the widget will be hidden immediately, but the actual destruction will be delayed until the event loop is finished. Up to FLTK 1.3.3 windows wouldn't be hidden before the event loop was done, hence you had to `hide()` a window in your window close callback if you called `Fl::delete_widget()` to destroy (and hide) the window.

FLTK 1.3.0 it is not necessary to remove widgets from their parent groups or windows before calling this, because it will be done in the widget's destructor, but it is not a failure to do this nevertheless.

Note

In FLTK 1.1 you **must** remove widgets from their parent group (or window) before deleting them.

See also

[Fl_Widget::~~Fl_Widget\(\)](#)

11.9.2.3 `do_widget_deletion()`

```
void Fl::do_widget_deletion ( ) [static]
```

Deletes widgets previously scheduled for deletion.

This is for internal use only. You should never call this directly.

`Fl::do_widget_deletion()` is called from the FLTK event loop or whenever you call `Fl::wait()`. The previously scheduled widgets are deleted in the same order they were scheduled by calling `Fl::delete_widget()`.

See also

[Fl::delete_widget\(Fl_Widget *wi\)](#)

11.9.2.4 `release_widget_pointer()`

```
void Fl::release_widget_pointer (
    Fl_Widget *& w ) [static]
```

Releases a widget pointer from the watch list.

This is used to remove a widget pointer that has been added to the watch list with `Fl::watch_widget_pointer()`, when it is not needed anymore.

Note

Internal use only, please use class `Fl_Widget_Tracker` instead.

See also

[Fl::watch_widget_pointer\(\)](#)

11.9.2.5 `watch_widget_pointer()`

```
void Fl::watch_widget_pointer (
    Fl_Widget *& w ) [static]
```

Adds a widget pointer to the widget watch list.

Note

Internal use only, please use class `Fl_Widget_Tracker` instead.

This can be used, if it is possible that a widget might be deleted during a callback or similar function. The widget pointer must be added to the watch list before calling the callback. After the callback the widget pointer can be queried, if it is NULL. If it is NULL, then the widget has been deleted during the callback and must not be accessed anymore. If the widget pointer is *not* NULL, then the widget has not been deleted and can be accessed safely.

After accessing the widget, the widget pointer must be released from the watch list by calling `Fl::release_widget_pointer()`.

Example for a button that is clicked (from its `handle()` method):

```
Fl_Widget *wp = this;           // save 'this' in a pointer variable
Fl::watch_widget_pointer(wp);   // add the pointer to the watch list
set_changed();                 // set the changed flag
do_callback();                  // call the callback
if (!wp) {                       // the widget has been deleted

    // DO NOT ACCESS THE DELETED WIDGET !

} else {                          // the widget still exists
    clear_changed();             // reset the changed flag
}
```

```
Fl::release_widget_pointer(wp); // remove the pointer from the watch list
```

This works, because all widgets call `Fl::clear_widget_pointer()` in their destructors.

See also

[Fl::release_widget_pointer\(\)](#)

[Fl::clear_widget_pointer\(\)](#)

An easier and more convenient method to control widget deletion during callbacks is to use the class `Fl_Widget_Tracker` with a local (automatic) variable.

See also

class [Fl_Widget_Tracker](#)

11.10 Cairo Support Functions and Classes

Classes

- class [Fl_Cairo_State](#)
Contains all the necessary info on the current cairo context.
- class [Fl_Cairo_Window](#)
This defines an FLTK window with Cairo support.

Functions

- static bool [Fl::cairo_autolink_context](#) ()
Gets the current autolink mode for Cairo support.
- static void [Fl::cairo_autolink_context](#) (bool alink)
When FLTK_HAVE_CAIRO is defined and [cairo_autolink_context\(\)](#) is true, any current window dc is linked to a current Cairo context.
- static cairo_t * [Fl::cairo_cc](#) ()
Gets the current Cairo context linked with a fltk window.
- static void [Fl::cairo_cc](#) (cairo_t *c, bool own=false)
Sets the current Cairo context to c.
- static void [Fl::cairo_flush](#) (cairo_t *c)
Flush Cairo drawings on Cairo context c.
- static cairo_t * [Fl::cairo_make_current](#) (Fl_Window *w)
Provides a Cairo context for window wi.

11.10.1 Detailed Description

11.10.2 Function Documentation

11.10.2.1 [cairo_autolink_context\(\)](#) [1/2]

```
static bool Fl::cairo_autolink_context ( ) [inline], [static]
```

Gets the current autolink mode for Cairo support.

Return values

<i>false</i>	if no Cairo context autolink is made for each window.
<i>true</i>	if any fltk window is attached a Cairo context when it is current.

See also

void [cairo_autolink_context\(bool alink\)](#)

Note

Only available when configure has the `--enable-cairo` option

11.10.2.2 [cairo_autolink_context\(\)](#) [2/2]

```
static void Fl::cairo_autolink_context (
    bool alink ) [inline], [static]
```

When FLTK_HAVE_CAIRO is defined and [cairo_autolink_context\(\)](#) is true, any current window dc is linked to a current Cairo context.

This is not the default, because it may not be necessary to add Cairo support to all fltk supported windows. When you wish to associate a Cairo context in this mode, you need to call explicitly in your `draw()` overridden method, [Fl::cairo_make_current\(Fl_Window*\)](#). This will create a Cairo context only for this Window. Still in custom Cairo application it is possible to handle completely this process automatically by setting `alink` to true. In this last case, you don't need anymore to call [Fl::cairo_make_current\(\)](#). You can use [Fl::cairo_cc\(\)](#) to get the current Cairo context anytime.

Note

Only available when configure has the `--enable-cairo` option

11.10.2.3 `cairo_cc()`

```
static void Fl::cairo_cc (
    cairo_t * c,
    bool own = false ) [inline], [static]
```

Sets the current Cairo context to `c`.

Set `own` to true if you want fltk to handle this cc deletion.

Note

Only available when configure has the `--enable-Cairo` option

11.10.2.4 `cairo_flush()`

```
static void Fl::cairo_flush (
    cairo_t * c ) [inline], [static]
```

Flush Cairo drawings on Cairo context `c`.

This is **required** on Windows if you use the Cairo context provided by the "Cairo autolink" option. Call this when all your drawings on the Cairo context are finished. This is maybe not necessary on other platforms than Windows but it does no harm if you call it always.

You don't need to use this if you use an [Fl_Cairo_Window](#) which does this automatically after the draw callback returns.

Code example for "Cairo autolink" mode:

In the overridden `draw()` method of your subclass of [Fl_Window](#) or any widget:

```
cairo_t *cc = Fl::cairo_cc(); // get the "autolink" Cairo context
// ... your Cairo drawings are here ...
Fl::cairo_flush(cc); // flush Cairo drawings to the device
```

If you configure FLTK with `'--enable-cairo'` or CMake option `'FLTK_OPTION_CAIRO_WINDOW'` (i.e. without `'--enable-cairoext'` or CMake option `'FLTK_OPTION_CAIRO_EXT'`) or if you don't enable the `'autolink'` Cairo context you may do the equivalent to use Cairo drawings in an overridden `draw()` method of derived classes by using

```
// get the Cairo context for the \c window
cairo_t *cc = Fl::cairo_make_current(window);
// ... your Cairo drawings are here ...
Fl::cairo_flush(cc); // flush Cairo drawings to the device
```

See also

[Fl::cairo_autolink_context\(bool\)](#)

[Fl::cairo_make_current\(Fl_Window*\)](#);

11.10.2.5 `cairo_make_current()`

```
cairo_t * Fl::cairo_make_current (
    Fl_Window * wi ) [static]
```

Provides a Cairo context for window `wi`.

This is needed in a `draw()` override if [Fl::cairo_autolink_context\(\)](#) returns false, which is the default. The `cairo_↔` context() does not need to be freed as it is freed every time a new Cairo context is created. When the program terminates, a call to `Fl::cairo_make_current(0)` will destroy any residual context.

Note

A new Cairo context is not always re-created when this method is used. In particular, if the current graphical context and the current window didn't change between two calls, the previous gc is internally kept, thus optimizing the drawing performances. Also, after this call, [Fl::cairo_cc\(\)](#) is adequately updated with this Cairo context.

Only available when configure has the `--enable-cairo` option

Returns

The valid `cairo_t *cairo` context associated to this window.

Return values

<code>NULL</code>	if <code>wi</code> is <code>NULL</code> or maybe with GL windows under Wayland
-------------------	--

11.11 Unicode and UTF-8 functions

fl global Unicode and UTF-8 handling functions declared in `<FL/fl_utf8.h>`

Macros

- `#define ERRORS_TO_CP1252 1`
Set to 1 to turn bad UTF-8 bytes in the 0x80-0x9f range into the Unicode index for Microsoft's CP1252 character set.
- `#define ERRORS_TO_ISO8859_1 1`
Set to 1 to turn bad UTF-8 bytes into ISO-8859-1.
- `#define NBC 0xFFFF + 1`
- `#define STRICT_RFC3629 0`
A number of Unicode code points are in fact illegal and should not be produced by a UTF-8 converter.

Functions

- `int fl_access` (const char *f, int mode)
Cross-platform function to test a files access() with a UTF-8 encoded name or value.
- `int fl_chdir` (const char *path)
Cross-platform function to change the current working directory, given as a UTF-8 encoded string.
- `int fl_chmod` (const char *f, int mode)
Cross-platform function to set a files mode() with a UTF-8 encoded name or value.
- `int fl_close_fd` (int fd)
Cross-platform function to close a file descriptor.
- `int fl_execvp` (const char *file, char *const *argv)
- `FILE * fl_fopen` (const char *f, const char *mode)
Cross-platform function to open files with a UTF-8 encoded name.
- `char * fl_getcwd` (char *buf, int len)
Cross-platform function to get the current working directory as a UTF-8 encoded value.
- `char * fl_getenv` (const char *v)
Cross-platform function to get environment variables with a UTF-8 encoded name or value.
- `char fl_make_path` (const char *path)
Cross-platform function to recursively create a path in the file system.
- `void fl_make_path_for_file` (const char *path)
Cross-platform function to create a path for the file in the file system.
- `int fl_mkdir` (const char *f, int mode)
Cross-platform function to create a directory with a UTF-8 encoded name.
- `unsigned int fl_nonspacing` (unsigned int ucs)
Returns true if the Unicode character `ucs` is non-spacing.
- `int fl_open` (const char *fname, int oflags,...)
Cross-platform function to open files with a UTF-8 encoded name.
- `int fl_open_ext` (const char *fname, int binary, int oflags,...)
Cross-platform function to open files with a UTF-8 encoded name.
- `int fl_putenv` (const char *var)
Cross-platform function to write environment variables with a UTF-8 encoded name or value.
- `int fl_rename` (const char *f, const char *n)
Cross-platform function to rename a filesystem object using UTF-8 encoded names.

- `int fl_rmdir` (const char *f)
Cross-platform function to remove a directory with a UTF-8 encoded name.
- `int fl_stat` (const char *f, struct stat *b)
Cross-platform function to stat() a file using a UTF-8 encoded name or value.
- `int fl_system` (const char *cmd)
Cross-platform function to run a system command with a UTF-8 encoded string.
- `int fl_tolower` (unsigned int ucs)
Returns the Unicode lower case value of ucs.
- `int fl_toupper` (unsigned int ucs)
Returns the Unicode upper case value of ucs.
- `unsigned fl_ucs_to_Utf16` (const unsigned ucs, unsigned short *dst, const unsigned dstlen)
Convert a single 32-bit Unicode codepoint into an array of 16-bit characters.
- `int fl_unlink` (const char *fname)
Cross-platform function to unlink() (that is, delete) a file using a UTF-8 encoded filename.
- `char * fl_utf2mbcs` (const char *s)
Converts UTF-8 string s to a local multi-byte character string.
- `const char * fl_utf8back` (const char *p, const char *start, const char *end)
Move p backward until it points to the start of a UTF-8 character.
- `int fl_utf8bytes` (unsigned ucs)
Return the number of bytes needed to encode the given UCS4 character in UTF-8.
- `unsigned fl_utf8decode` (const char *p, const char *end, int *len)
Decode a single UTF-8 encoded character starting at p.
- `int fl_utf8encode` (unsigned ucs, char *buf)
Write the UTF-8 encoding of ucs into buf and return the number of bytes written.
- `unsigned fl_utf8from_mb` (char *dst, unsigned dstlen, const char *src, unsigned srclen)
Convert a filename from the locale-specific multibyte encoding used by Windows to UTF-8 as used by FLTK.
- `unsigned fl_utf8froma` (char *dst, unsigned dstlen, const char *src, unsigned srclen)
Convert an ISO-8859-1 (ie normal c-string) byte stream to UTF-8.
- `unsigned fl_utf8fromwc` (char *dst, unsigned dstlen, const wchar_t *src, unsigned srclen)
Turn "wide characters" as returned by some system calls (especially on Windows) into UTF-8.
- `const char * fl_utf8fwd` (const char *p, const char *start, const char *end)
Move p forward until it points to the start of a UTF-8 character.
- `int fl_utf8len` (char c)
Returns the byte length of the UTF-8 sequence with first byte c, or -1 if c is not valid.
- `int fl_utf8len1` (char c)
Returns the byte length of the UTF-8 sequence with first byte c, or 1 if c is not valid.
- `int fl_utf8locale` ()
Return true if the "locale" seems to indicate that UTF-8 encoding is used.
- `int fl_utf8strlen` (const char *text, int len)
Return the length in bytes of a UTF-8 string.
- `int fl_utf8test` (const char *src, unsigned srclen)
Examines the first srclen bytes in src and returns a verdict on whether it is UTF-8 or not.
- `unsigned fl_utf8to_mb` (const char *src, unsigned srclen, char *dst, unsigned dstlen)
Convert the UTF-8 used by FLTK to the locale-specific encoding used for filenames (and sometimes used for data in files).
- `unsigned fl_utf8toa` (const char *src, unsigned srclen, char *dst, unsigned dstlen)
Convert a UTF-8 sequence into an array of 1-byte characters.
- `unsigned fl_utf8toUtf16` (const char *src, unsigned srclen, unsigned short *dst, unsigned dstlen)
Convert a UTF-8 sequence into an array of 16-bit characters.
- `unsigned fl_utf8towc` (const char *src, unsigned srclen, wchar_t *dst, unsigned dstlen)
Converts a UTF-8 string into a wide character string.

- `int fl_utf_nb_char` (const unsigned char *buf, int len)
Returns the number of Unicode chars in the UTF-8 string.
- `int fl_utf_strcasecmp` (const char *s1, const char *s2)
UTF-8 aware strcasecmp - converts to Unicode and tests.
- `int fl_utf_strncasecmp` (const char *s1, const char *s2, int n)
UTF-8 aware strncasecmp - converts to lower case Unicode and tests.
- `int fl_utf_tolower` (const unsigned char *str, int len, char *buf)
Converts the string str to its lower case equivalent into buf.
- `int fl_utf_toupper` (const unsigned char *str, int len, char *buf)
Converts the string str to its upper case equivalent into buf.
- `int fl_wcwidth` (const char *src)
extended wrapper around fl_wcwidth_(unsigned int ucs) function.
- `int fl_wcwidth_` (unsigned int ucs)
Wrapper to adapt Markus Kuhn's implementation of wcwidth() for FLTK.

11.11.1 Detailed Description

fl global Unicode and UTF-8 handling functions declared in `<FL/fl_utf8.h>`

11.11.2 Macro Definition Documentation

11.11.2.1 ERRORS_TO_CP1252

```
#define ERRORS_TO_CP1252 1
```

Set to 1 to turn bad UTF-8 bytes in the 0x80-0x9f range into the Unicode index for Microsoft's CP1252 character set.

You should also set `ERRORS_TO_ISO8859_1`. With this a huge amount of more available text (such as all web pages) are correctly converted to Unicode.

11.11.2.2 ERRORS_TO_ISO8859_1

```
#define ERRORS_TO_ISO8859_1 1
```

Set to 1 to turn bad UTF-8 bytes into ISO-8859-1.

If this is zero they are instead turned into the Unicode REPLACEMENT CHARACTER, of value 0xfffd. If this is on `fl_utf8decode()` will correctly map most (perhaps all) human-readable text that is in ISO-8859-1. This may allow you to completely ignore character sets in your code because virtually everything is either ISO-8859-1 or UTF-8.

11.11.2.3 STRICT_RFC3629

```
#define STRICT_RFC3629 0
```

A number of Unicode code points are in fact illegal and should not be produced by a UTF-8 converter.

Turn this on will replace the bytes in those encodings with errors. If you do this then converting arbitrary 16-bit data to UTF-8 and then back is not an identity, which will probably break a lot of software.

11.11.3 Function Documentation

11.11.3.1 fl_access()

```
int fl_access (
    const char * f,
    int mode )
```

Cross-platform function to test a files access() with a UTF-8 encoded name or value.

This function is especially useful on the Windows platform where the standard access() function fails with UTF-8 encoded non-ASCII filenames.

Windows defines the mode values 0 for existence, 2 for writable, 4 for readable, and 6 of readable and writable. On other systems, the modes `X_OK`, `W_OK`, and `R_OK` are usually defined as 1, 2, and 4.

Upon successful completion, the value 0 is returned on all platforms.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
in	<i>mode</i>	the mode to test

Returns

the return value of `_waccess()` on Windows or `access()` on other platforms.

11.11.3.2 fl_chdir()

```
int fl_chdir (
    const char * path )
```

Cross-platform function to change the current working directory, given as a UTF-8 encoded string.

This function is especially useful on the Windows platform where the standard `_wchdir()` function needs a `path` in UTF-16 encoding.

The `path` is converted to a system specific encoding if necessary and the system specific `chdir (converted←_path)` function is called.

The function returns 0 on success and -1 on error. Depending on the platform, `errno` **may** be set if an error occurs.

Note

The possible `errno` values are platform specific. Refer to the documentation of the platform specific `chdir()` function.

If the function is not implemented on a particular platform the default implementation returns -1 and `errno` is **not** set.

If the `path` is `NULL` the function returns -1, but `errno` is **not** changed. This is a convenience feature of `fl_chdir()` as opposed to `chdir()`.

Parameters

in	<i>path</i>	the target directory for <code>chdir</code> (may be <code>NULL</code>)
----	-------------	---

Returns

0 if successful, -1 on error (`errno` may be set)

11.11.3.3 fl_chmod()

```
int fl_chmod (
    const char * f,
    int mode )
```

Cross-platform function to set a files mode() with a UTF-8 encoded name or value.

This function is especially useful on the Windows platform where the standard `chmod()` function fails with UTF-8 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
in	<i>mode</i>	the mode to set

Returns

the return value of `_wchmod()` on Windows or `chmod()` on other platforms.

11.11.3.4 fl_close_fd()

```
int fl_close_fd (
    int fd )
```

Cross-platform function to close a file descriptor.

Returns

0 in case of success, or -1 in case of error.

11.11.3.5 fl_fopen()

```
FILE * fl_fopen (
    const char * f,
    const char * mode )
```

Cross-platform function to open files with a UTF-8 encoded name.

This function is especially useful on the Windows platform where the standard `fopen()` function fails with UTF-8 encoded non-ASCII filenames.

Parameters

<i>f</i>	the UTF-8 encoded filename
<i>mode</i>	same as the second argument of the standard <code>fopen()</code> function

Returns

a FILE pointer upon successful completion, or NULL in case of error.

See also

[fl_open\(\)](#).

11.11.3.6 fl_getcwd()

```
char * fl_getcwd (
    char * buf,
    int len )
```

Cross-platform function to get the current working directory as a UTF-8 encoded value.

This function is especially useful on the Windows platform where the standard `_wgetcwd()` function returns UTF-16 encoded non-ASCII filenames.

If `buf` is NULL a buffer of size `(len+1)` is allocated, filled with the current working directory, and returned. In this case the buffer must be released by the caller with `free()` to prevent memory leaks.

Parameters

in	<i>buf</i>	the buffer to populate (may be NULL)
in	<i>len</i>	the length of the buffer

Returns

the CWD encoded as UTF-8

11.11.3.7 fl_getenv()

```
char * fl_getenv (
    const char * v )
```

Cross-platform function to get environment variables with a UTF-8 encoded name or value.

This function is especially useful on the Windows platform where non-ASCII environment variables are encoded as wide characters. The returned value of the variable is encoded in UTF-8 as well.

On platforms other than Windows this function calls `getenv` directly. The return value is returned as-is.

The return value is a pointer to an implementation defined buffer:

- an internal buffer that is (re)allocated as needed (Windows) or
- the string in the environment itself (Unix, Linux, MacOS) or
- any other implementation (other platforms). This string must be considered read-only and must not be freed by the caller.

If the resultant string is to be used later it must be copied to a safe place. The next call to `fl_getenv()` or any other environment changes may overwrite the string.

Note

This function is not thread-safe.

Parameters

in	v	the UTF-8 encoded environment variable
----	---	--

Returns

the environment variable in UTF-8 encoding, or NULL in case of error.

11.11.3.8 fl_make_path()

```
char fl_make_path (
    const char * path )
```

Cross-platform function to recursively create a path in the file system.

This function creates a `path` in the file system by recursively creating all directories.

Parameters

in	path	a Unix style ('/' forward slashes) absolute or relative pathname
----	------	--

Returns

1 if the path was created, 0 if creating the path failed at some point

11.11.3.9 fl_make_path_for_file()

```
void fl_make_path_for_file (
    const char * path )
```

Cross-platform function to create a path for the file in the file system.

This function strips the filename from the given `path` and creates a path in the file system by recursively creating all directories.

11.11.3.10 fl_mkdir()

```
int fl_mkdir (
    const char * f,
    int mode )
```

Cross-platform function to create a directory with a UTF-8 encoded name.

This function is especially useful on the Windows platform where the standard `_wmkdir()` function expects UTF-16 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
in	<i>mode</i>	the mode of the directory

Returns

the return value of `_wmkdir()` on Windows or `mkdir()` on other platforms.

11.11.3.11 fl_nonspacing()

```
unsigned int fl_nonspacing (
    unsigned int ucs )
```

Returns true if the Unicode character `ucs` is non-spacing.

Non-spacing characters in Unicode are typically combining marks like tilde (~), diaeresis (¨), or other marks that are added to a base character, for instance 'a' (base character) + '¨' (combining mark) = 'ä' (German Umlaut).

- http://unicode.org/glossary/#base_character
- http://unicode.org/glossary/#nonspacing_mark
- http://unicode.org/glossary/#combining_character

11.11.3.12 fl_open()

```
int fl_open (
    const char * fname,
    int oflags,
    ... )
```

Cross-platform function to open files with a UTF-8 encoded name.

This function is especially useful on the Windows platform where the standard `open()` function fails with UTF-8 encoded non-ASCII filenames.

Parameters

in	<i>fname</i>	the UTF-8 encoded filename
in	<i>oflags</i>	other arguments are as in the standard <code>open()</code> function

Returns

a file descriptor upon successful completion, or -1 in case of error.

See also

[fl_fopen\(\)](#), [fl_open_ext\(\)](#), [fl_close_fd\(int fd\)](#).

11.11.3.13 fl_open_ext()

```
int fl_open_ext (
    const char * fname,
```

```

    int binary,
    int oflags,
    ... )

```

Cross-platform function to open files with a UTF-8 encoded name.

In comparison with `fl_open()`, this function allows to control whether the file is opened in binary (a.k.a. untranslated) mode. This is especially useful on the Windows platform where files are by default opened in text (translated) mode.

Parameters

in	<i>fname</i>	the UTF-8 encoded filename
in	<i>binary</i>	if non-zero, the file is to be accessed in binary (a.k.a. untranslated) mode.
in	<i>oflags</i> ,...	these arguments are as in the standard <code>open()</code> function. Setting <code>oflags</code> to zero opens the file for reading.

Returns

a file descriptor upon successful completion, or -1 in case of error.

11.11.3.14 fl_putenv()

```

int fl_putenv (
    const char * var )

```

Cross-platform function to write environment variables with a UTF-8 encoded name or value.

This function is especially useful on the Windows platform where non-ASCII environment variables are encoded as wide characters.

The given argument `var` must be encoded in UTF-8 in the form "name=value". The 'name' part must conform to platform dependent restrictions on environment variable names.

The string given in `var` is copied and optionally converted to the required encoding for the platform. On platforms other than Windows this function calls `putenv` directly.

The return value is zero on success and non-zero in case of error. The value in case of error is platform specific and returned as-is.

Note

The copied string is allocated on the heap and "lost" on some platforms, i.e. calling `fl_putenv()` to change environment variables frequently may cause memory leaks. There may be an option to avoid this in a future implementation.

This function is not thread-safe.

Parameters

in	<i>var</i>	the UTF-8 encoded environment variable 'name=value'
----	------------	---

Returns

0 on success, non-zero in case of error.

11.11.3.15 fl_rename()

```

int fl_rename (
    const char * f,
    const char * n )

```

Cross-platform function to rename a filesystem object using UTF-8 encoded names.

This function is especially useful on the Windows platform where the standard `_wrename()` function expects UTF-16 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename to change
in	<i>n</i>	the new UTF-8 encoded filename to set

Returns

the return value of `_wrename()` on Windows or `rename()` on other platforms.

11.11.3.16 fl_rmdir()

```
int fl_rmdir (
    const char * f )
```

Cross-platform function to remove a directory with a UTF-8 encoded name.

This function is especially useful on the Windows platform where the standard `_wrmdir()` function expects UTF-16 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename to remove
----	----------	--------------------------------------

Returns

the return value of `_wrmdir()` on Windows or `rmdir()` on other platforms.

11.11.3.17 fl_stat()

```
int fl_stat (
    const char * f,
    struct stat * b )
```

Cross-platform function to `stat()` a file using a UTF-8 encoded name or value.

This function is especially useful on the Windows platform where the standard `stat()` function fails with UTF-8 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
	<i>b</i>	the stat struct to populate

Returns

the return value of `_wstat()` on Windows or `stat()` on other platforms.

11.11.3.18 fl_system()

```
int fl_system (
    const char * cmd )
```

Cross-platform function to run a system command with a UTF-8 encoded string.

This function is especially useful on the Windows platform where non-ASCII program (file) names must be encoded as wide characters.

On platforms other than Windows this function calls `system()` directly.

Parameters

in	<i>cmd</i>	the UTF-8 encoded command string
----	------------	----------------------------------

Returns

the return value of `_wsystem()` on Windows or `system()` on other platforms.

11.11.3.19 fl_ucs_to_Utf16()

```
unsigned fl_ucs_to_Utf16 (
    const unsigned ucs,
    unsigned short * dst,
    const unsigned dstlen )
```

Convert a single 32-bit Unicode codepoint into an array of 16-bit characters.

These are used by some system calls, especially on Windows.

`ucs` is the value to convert.

`dst` points at an array to write, and `dstlen` is the number of locations in this array. At most `dstlen` words will be written, and a 0 terminating word will be added if `dstlen` is large enough. Thus this function will never overwrite the buffer and will attempt return a zero-terminated string if space permits. If `dstlen` is zero then `dst` can be set to NULL and no data is written, but the length is returned.

The return value is the number of 16-bit words that *would* be written to `dst` if it is large enough, not counting any terminating zero.

If the return value is greater than `dstlen` it indicates truncation, you should then allocate a new array of size `return+1` and call this again.

Unicode characters in the range 0x10000 to 0x10ffff are converted to "surrogate pairs" which take two words each (in UTF-16 encoding). Typically, setting `dstlen` to 2 will ensure that any valid Unicode value can be converted, and setting `dstlen` to 3 or more will allow a NULL terminated sequence to be returned.

11.11.3.20 fl_unlink()

```
int fl_unlink (
    const char * fname )
```

Cross-platform function to `unlink()` (that is, delete) a file using a UTF-8 encoded filename.

This function is especially useful on the Windows platform where the standard function expects UTF-16 encoded non-ASCII filenames.

Parameters

<code>fname</code>	the filename to unlink
--------------------	------------------------

Returns

the return value of `_wunlink()` on Windows or `unlink()` on other platforms.

11.11.3.21 fl_utf8back()

```
const char * fl_utf8back (
    const char * p,
    const char * start,
    const char * end )
```

Move `p` backward until it points to the start of a UTF-8 character.

If it already points at the start of one then it is returned unchanged. Any UTF-8 errors are treated as though each byte of the error is an individual character.

`start` is the start of the string and is used to limit the backwards search for the start of a UTF-8 character.

`end` is the end of the string and is assumed to be a break between characters. It is assumed to be greater than `p`.

If you wish to decrement a UTF-8 pointer, pass `p-1` to this.

11.11.3.22 fl_utf8bytes()

```
int fl_utf8bytes (
    unsigned ucs )
```

Return the number of bytes needed to encode the given UCS4 character in UTF-8. Returns number of bytes that `utf8encode()` will use to encode the character `ucs`.

Parameters

<code>in</code>	<code>ucs</code>	UCS4 encoded character
-----------------	------------------	------------------------

Returns

number of bytes required

11.11.3.23 `fl_utf8decode()`

```
unsigned fl_utf8decode (
    const char * p,
    const char * end,
    int * len )
```

Decode a single UTF-8 encoded character starting at `p`.

The resulting Unicode value (in the range 0-0x10ffff) is returned, and `len` is set to the number of bytes in the UTF-8 encoding (adding `len` to `p` will point at the next character).

If `p` points at an illegal UTF-8 encoding, including one that would go past `end`, or where a code uses more bytes than necessary, then `*(unsigned char*)p` is translated as though it is in the Microsoft CP1252 character set and `len` is set to 1. Treating errors this way allows this to decode almost any ISO-8859-1 or CP1252 text that has been mistakenly placed where UTF-8 is expected, and has proven very useful.

If you want errors to be converted to error characters (as the standards recommend), adding a test to see if the length is unexpectedly 1 will work:

```
if (*p & 0x80) { // what should be a multibyte encoding
    code = fl_utf8decode(p,end,&len);
    if (len<2) code = 0xFFFD; // Turn errors into REPLACEMENT CHARACTER
} else { // handle the 1-byte UTF-8 encoding:
    code = *p;
    len = 1;
}
```

Direct testing for the 1-byte case (as shown above) will also speed up the scanning of strings where the majority of characters are ASCII.

11.11.3.24 `fl_utf8encode()`

```
int fl_utf8encode (
    unsigned ucs,
    char * buf )
```

Write the UTF-8 encoding of `ucs` into `buf` and return the number of bytes written.

Up to 4 bytes may be written. If you know that `ucs` is less than 0x10000 then at most 3 bytes will be written. If you wish to speed this up, remember that anything less than 0x80 is written as a single byte.

If `ucs` is greater than 0x10ffff this is an illegal character according to RFC 3629. These are converted as though they are 0xFFFD (REPLACEMENT CHARACTER).

RFC 3629 also says many other values for `ucs` are illegal (in the range 0xd800 to 0xdfff, or ending with 0xfffe or 0xffff). However I encode these as though they are legal, so that `utf8encode/fl_utf8decode` will be the identity for all codes between 0 and 0x10ffff.

11.11.3.25 `fl_utf8from_mb()`

```
unsigned fl_utf8from_mb (
    char * dst,
    unsigned dstlen,
    const char * src,
    unsigned srclen )
```

Convert a filename from the locale-specific multibyte encoding used by Windows to UTF-8 as used by FLTK.

Up to `dstlen` bytes are written to `dst`, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to `dstlen` then if you malloc a new array of

size `n+1` you will have the space needed for the entire string. If `dstlen` is zero then nothing is written and this call just measures the storage space needed.

On Unix or on Windows when a UTF-8 locale is in effect, this does not change the data. You may also want to check if `fl_utf8test()` returns non-zero, so that the filesystem can store filenames in UTF-8 encoding regardless of the locale.

11.11.3.26 `fl_utf8froma()`

```
unsigned fl_utf8froma (
    char * dst,
    unsigned dstlen,
    const char * src,
    unsigned srclen )
```

Convert an ISO-8859-1 (ie normal c-string) byte stream to UTF-8.

It is possible this should convert Microsoft's CP1252 to UTF-8 instead. This would translate the codes in the range 0x80-0x9f to different characters. Currently it does not do this.

Up to `dstlen` bytes are written to `dst`, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to `dstlen` then if you malloc a new array of size `n+1` you will have the space needed for the entire string. If `dstlen` is zero then nothing is written and this call just measures the storage space needed.

`srclen` is the number of bytes in `src` to convert.

If the return value equals `srclen` then this indicates that no conversion is necessary, as only ASCII characters are in the string.

11.11.3.27 `fl_utf8fromwc()`

```
unsigned fl_utf8fromwc (
    char * dst,
    unsigned dstlen,
    const wchar_t * src,
    unsigned srclen )
```

Turn "wide characters" as returned by some system calls (especially on Windows) into UTF-8.

Up to `dstlen` bytes are written to `dst`, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to `dstlen` then if you malloc a new array of size `n+1` you will have the space needed for the entire string. If `dstlen` is zero then nothing is written and this call just measures the storage space needed.

`srclen` is the number of words in `src` to convert. On Windows this is not necessarily the number of characters, due to there possibly being "surrogate pairs" in the UTF-16 encoding used. On Unix `wchar_t` is 32 bits and each location is a character.

On Unix if a `src` word is greater than 0x10ffff then this is an illegal character according to RFC 3629. These are converted as though they are 0xFFFD (REPLACEMENT CHARACTER). Characters in the range 0xd800 to 0xdfff, or ending with 0xfffe or 0xffff are also illegal according to RFC 3629. However I encode these as though they are legal, so that `fl_utf8towc` will return the original data.

On Windows "surrogate pairs" are converted to a single character and UTF-8 encoded (as 4 bytes). Mismatched halves of surrogate pairs are converted as though they are individual characters.

11.11.3.28 `fl_utf8fwd()`

```
const char * fl_utf8fwd (
    const char * p,
    const char * start,
    const char * end )
```

Move `p` forward until it points to the start of a UTF-8 character.

If it already points at the start of one then it is returned unchanged. Any UTF-8 errors are treated as though each byte of the error is an individual character.

`start` is the start of the string and is used to limit the backwards search for the start of a UTF-8 character.

`end` is the end of the string and is assumed to be a break between characters. It is assumed to be greater than `p`.

This function is for moving a pointer that was jumped to the middle of a string, such as when doing a binary search for a position. You should use either this or `fl_utf8back()` depending on which direction your algorithm can handle

the pointer moving. Do not use this to scan strings, use [fl_utf8decode\(\)](#) instead.

11.11.3.29 fl_utf8len()

```
int fl_utf8len (
    char c )
```

Returns the byte length of the UTF-8 sequence with first byte `c`, or -1 if `c` is not valid. This function is helpful for finding faulty UTF-8 sequences.

See also

[fl_utf8len1](#)

11.11.3.30 fl_utf8len1()

```
int fl_utf8len1 (
    char c )
```

Returns the byte length of the UTF-8 sequence with first byte `c`, or 1 if `c` is not valid. This function can be used to scan faulty UTF-8 sequences, albeit ignoring invalid codes.

See also

[fl_utf8len](#)

11.11.3.31 fl_utf8locale()

```
int fl_utf8locale (
    void )
```

Return true if the "locale" seems to indicate that UTF-8 encoding is used.

If true the `fl_utf8to_mb` and `fl_utf8from_mb` don't do anything useful.

It is highly recommended that you change your system so this does return true. On Windows this is done by setting the "codepage" to CP_UTF8. On Unix this is done by setting `$LC_CTYPE` to a string containing the letters "utf" or "UTF" in it, or by deleting all `$LC*` and `$LANG` environment variables. In the future it is likely that all non-Asian Unix systems will return true, due to the compatibility of UTF-8 with ISO-8859-1.

11.11.3.32 fl_utf8strlen()

```
int fl_utf8strlen (
    const char * text,
    int len )
```

Return the length in bytes of a UTF-8 string.

Parameters

in	<i>text</i>	encoded in UTF-8
in	<i>len</i>	number of Unicode characters, -1 to test until the end of text

Returns

number of bytes that make up the Unicode string

See also

[fl_utf_nb_char\(const unsigned char *buf, int len\)](#)

11.11.3.33 fl_utf8test()

```
int fl_utf8test (
    const char * src,
    unsigned srclen )
```

Examines the first `srclen` bytes in `src` and returns a verdict on whether it is UTF-8 or not.

- Returns 0 if there is any illegal UTF-8 sequences, using the same rules as [fl_utf8decode\(\)](#). Note that some UCS values considered illegal by RFC 3629, such as 0xffff, are considered legal by this.
- Returns 1 if there are only single-byte characters (ie no bytes have the high bit set). This is legal UTF-8, but also indicates plain ASCII. It also returns 1 if `srclen` is zero.
- Returns 2 if there are only characters less than 0x800.
- Returns 3 if there are only characters less than 0x10000.
- Returns 4 if there are characters in the 0x10000 to 0x10ffff range.

Because there are many illegal sequences in UTF-8, it is almost impossible for a string in another encoding to be confused with UTF-8. This is very useful for transitioning Unix to UTF-8 filenames, you can simply test each filename with this to decide if it is UTF-8 or in the locale encoding. My hope is that if this is done we will be able to cleanly transition to a locale-less encoding.

11.11.3.34 fl_utf8to_mb()

```
unsigned fl_utf8to_mb (
    const char * src,
    unsigned srclen,
    char * dst,
    unsigned dstlen )
```

Convert the UTF-8 used by FLTK to the locale-specific encoding used for filenames (and sometimes used for data in files).

Unfortunately due to stupid design you will have to do this as needed for filenames. This is a bug on both Unix and Windows.

Up to `dstlen` bytes are written to `dst`, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to `dstlen` then if you malloc a new array of size `n+1` you will have the space needed for the entire string. If `dstlen` is zero then nothing is written and this call just measures the storage space needed.

If [fl_utf8locale\(\)](#) returns true then this does not change the data.

11.11.3.35 fl_utf8toa()

```
unsigned fl_utf8toa (
    const char * src,
    unsigned srclen,
    char * dst,
    unsigned dstlen )
```

Convert a UTF-8 sequence into an array of 1-byte characters.

If the UTF-8 decodes to a character greater than 0xff then it is replaced with '?'.

Errors in the UTF-8 sequence are converted as individual bytes, same as [fl_utf8decode\(\)](#) does. This allows ISO-8859-1 text mistakenly identified as UTF-8 to be printed correctly (and possibly CP1252 on Windows).

`src` points at the UTF-8 sequence, and `srclen` is the number of bytes to convert.

Up to `dstlen` bytes are written to `dst`, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to `dstlen` then if you malloc a new array of size `n+1` you will have the space needed for the entire string. If `dstlen` is zero then nothing is written and this call just measures the storage space needed.

11.11.3.36 fl_utf8toUtf16()

```
unsigned fl_utf8toUtf16 (
    const char * src,
    unsigned srclen,
    unsigned short * dst,
    unsigned dstlen )
```

Convert a UTF-8 sequence into an array of 16-bit characters.

These are used by some system calls, especially on Windows.

`src` points at the UTF-8, and `srclen` is the number of bytes to convert.

`dst` points at an array to write, and `dstlen` is the number of locations in this array. At most `dstlen-1` words will be written there, plus a 0 terminating word. Thus this function will never overwrite the buffer and will always return a zero-terminated string. If `dstlen` is zero then `dst` can be null and no data is written, but the length is returned. The return value is the number of 16-bit words that *would* be written to `dst` if it were long enough, not counting the terminating zero. If the return value is greater or equal to `dstlen` it indicates truncation, you can then allocate a new array of size `return+1` and call this again.

Errors in the UTF-8 are converted as though each byte in the erroneous string is in the Microsoft CP1252 encoding. This allows ISO-8859-1 text mistakenly identified as UTF-8 to be printed correctly.

Unicode characters in the range 0x10000 to 0x10ffff are converted to "surrogate pairs" which take two words each (this is called UTF-16 encoding).

11.11.3.37 `fl_utf8towc()`

```
unsigned fl_utf8towc (
    const char * src,
    unsigned srclen,
    wchar_t * dst,
    unsigned dstlen )
```

Converts a UTF-8 string into a wide character string.

This function generates 32-bit `wchar_t` (e.g. "ucs4" as it were) except on Windows where it is equivalent to `fl_utf8toUtf16` and returns UTF-16.

`src` points at the UTF-8, and `srclen` is the number of bytes to convert.

`dst` points at an array to write, and `dstlen` is the number of locations in this array. At most `dstlen-1` `wchar_t` will be written there, plus a 0 terminating `wchar_t`.

The return value is the number of `wchar_t` that *would* be written to `dst` if it were long enough, not counting the terminating zero. If the return value is greater or equal to `dstlen` it indicates truncation, you can then allocate a new array of size `return+1` and call this again.

Notice that `sizeof(wchar_t)` is 2 on Windows and is 4 on Linux and most other systems. Where `wchar_t` is 16 bits, Unicode characters in the range 0x10000 to 0x10ffff are converted to "surrogate pairs" which take two words each (this is called UTF-16 encoding). If `wchar_t` is 32 bits this rather nasty problem is avoided.

Note that Windows includes Cygwin, i.e. compiled with Cygwin's POSIX layer (`cygwin1.dll`, `-enable-cygwin`), either native (GDI) or X11.

11.11.3.38 `fl_utf_nb_char()`

```
int fl_utf_nb_char (
    const unsigned char * buf,
    int len )
```

Returns the number of Unicode chars in the UTF-8 string.

See also

[fl_utf8strlen\(const char *text, int len\)](#)

11.11.3.39 `fl_utf_strcasecmp()`

```
int fl_utf_strcasecmp (
    const char * s1,
    const char * s2 )
```

UTF-8 aware `strcasecmp` - converts to Unicode and tests.

Returns

result of comparison

Return values

0	if the strings are equal
---	--------------------------

Return values

1	if s1 is greater than s2
-1	if s1 is less than s2

11.11.3.40 fl_utf_strncasecmp()

```
int fl_utf_strncasecmp (
    const char * s1,
    const char * s2,
    int n )
```

UTF-8 aware strncasecmp - converts to lower case Unicode and tests.

Parameters

<i>s1,s2</i>	the UTF-8 strings to compare
<i>n</i>	the maximum number of UTF-8 characters to compare

Returns

result of comparison

Return values

0	if the strings are equal
>0	if s1 is greater than s2
<0	if s1 is less than s2

11.11.3.41 fl_utf_tolower()

```
int fl_utf_tolower (
    const unsigned char * str,
    int len,
    char * buf )
```

Converts the string *str* to its lower case equivalent into *buf*.

Warning: to be safe *buf* length must be at least $3 * len$ [for 16-bit Unicode]

11.11.3.42 fl_utf_toupper()

```
int fl_utf_toupper (
    const unsigned char * str,
    int len,
    char * buf )
```

Converts the string *str* to its upper case equivalent into *buf*.

Warning: to be safe *buf* length must be at least $3 * len$ [for 16-bit Unicode]

11.11.3.43 fl_wcwidth()

```
int fl_wcwidth (
    const char * src )
```

extended wrapper around [fl_wcwidth_\(unsigned int ucs\)](#) function.

Parameters

<i>in</i>	<i>src</i>	pointer to start of UTF-8 byte sequence
-----------	------------	---

Returns

width of character in columns

Depending on build options, this function may map C1 control characters (0x80 to 0x9f) to CP1252, and return the width of that character instead. This is not the same behaviour as `fl_wcwidth_(unsigned int ucs)`.

Note that other control characters and DEL will still return -1, so if you want different behaviour, you need to test for those characters before calling `fl_wcwidth()`, and handle them separately.

11.11.3.44 fl_wcwidth_()

```
int fl_wcwidth_ (
    unsigned int ucs )
```

Wrapper to adapt Markus Kuhn's implementation of `wcwidth()` for FLTK.

Parameters

in	<i>ucs</i>	Unicode character value
----	------------	-------------------------

Returns

width of character in columns

See <http://www.cl.cam.ac.uk/~mgk25/ucs/wcwidth.c> for Markus Kuhn's original implementation of `wcwidth()` and `wcswidth()` (defined in IEEE Std 1002.1-2001) for Unicode.

WARNING: this function returns widths for "raw" Unicode characters. It does not even try to map C1 control characters (0x80 to 0x9F) to CP1252, and C0/C1 control characters and DEL will return -1. You are advised to use `fl_width(const char* src)` instead.

11.12 String handling functions

String handling functions declared in `<FL/fl_string_functions.h>`

Functions

- `char * fl_strdup (const char *s)`
Cross platform interface to POSIX function `strdup()`.

11.12.1 Detailed Description

String handling functions declared in `<FL/fl_string_functions.h>`

11.12.2 Function Documentation

11.12.2.1 fl_strdup()

```
char * fl_strdup (
    const char * s )
```

Cross platform interface to POSIX function `strdup()`.

The `fl_strdup()` function returns a pointer to a new string which is a duplicate of the string 's'. Memory for the new string is obtained with `malloc(3)`, and can be freed with `free(3)`.

Implementation:

- POSIX: `strdup()`
- WinAPI: `_strdup()`

11.13 Mac OS X-specific symbols

Mac OS X-specific symbols declared in `<FL/platform.H>`

Classes

- class [FL_Mac_App_Menu](#)

Functions

- [FL_Window](#) * [fl_mac_find](#) (FLWindow *)
Returns the [FL_Window](#) corresponding to the given macOS-specific window reference.
- CGContextRef [fl_mac_gc](#) ()
Returns the macOS-specific graphics context for the current window.
- void [fl_mac_set_about](#) ([FL_Callback](#) *cb, void *user_data, int shortcut=0)
Attaches a callback to the "About myprog" item of the system application menu.
- FLWindow * [fl_mac_xid](#) (const [FL_Window](#) *win)
Returns the macOS-specific window reference corresponding to the given [FL_Window](#) object.
- void [fl_open_callback](#) (void(*cb)(const char *))
Register a function called for each file dropped onto an application icon.

Variables

- int [fl_mac_os_version](#)
The version number of the running Mac OS X (e.g., 100604 for 10.6.4, 101300 for 10.13, 140102 for 14.1.2).

11.13.1 Detailed Description

Mac OS X-specific symbols declared in [<FL/platform.H>](#)

See also

[The Apple OS X Interface](#)

11.13.2 Function Documentation

11.13.2.1 [fl_mac_set_about\(\)](#)

```
void fl_mac_set_about (
    FL\_Callback * cb,
    void * user_data,
    int shortcut = 0 )
```

Attaches a callback to the "About myprog" item of the system application menu.

For back-compatibility. Equivalent to [FL_Sys_Menu_Bar::about\(FL_Callback *cb, void *user_data\)](#).

11.13.2.2 [fl_open_callback\(\)](#)

```
void fl_open_callback (
    void(*) (const char *) cb )
```

Register a function called for each file dropped onto an application icon.

This function is effective only on the Mac OS X platform. `cb` will be called with a single Unix-style file name and path. If multiple files were dropped, `cb` will be called multiple times.

This function should be called before [fl_open_display\(\)](#) is called, either directly or indirectly (this happens at the first `show()` of a window), to be effective for files dropped on the application icon at launch time. It can also be called at any point to change the function used to open dropped files. A call with a NULL argument, after a previous call, makes the app ignore files dropped later.

11.13.3 Variable Documentation

11.13.3.1 [fl_mac_os_version](#)

```
int fl_mac_os_version [extern]
```

The version number of the running Mac OS X (e.g., 100604 for 10.6.4, 101300 for 10.13, 140102 for 14.1.2).

FLTK initializes this global variable before `main()` begins running. If the value is needed in a static initializer, a previous call to [FL::system_driver\(\)](#) makes sure [fl_mac_os_version](#) has been initialized.

11.14 Common Dialog Classes and Functions

Common dialog functions for file selection, message output, and more.

Files

- file [fl_ask.cxx](#)
Utility functions for common dialogs.

Classes

- class [FL_Color_Chooser](#)
The [FL_Color_Chooser](#) widget provides a standard RGB color chooser.
- class [FL_File_Chooser](#)
The [FL_File_Chooser](#) widget displays a standard file selection dialog that supports various selection modes.

Functions

- void [fl_alert](#) (const char *fmt,...)
Shows an alert message dialog box.
- int [fl_ask](#) (const char *fmt,...)
*Shows a dialog displaying the *fmt* message, this dialog features 2 yes/no buttons.*
- void [fl_beep](#) (int type)
Emits a system beep.
- int [fl_choice](#) (const char *fmt, const char *b0, const char *b1, const char *b2,...)
*Shows a dialog displaying the printf style *fmt* message.*
- int [fl_choice_n](#) (const char *fmt, const char *b0, const char *b1, const char *b2,...)
*Shows a dialog displaying the printf style *fmt* message.*
- int [fl_color_chooser](#) (const char *name, double &r, double &g, double &b, int cmode)
Pops up a window to let the user pick an arbitrary RGB color.
- int [fl_color_chooser](#) (const char *name, uchar &r, uchar &g, uchar &b, int cmode)
Pops up a window to let the user pick an arbitrary RGB color.
- char * [fl_dir_chooser](#) (const char *message, const char *fname, int relative)
Shows a file chooser dialog and gets a directory.
- char * [fl_file_chooser](#) (const char *message, const char *pat, const char *fname, int relative)
Shows a file chooser dialog and gets a filename.
- void [fl_file_chooser_callback](#) (void(*cb)(const char *))
Set the file chooser callback.
- void [fl_file_chooser_ok_label](#) (const char *)
Set the "OK" button label.
- const char * [fl_input](#) (const char *fmt, const char *defstr,...)
*Shows an input dialog displaying the *fmt* message with variable arguments.*
- const char * [fl_input](#) (int maxchar, const char *fmt, const char *defstr,...)
*Shows an input dialog displaying the *fmt* message with variable arguments.*
- void [fl_message](#) (const char *fmt,...)
Shows an information message dialog box.
- int [fl_message_hotspot](#) ()
Gets whether or not to move the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#) to follow the mouse pointer.
- void [fl_message_hotspot](#) (int enable)
Sets whether or not to move the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#) to follow the mouse pointer.
- [FL_Widget](#) * [fl_message_icon](#) ()

- Gets the `Fl_Box` icon container of the current default dialog used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.*
- void `fl_message_icon_label` (const char *str)
 - Sets the icon label of the dialog window used in many common dialogs.*
- void `fl_message_position` (const int x, const int y, const int center)
 - Sets the preferred position for the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.*
- void `fl_message_position` (Fl_Widget *widget)
 - Sets the preferred position for the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.*
- int `fl_message_position` (int *x, int *y)
 - Gets the preferred position for the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.*
- void `fl_message_title` (const char *title)
 - Sets the title of the dialog window used in many common dialogs.*
- void `fl_message_title_default` (const char *title)
 - Sets the default title of the dialog window used in many common dialogs.*
- const char * `fl_password` (const char *fmt, const char *defstr,...)
 - Shows an input dialog displaying the `fmt` message with variable arguments.*
- const char * `fl_password` (int maxchar, const char *fmt, const char *defstr,...)
 - Shows an input dialog displaying the `fmt` message with variable arguments.*

Variables

- static void(* `Fl::error`)(const char *,...) = Fl_System_Driver::error
 - FLTK calls `Fl::error()` to output a normal error message.*
- static void(* `Fl::fatal`)(const char *,...) = Fl_System_Driver::fatal
 - FLTK calls `Fl::fatal()` to output a fatal error message.*
- const char * `fl_cancel` = "Cancel"
 - string pointer used in common dialogs, you can change it to another language*
- const char * `fl_close` = "Close"
 - string pointer used in common dialogs, you can change it to another language*
- `Fl_Font fl_message_font_ = FL_HELVETICA`
- `Fl_Fontsize fl_message_size_ = -1`
- const char * `fl_no` = "No"
 - string pointer used in common dialogs, you can change it to another language*
- const char * `fl_ok` = "OK"
 - string pointer used in common dialogs, you can change it to another language*
- const char * `fl_yes` = "Yes"
 - string pointer used in common dialogs, you can change it to another language*
- static void(* `Fl::warning`)(const char *,...) = Fl_System_Driver::warning
 - FLTK calls `Fl::warning()` to output a warning message.*

11.14.1 Detailed Description

Common dialog functions for file selection, message output, and more.

11.14.2 Function Documentation

11.14.2.1 fl_alert()

```
void fl_alert (
    const char * fmt,
    ... )
```

Shows an alert message dialog box.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
----	------------	--

11.14.2.2 fl_ask()

```
int fl_ask (
    const char * fmt,
    ... )
```

Shows a dialog displaying the *fmt* message, this dialog features 2 yes/no buttons.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
----	------------	--

Return values

0	if the no button is selected
1	if yes is selected

Deprecated `fl_ask()` is deprecated since it uses "Yes" and "No" for the buttons which does not conform to the current FLTK Human Interface Guidelines. Use `fl_choice()` with the appropriate verbs instead.

11.14.2.3 fl_beep()

```
void fl_beep (
    int type )
```

Emits a system beep.

This function is platform specific. Depending on the input *type* a different sound may be played or the system speaker may beep with a different volume.

On X the system speaker is used which may not work at all on newer systems that don't have a speaker. Since 1.4.0 `FL_BEEP_DEFAULT` and other types honor the system or user settings whereas `FL_BEEP_ERROR` uses 100% volume. This may be changed in a future version.

On Wayland an ASCII BEL (0x07) is output to stderr.

On Windows the `MessageBeep()` function is used to play different sounds depending on the *type* argument.

On macOS the system beep function `NSBeep()` is used for `FL_BEEP_DEFAULT` and `FL_BEEP_ERROR`. Other types are ignored.

On other platforms the behavior is undefined and may change in the future.

Parameters

in	<i>type</i>	The beep type from the <code>FL_Beep</code> enumeration (optional)
----	-------------	--

```
#include <FL/fl_ask.H>
```

11.14.2.4 fl_choice()

```
int fl_choice (
    const char * fmt,
    const char * b0,
    const char * b1,
    const char * b2,
    ... )
```

Shows a dialog displaying the printf style *fmt* message.

This dialog features up to 3 customizable choice buttons which are specified in order of *right-to-left* in the dialog, e.g.

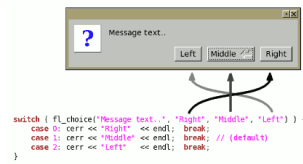


Figure 11.5 `fl_choice()` button ordering

```
#include <FL/fl_ask.H>
```

Three choices with `printf()` style formatting:

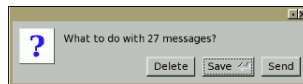


Figure 11.6 `fl_choice()` three choices with `printf` formatting

```

int num_msgs = GetNumberOfMessages();
switch ( fl_choice("What to do with %d messages?", "Send", "Save", "Delete", num_msgs) ) {
  case 0: .. // Send
  case 1: .. // Save (default)
  case 2: .. // Delete
  ..
}

```

Three choice example:

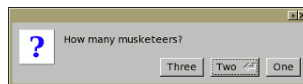


Figure 11.7 `fl_choice()` three choices

```

switch ( fl_choice("How many bedrooms?", "Zero", "One", "Two") ) {
  case 0: .. // "Zero"
  case 1: .. // "One" (default)
  case 2: .. // "Two"
}

```

Two choice example:

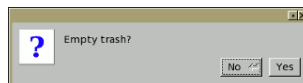


Figure 11.8 `fl_choice()` two choices

```

switch ( fl_choice("Empty trash?", "Yes", "No", 0) ) {
  case 0: .. // Yes
  case 1: .. // No (default)
}

```

One choice example:

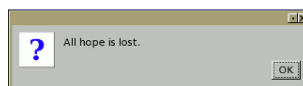


Figure 11.9 `fl_choice()` one choice

```
fl_choice("All hope is lost.", "OK", 0, 0); // "OK" default
```

Parameters

in	<i>fmt</i>	can be used as an <code>sprintf</code> -like format and variables for the message text
in	<i>b0</i>	text label for right button 0
in	<i>b1</i>	text label for middle button 1 (can be 0)
in	<i>b2</i>	text label for left button 2 (can be 0)

Return values

0	if the button with <code>b0</code> text is pushed or the user pressed the <code>Escape</code> key or clicked the window close button
1	if the button with <code>b1</code> text is pushed or the user pressed the <code>Return</code> key
2	if the button with <code>b2</code> text is pushed

11.14.2.5 `fl_choice_n()`

```
int fl_choice_n (
    const char * fmt,
    const char * b0,
    const char * b1,
    const char * b2,
    ... )
```

Shows a dialog displaying the `printf` style `fmt` message.

This function is like `fl_choice()` but returns `-1` if the dialog window was closed by pressing the `Escape` key or the window close button rather than pushing one of the dialog buttons.

See also

[fl_choice\(\)](#)

Parameters

in	<code>fmt</code>	can be used as an <code>sprintf</code> -like format and variables for the message text
in	<code>b0</code>	text label for right button 0
in	<code>b1</code>	text label for middle button 1 (can be 0)
in	<code>b2</code>	text label for left button 2 (can be 0)

Return values

-3	reserved, FLTK 1.3 only: another dialog is still open (not possible in 1.4)
-2	if the dialog was closed by pushing the window close button
-1	if the dialog was closed by hitting <code>Escape</code>
0	if the button with <code>b0</code> text is pushed
1	if the button with <code>b1</code> text is pushed
2	if the button with <code>b2</code> text is pushed

11.14.2.6 `fl_color_chooser()` [1/2]

```
int fl_color_chooser (
    const char * name,
    double & r,
    double & g,
    double & b,
    int cmode ) [related]
```

Pops up a window to let the user pick an arbitrary RGB color.

Note

```
#include <FL/Fl_Color_Chooser.H>
```

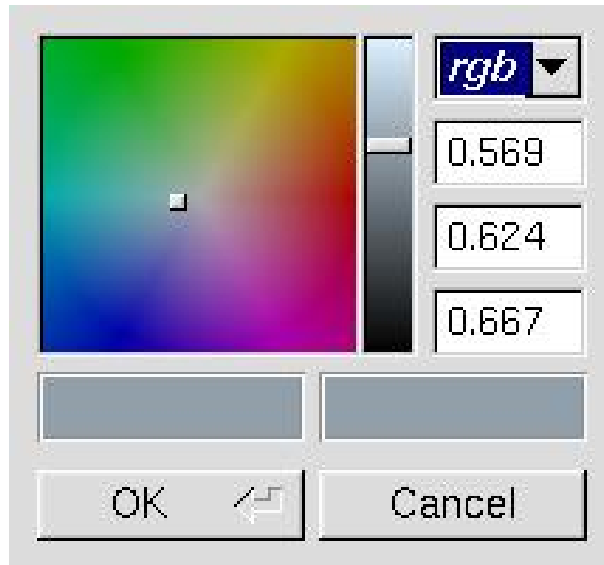


Figure 11.10 fl_color_chooser

Parameters

in	<i>name</i>	Title label for the window
in, out	<i>r,g,b</i>	Color components in the range 0.0 to 1.0.
in	<i>cmode</i>	Optional mode for color chooser. See mode(int) . Default -1 if none (rgb mode).

Return values

1	if user confirms the selection
0	if user cancels the dialog

11.14.2.7 fl_color_chooser() [2/2]

```
int fl_color_chooser (
    const char * name,
    uchar & r,
    uchar & g,
    uchar & b,
    int cmode ) [related]
```

Pops up a window to let the user pick an arbitrary RGB color.

Note

```
#include <FL/Fl_Color_Chooser.H>
```

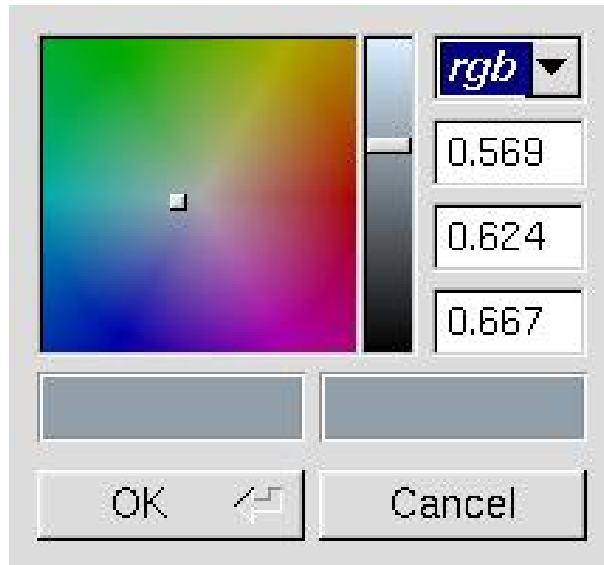


Figure 11.11 fl_color_chooser

Parameters

in	<i>name</i>	Title label for the window
in, out	<i>r,g,b</i>	Color components in the range 0 to 255.
in	<i>cmode</i>	Optional mode for color chooser. See mode(int) . Default -1 if none (rgb mode).

Return values

1	if user confirms the selection
0	if user cancels the dialog

11.14.2.8 fl_dir_chooser()

```
char * fl_dir_chooser (
    const char * message,
    const char * fname,
    int relative ) [related]
```

Shows a file chooser dialog and gets a directory.

Note

```
#include <FL/Fl_File_Chooser.H>
```

Parameters

in	<i>message</i>	title bar text
in	<i>fname</i>	initial/default directory name
in	<i>relative</i>	0 for absolute path return, relative otherwise

Returns

the directory path string chosen by the user or NULL if user cancels

11.14.2.9 `fl_file_chooser()`

```
char * fl_file_chooser (
    const char * message,
    const char * pat,
    const char * fname,
    int relative ) [related]
```

Shows a file chooser dialog and gets a filename.

Note

```
#include <FL/Fl_File_Chooser.H>
```

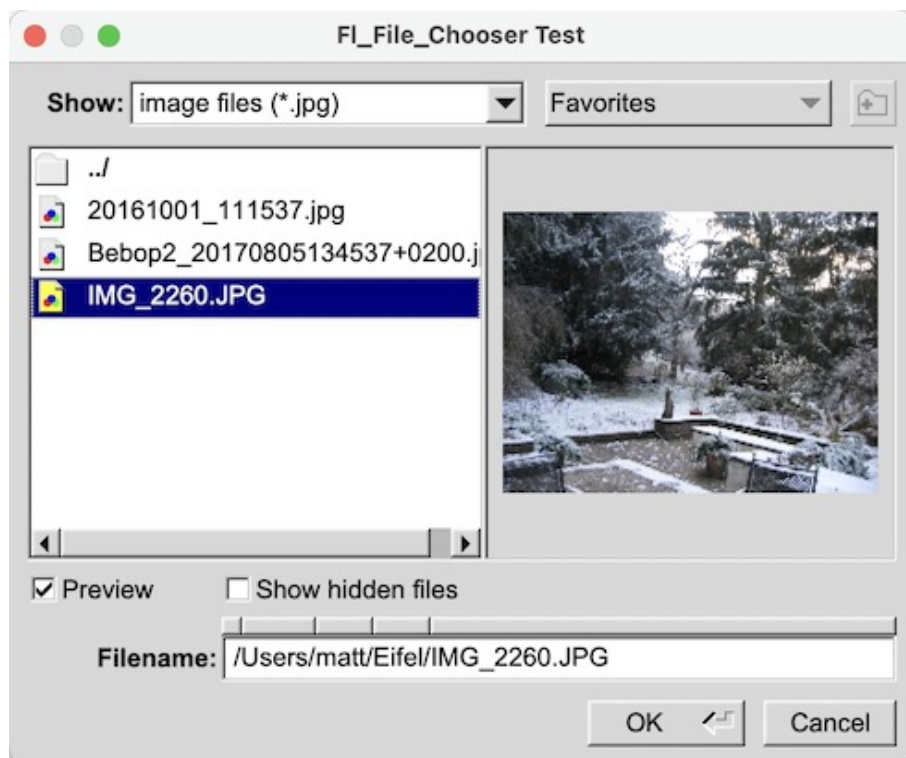


Figure 11.12 `Fl_File_Chooser`

Parameters

in	<i>message</i>	text in title bar
in	<i>pat</i>	filename pattern filter
in	<i>fname</i>	initial/default filename selection
in	<i>relative</i>	0 for absolute path name, relative path name otherwise

Returns

the user selected filename, in absolute or relative format or NULL if user cancels

11.14.2.10 fl_file_chooser_callback()

```
void fl_file_chooser_callback (
    void(*) (const char *) cb ) [related]
```

Set the file chooser callback.

Note

```
#include <FL/Fl_File_Chooser.H>
```

11.14.2.11 fl_file_chooser_ok_label()

```
void fl_file_chooser_ok_label (
    const char * l ) [related]
```

Set the "OK" button label.

Note

```
#include <FL/Fl_File_Chooser.H>
```

11.14.2.12 fl_input() [1/2]

```
const char * fl_input (
    const char * fmt,
    const char * defstr,
    ... )
```

Shows an input dialog displaying the *fmt* message with variable arguments.

Returns the string in an internally allocated buffer that may be changed later. You **must** copy the string immediately after return from this method - at least before the next execution of the event loop.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>defstr</i>	defines the default returned string if no text is entered

Returns

the user string input if OK was pushed

Return values

NULL	if Cancel was pushed or the window was closed by the user
------	---

11.14.2.13 fl_input() [2/2]

```
const char * fl_input (
    int maxchar,
    const char * fmt,
    const char * defstr,
    ... )
```

Shows an input dialog displaying the *fmt* message with variable arguments.

This is the same as `const char *fl_input(const char *fmt, const char *defstr, ...)` except that it has an additional

parameter to limit the number of characters the user can input.

Returns the string in an internally allocated buffer that may be changed later. You **must** copy the string immediately after return from this method - at least before the next execution of the event loop.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>maxchar</i>	maximum number of characters the user can input (UTF-8 aware)
in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>defstr</i>	defines the default returned string if no text is entered

Returns

the user string input if OK was pushed

Return values

<i>NULL</i>	if Cancel was pushed or the window was closed by the user
-------------	---

11.14.2.14 fl_message()

```
void fl_message (
    const char * fmt,
    ... )
```

Shows an information message dialog box.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
----	------------	--

11.14.2.15 fl_message_hotspot() [1/2]

```
int fl_message_hotspot (
    void )
```

Gets whether or not to move the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#) to follow the mouse pointer.

This is a permanent setting. It remains active and affects the window position unless overridden by an explicit positioning request by means of one of the [fl_message_position\(\)](#) variants.

```
#include <FL/fl_ask.H>
```

Returns

0 if disabled, non-zero otherwise

See also

[void fl_message_hotspot\(int\)](#)
[int fl_message_position\(int *x, int *y\)](#)
[void fl_message_position\(FL_Widget *\)](#)
[fl_message_position\(\)](#)

11.14.2.16 fl_message_hotspot() [2/2]

```
void fl_message_hotspot (
    int enable )
```

Sets whether or not to move the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.

The default is *enabled*, so that the default button is the hotspot and appears at the mouse position.

```
#include <FL/fl_ask.H>
```

Parameters

<code>in</code>	<code>enable</code>	non-zero enables hotspot behavior, 0 disables hotspot
-----------------	---------------------	---

11.14.2.17 fl_message_icon()

```
Fl_Widget * fl_message_icon ( )
```

Gets the `Fl_Box` icon container of the current default dialog used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.

The return value cannot be Null. The object pointed to is an `Fl_Box` widget. The returned pointer (`Fl_Widget *`) can be safely cast to an `Fl_Box*` pointer.

Note

You can set some attributes of this **default** icon box. These attributes are sticky, i.e. they will be used in all subsequent common dialogs unless overridden by specific "one shot" variables. Setting any attribute except those mentioned below causes undefined behavior.

Supported icon attributes:

- `box()`
- `labelfont()`
- `labelsize()`
- `color()`
- `labelcolor()`
- `image()`
- `align()`

The icon size can not be changed. If you set an `image()` you should scale it to the available size, i.e. `w()` and `h()` of the icon box.

```
#include <FL/fl_ask.H>
```

11.14.2.18 fl_message_icon_label()

```
void fl_message_icon_label (
    const char * str )
```

Sets the icon label of the dialog window used in many common dialogs.

This icon label will be used in the next call of one of the common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.

The label `str` is stored internally as a reference, it must be in scope until the dialog function (e.g. `fl_choice`) is called.

It applies only to the **next** call of one of the common dialogs and will be reset after that call so the next dialog will use its default label unless set again.

Note

This label string must be short, usually only one character so it fits in the icon box. You can use any valid UTF-8 character, e.g. the Euro sign ("€") which is three bytes in UTF-8 encoding.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>str</i>	icon label
----	------------	------------

11.14.2.19 fl_message_position() [1/3]

```
void fl_message_position (
    const int x,
    const int y,
    const int center )
```

Sets the preferred position for the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).

The position set with this method overrides the hotspot setting, i.e. setting a position has higher priority than the hotspot mode set by [fl_message_hotspot\(int\)](#).

The preferred position set by any of the [fl_message_position\(\)](#) variants affects only the next call of one of the common dialogs. The preferred position is reset to 0 (unset) as soon as the dialog is shown.

If the optional argument *center* is non-zero (true) the message box will be centered at the given coordinates rather than using the X/Y position as the window position (top left corner).

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>x</i>	Preferred X position
in	<i>y</i>	Preferred Y position
in	<i>center</i>	1 = centered, 0 = absolute

See also

[int fl_message_position\(int *x, int *y\)](#)

11.14.2.20 fl_message_position() [2/3]

```
void fl_message_position (
    Fl_Widget * widget )
```

Sets the preferred position for the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).

The message box will be centered over the given widget or window extensions.

Everything else is like [fl_message_position\(int, int, int\)](#) with argument 'center' set to 1.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>widget</i>	Widget or window to position the message box over.
----	---------------	--

See also

[int fl_message_position\(int x, int y, int center\)](#)

11.14.2.21 fl_message_position() [3/3]

```
int fl_message_position (
    int * x,
    int * y )
```

Gets the preferred position for the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).

```
#include <FL/fl_ask.H>
```


The position set with this method overrides the hotspot setting, i.e. setting a position has higher priority than the hotspot mode set by `fl_message_hotspot(int)`.

The preferred position set by any of the `fl_message_position()` variants affects only the next call of one of the common dialogs. The preferred position is reset to 0 (unset) as soon as the dialog is shown.

Parameters

out	x	Preferred X position, returns -1 if not set
out	y	Preferred Y position, returns -1 if not set

Returns

whether position is currently set or not

Return values

0	position is not set (hotspot may be enabled or not)
1	position is set (window position)
2	position is set (message box centered)

See also

[fl_message_hotspot\(\)](#)
[fl_message_hotspot\(int\)](#)
[fl_message_position\(int, int\)](#)
[fl_message_position\(const int x, const int y, const int center\)](#)
[fl_message_position\(FL_Widget *\)](#)

11.14.2.22 fl_message_title()

```
void fl_message_title (
    const char * title )
```

Sets the title of the dialog window used in many common dialogs.

This window `title` will be used in the next call of one of the common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.

The `title` string is copied internally, so that you can use a local variable or free the string immediately after this call. It applies only to the **next** call of one of the common dialogs and will be reset to an empty title (the default for all dialogs) after that call.

```
#include <FL/fl_ask.H>
```

Parameters

in	title	window label, string copied internally
----	-------	--

11.14.2.23 fl_message_title_default()

```
void fl_message_title_default (
    const char * title )
```

Sets the default title of the dialog window used in many common dialogs.

This window `title` will be used in all subsequent calls of one of the common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`, unless a specific title has been set with `fl_message_title(const char *title)`.

The default is no title. You can override the default title for a single dialog with `fl_message_title(const char *title)`.

The `title` string is copied internally, so that you can use a local variable or free the string immediately after this call.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>title</i>	default window label, string copied internally
----	--------------	--

11.14.2.24 fl_password() [1/2]

```
const char * fl_password (
    const char * fmt,
    const char * defstr,
    ... )
```

Shows an input dialog displaying the *fmt* message with variable arguments.

Like `fl_input()` except the input text is not shown, '*' or similar replacement characters are displayed instead.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>defstr</i>	defines the default returned string if no text is entered

Returns

the user string input if OK was pushed

Return values

<i>NULL</i>	if Cancel was pushed or the window was closed by the user
-------------	---

11.14.2.25 fl_password() [2/2]

```
const char * fl_password (
    int maxchar,
    const char * fmt,
    const char * defstr,
    ... )
```

Shows an input dialog displaying the *fmt* message with variable arguments.

Like `fl_input()` except the input text is not shown, '*' or similar replacement characters are displayed instead.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>maxchar</i>	input length limit in chars, 0 = no limit
in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>defstr</i>	defines the default returned string if no text is entered

Returns

the user string input if OK was pushed

Return values

<i>NULL</i>	if Cancel was pushed or the window was closed by the user
-------------	---

11.14.3 Variable Documentation

11.14.3.1 error

```
void(* Fl::error)(const char *format,...) = Fl_System_Driver::error [static]
```

FLTK calls [Fl::error\(\)](#) to output a normal error message.

The default version on Windows displays the error message in a MessageBox window.

The default version on all other platforms prints the error message to stderr.

You can override the behavior by setting the function pointer to your own routine.

[Fl::error\(\)](#) means there is a recoverable error such as the inability to read an image file. The default implementation returns after displaying the message.

Note

```
#include <FL/Fl.H>
```

11.14.3.2 fatal

```
void(* Fl::fatal)(const char *format,...) = Fl_System_Driver::fatal [static]
```

FLTK calls [Fl::fatal\(\)](#) to output a fatal error message.

The default version on Windows displays the error message in a MessageBox window.

The default version on all other platforms prints the error message to stderr.

You can override the behavior by setting the function pointer to your own routine.

[Fl::fatal\(\)](#) must not return, as FLTK is in an unusable state, however your version may be able to use longjmp or an exception to continue, as long as it does not call FLTK again. The default implementation exits with status 1 after displaying the message.

Note

```
#include <FL/Fl.H>
```

11.14.3.3 warning

```
void(* Fl::warning)(const char *format,...) = Fl_System_Driver::warning [static]
```

FLTK calls [Fl::warning\(\)](#) to output a warning message.

The default version on Windows returns *without* printing a warning message, because Windows programs normally don't have stderr (a console window) enabled.

The default version on all other platforms prints the warning message to stderr.

You can override the behavior by setting the function pointer to your own routine.

[Fl::warning\(\)](#) means that there was a recoverable problem, the display may be messed up, but the user can probably keep working - all X protocol errors call this, for example. The default implementation returns after displaying the message.

Note

```
#include <FL/Fl.H>
```

11.15 The gtk_shell1 interface

gtk_shell is a protocol extension providing additional features for clients implementing it.

Classes

- struct [gtk_shell1_listener](#)

Macros

- #define `GTK_SHELL1_CAPABILITIES_SINCE_VERSION 1`
- #define `GTK_SHELL1_GET_GTK_SURFACE_SINCE_VERSION 1`
- #define `GTK_SHELL1_NOTIFY_LAUNCH_SINCE_VERSION 3`
- #define `GTK_SHELL1_SET_STARTUP_ID_SINCE_VERSION 1`
- #define `GTK_SHELL1_SYSTEM_BELL_SINCE_VERSION 1`

11.15.1 Detailed Description

gtk_shell is a protocol extension providing additional features for clients implementing it.

11.16 The gtk_surface1 interface

Classes

- struct [gtk_surface1_listener](#)

Macros

- #define `GTK_SURFACE1_CONFIGURE_EDGES_SINCE_VERSION` 2
- #define `GTK_SURFACE1_CONFIGURE_SINCE_VERSION` 1
- #define `GTK_SURFACE1_PRESENT_SINCE_VERSION` 1
- #define `GTK_SURFACE1_RELEASE_SINCE_VERSION` 4
- #define `GTK_SURFACE1_REQUEST_FOCUS_SINCE_VERSION` 3
- #define `GTK_SURFACE1_SET_DBUS_PROPERTIES_SINCE_VERSION` 1
- #define `GTK_SURFACE1_SET_MODAL_SINCE_VERSION` 1
- #define `GTK_SURFACE1_STATE_TILED_BOTTOM_SINCE_VERSION` 2
- #define `GTK_SURFACE1_STATE_TILED_LEFT_SINCE_VERSION` 2
- #define `GTK_SURFACE1_STATE_TILED_RIGHT_SINCE_VERSION` 2
- #define `GTK_SURFACE1_STATE_TILED_TOP_SINCE_VERSION` 2
- #define `GTK_SURFACE1_TITLEBAR_GESTURE_SINCE_VERSION` 5
- #define `GTK_SURFACE1_UNSET_MODAL_SINCE_VERSION` 1

11.16.1 Detailed Description

11.17 File names and URI utility functions

File names and URI functions defined in [<FL/filename.H>](#)

Macros

- #define `FL_PATH_MAX` 2048
all path buffers should use this length

Typedefs

- typedef int() `Fl_File_Sort_F`(struct dirent **, struct dirent **)
File sorting function.

Functions

- void `fl_decode_uri` (char *uri)
Decodes a URL-encoded string.
- int `fl_filename_absolute` (char *to, int tolen, const char *from)
Makes a filename absolute from a relative filename to the current working directory.
- int `fl_filename_absolute` (char *to, int tolen, const char *from, const char *cwd)
Concatenate the absolute path base with from to form the new absolute path in to.
- int `fl_filename_expand` (char *to, int tolen, const char *from)
Expands a filename containing shell variables and tilde (~).
- const char * `fl_filename_ext` (const char *buf)
Gets the extension of a filename.
- void `fl_filename_free_list` (struct dirent **l, int n)

- Free the list of filenames that is generated by `fl_filename_list()`.*

 - `int fl_filename_isdir` (const char *name)

Determines if a file exists and is a directory from its filename.
 - `int fl_filename_list` (const char *d, struct dirent ***l, `FI_File_Sort_F` *s=`fl_numericsort`)

Portable and const-correct wrapper for the `scandir()` function.
 - `int fl_filename_match` (const char *name, const char *pattern)

Checks if a string `s` matches a pattern `p`.
 - `const char * fl_filename_name` (const char *filename)

Gets the file name from a path.
 - `int fl_filename_relative` (char *to, int tolen, const char *from)

Makes a filename relative to the current working directory.
 - `int fl_filename_relative` (char *to, int tolen, const char *from, const char *cwd)

Makes a filename relative to any other directory.
 - `char * fl_filename_setext` (char *to, int tolen, const char *ext)

Replaces the extension in `buf` of `max`.
 - `int fl_open_uri` (const char *uri, char *msg, int msglen)

Opens the specified Uniform Resource Identifier (URI).

11.17.1 Detailed Description

File names and URI functions defined in [<FL/filename.H>](#)

11.17.2 Typedef Documentation

11.17.2.1 FI_File_Sort_F

```
typedef int() FI_File_Sort_F(struct dirent **, struct dirent **)
File sorting function.
```

See also

[fl_filename_list\(\)](#)

11.17.3 Function Documentation

11.17.3.1 fl_decode_uri()

```
void fl_decode_uri (
    char * uri )
```

Decodes a URL-encoded string.

In a Uniform Resource Identifier (URI), all non-ASCII bytes and several others (e.g., '<', '"', ''') are URL-encoded using 3 bytes by "%XY" where XY is the hexadecimal value of the byte. This function decodes the URI restoring its original UTF-8 encoded content. Decoding is done in-place.

11.17.3.2 fl_filename_absolute() [1/2]

```
int fl_filename_absolute (
    char * to,
    int tolen,
    const char * from )
```

Makes a filename absolute from a relative filename to the current working directory.

```
#include <FL/filename.H>
[.]
fl_chdir("/var/tmp");
fl_filename_absolute(out, sizeof(out), "foo.txt"); // out="/var/tmp/foo.txt"
fl_filename_absolute(out, sizeof(out), "./foo.txt"); // out="/var/tmp/foo.txt"
fl_filename_absolute(out, sizeof(out), "../log/messages"); // out="/var/log/messages"
```

Parameters

out	<i>to</i>	resulting absolute filename
in	<i>toLen</i>	size of the absolute filename buffer
in	<i>from</i>	relative filename

Returns

0 if no change, non zero otherwise

11.17.3.3 fl_filename_absolute() [2/2]

```
int fl_filename_absolute (
    char * to,
    int toLen,
    const char * from,
    const char * base )
```

Concatenate the absolute path *base* with *from* to form the new absolute path in *to*.

```
#include <FL/filename.H>
char out[FL_PATH_MAX];
fl_filename_absolute(out, sizeof(out), "../foo.txt", "/var/tmp"); // out="/var/foo.txt"
fl_filename_absolute(out, sizeof(out), "../local/bin", "/usr/bin"); // out="/usr/local/bin"
```

Parameters

out	<i>to</i>	resulting absolute filename
in	<i>toLen</i>	size of the absolute filename buffer
in	<i>from</i>	relative filename
in	<i>base</i>	<i>from</i> is relative to this absolute file path

Returns

0 if no change, non zero otherwise

11.17.3.4 fl_filename_expand()

```
int fl_filename_expand (
    char * to,
    int toLen,
    const char * from )
```

Expands a filename containing shell variables and tilde (~).

Currently handles these variants:

```
"~username" // if 'username' does not exist, result will be unchanged
"~/file"
"${VARNAME}" // does NOT handle ${VARNAME}
```

Examples:

```
#include <FL/filename.H>
[.]
putenv("TMPDIR=/var/tmp");
fl_filename_expand(out, sizeof(out), "~fred/.cshrc"); // out="/usr/fred/.cshrc"
fl_filename_expand(out, sizeof(out), "~/cshrc"); // out="/usr/<yourname>/cshrc"
fl_filename_expand(out, sizeof(out), "$TMPDIR/foo.txt"); // out="/var/tmp/foo.txt"
```

Parameters

out	<i>to</i>	resulting expanded filename
in	<i>toLen</i>	size of the expanded filename buffer
in	<i>from</i>	filename containing shell variables

Returns

0 if no change, non zero otherwise

11.17.3.5 fl_filename_ext()

```
const char * fl_filename_ext (
    const char * buf )
```

Gets the extension of a filename.

```
#include <FL/filename.H>
[...]
```

```
const char *out;
out = fl_filename_ext("/some/path/foo.txt"); // result: ".txt"
out = fl_filename_ext("/some/path/foo"); // result: NULL
```

Parameters

in	<i>buf</i>	the filename to be parsed
----	------------	---------------------------

Returns

a pointer to the extension (including '.') if any or NULL otherwise

11.17.3.6 fl_filename_free_list()

```
void fl_filename_free_list (
    struct dirent *** list,
    int n )
```

Free the list of filenames that is generated by [fl_filename_list\(\)](#).

Free everything that was allocated by a previous call to [fl_filename_list\(\)](#). Use the return values as parameters for this function.

Parameters

in, out	<i>list</i>	table containing the resulting directory listing
in	<i>n</i>	number of entries in the list

11.17.3.7 fl_filename_isdir()

```
int fl_filename_isdir (
    const char * n )
```

Determines if a file exists and is a directory from its filename.

```
#include <FL/filename.H>
[...]
```

```
fl_filename_isdir("/etc"); // returns non-zero
fl_filename_isdir("/etc/hosts"); // returns 0
```

Parameters

in	<i>n</i>	the filename to parse
----	----------	-----------------------

Returns

non zero if file exists and is a directory, zero otherwise

11.17.3.8 fl_filename_list()

```
int fl_filename_list (
    const char * d,
```

```

dirent *** list,
    Fl_File_Sort_F * sort )

```

Portable and const-correct wrapper for the scandir() function.

For each file in that directory a "dirent" structure is created. The only portable thing about a dirent is that dirent.d_name is the nul-terminated file name. A pointers array to these dirent's is created and a pointer to the array is returned in *list. The number of entries is given as a return value. If there is an error reading the directory a number less than zero is returned, and errno has the reason; errno does not work under Windows.

Include:

```
#include <FL/filename.H>
```

Parameters

in	<i>d</i>	the name of the directory to list. It does not matter if it has a trailing slash.
out	<i>list</i>	table containing the resulting directory listing
in	<i>sort</i>	sorting functor: <ul style="list-style-type: none"> • fl_alphasort: The files are sorted in ascending alphabetical order; upper and lowercase letters are compared according to their ASCII ordering uppercase before lowercase. • fl_casealphasort: The files are sorted in ascending alphabetical order; upper and lowercase letters are compared equally case is not significant. • fl_casenumERICsort: The files are sorted in ascending "alphanumeric" order, where an attempt is made to put unpadding numbers in consecutive order; upper and lowercase letters are compared equally case is not significant. • fl_numericSORT: The files are sorted in ascending "alphanumeric" order, where an attempt is made to put unpadding numbers in consecutive order; upper and lowercase letters are compared according to their ASCII ordering - uppercase before lowercase.

Returns

the number of entries if no error, a negative value otherwise.

Todo should support returning OS error messages

11.17.3.9 fl_filename_match()

```

int fl_filename_match (
    const char * s,
    const char * p )

```

Checks if a string *s* matches a pattern *p*.

The following syntax is used for the pattern:

- * matches any sequence of 0 or more characters.
- ? matches any single character.
- [set] matches any character in the set. Set can contain any single characters, or a-z to represent a range. To match] or - they must be the first characters. To match ^ or ! they must not be the first characters.
- [^set] or [!set] matches any character not in the set.
- {X|Y|Z} or {X,Y,Z} matches any one of the subexpressions literally.
- \x quotes the character x so it has no special meaning.
- x all other characters are matched "exactly" on a **case-insensitive** basis.

Notes:

- *s* and *p* are matched on a char/byte basis, not as UCS codepoints or UTF-8 sequences.

- [set] ranges must run from low to high, i.e. [a-z] and not [z-a]
- [set] comparison is **case-sensitive**, i.e. [a-z] won't match "A".
- \x only applies to the fl_filename_match special characters * ? [{
- \x needs a double \ or the compiler will complain about non-standard escape sequences.

Include:

```
#include <FL/filename.H>
```

Parameters

in	s	the string to check for a match
in	p	the string pattern

Returns

non zero if the string matches the pattern

11.17.3.10 fl_filename_name()

```
const char * fl_filename_name (
    const char * filename )
```

Gets the file name from a path.

Similar to basename(3), exceptions shown below.

```
#include <FL/filename.H>
[...]
```

const char *out;		
out = fl_filename_name("/usr/lib");	// out="lib"	
out = fl_filename_name("/usr/");	// out=""	(basename(3) returns "usr" instead)
out = fl_filename_name("/usr");	// out="usr"	
out = fl_filename_name("/");	// out=""	(basename(3) returns "/" instead)
out = fl_filename_name(".");	// out="."	
out = fl_filename_name("../");	// out=".."	

Returns

a pointer to the char after the last slash, or to filename if there is none.

11.17.3.11 fl_filename_relative() [1/2]

```
int fl_filename_relative (
    char * to,
    int tolen,
    const char * from )
```

Makes a filename relative to the current working directory.

Return the *from* path made relative to the working directory, similar to C++17 `std::filesystem::path::lexically_relative`. This function can also be called with a fourth argument for a user supplied *base* directory path

These conversions are purely lexical. They do not check that the paths exist, do not follow symlinks, and do not access the filesystem at all.

Path arguments must be absolute (start at the root directory) and must not contain . or .. segments, or double separators. A single trailing separator is ok.

On Windows, path arguments must start with a drive name, e.g. c:\. Windows network paths and other special paths starting with a double separator are not supported (\\cloud\drive\path, \\?\, etc.) . Separators can be \ and / and will be preserved. Newly created separators are always the forward slash /.

On Windows and macOS, the path segment tests are case insensitive.

If the path can not be generated, *from* path is copied into the *to* buffer and 0 is returned.

```
#include <FL/filename.H>
[...]
```

fl_chdir("/var/tmp/somedir");	// set cwd to /var/tmp/somedir
char out[FL_PATH_MAX];	

```

fl_filename_relative(out, sizeof(out), "/var/tmp/somedir/foo.txt"); // out="foo.txt", return=1
fl_filename_relative(out, sizeof(out), "/var/tmp/foo.txt"); // out="../foo.txt", return=1
fl_filename_relative(out, sizeof(out), "foo.txt"); // out="foo.txt", return=0 (no
change)
fl_filename_relative(out, sizeof(out), "../foo.txt"); // out="../foo.txt", return=0 (no
change)
fl_filename_relative(out, sizeof(out), "../foo.txt"); // out="../foo.txt", return=0 (no
change)

```

Parameters

out	<i>to</i>	resulting relative filename
in	<i>tolen</i>	size of the relative filename buffer
in	<i>from</i>	absolute filename

Returns

0 if no change, non zero otherwise

See also

[fl_filename_relative\(char *to, int tolen, const char *from, const char *base\)](#)

11.17.3.12 fl_filename_relative() [2/2]

```

int fl_filename_relative (
    char * to,
    int tolen,
    const char * from,
    const char * base )

```

Makes a filename relative to any other directory.

Parameters

out	<i>to</i>	resulting relative filepath
in	<i>tolen</i>	size of the relative filename buffer
in	<i>from</i>	absolute filepath
in	<i>base</i>	generate filepath relative to this absolute filepath

Returns

0 if no change, non zero otherwise

See also

[fl_filename_relative\(char *to, int tolen, const char *from\)](#)

11.17.3.13 fl_filename_setext()

```

char * fl_filename_setext (
    char * buf,
    int buflen,
    const char * ext )

```

Replaces the extension in *buf* of max.

size *buflen* with the extension in *ext*.

If there's no '.' in *buf*, *ext* is appended.

If *ext* is NULL, behaves as if it were an empty string ("").

Example

```
#include <FL/filename.H>
[.]
char buf[FL_PATH_MAX] = "/path/myfile.cxx";
fl_filename_setext(buf, sizeof(buf), ".txt"); // buf[] becomes "/path/myfile.txt"
```

Returns

buf itself for calling convenience.

11.17.3.14 fl_open_uri()

```
int fl_open_uri (
    const char * uri,
    char * msg,
    int msglen )
```

Opens the specified Uniform Resource Identifier (URI).

Uses an operating-system dependent program or interface. For URIs using the "ftp", "http", or "https" schemes, the system default web browser is used to open the URI, while "mailto" and "news" URIs are typically opened using the system default mail reader and "file" URIs are opened using the file system navigator.

On success, the (optional) msg buffer is filled with the command that was run to open the URI; on Windows, this will always be "open uri".

On failure, the msg buffer is filled with an English error message.

Note**Platform Specific Issues: Windows**

With "file:" based URIs on Windows, you may encounter issues with anchors being ignored. Example: "file://c:/some/index.html#anchor" may open in the browser without the "#anchor" suffix. The behavior seems to vary across different Windows versions. Workaround: open a link to a separate html file that redirects to the desired "file:" URI.

Example

```
#include <FL/filename.H>
[.]
char errmsg[512];
if ( !fl_open_uri("http://google.com/", errmsg, sizeof(errmsg)) ) {
    char warnmsg[768];
    sprintf(warnmsg, "Error: %s", errmsg);
    fl_alert(warnmsg);
}
```

Parameters

<i>uri</i>	The URI to open
<i>msg</i>	Optional buffer which contains the command or error message
<i>msglen</i>	Length of optional buffer

Returns

1 on success, 0 on failure

Chapter 12

Class Documentation

12.1 FI_Grid::Cell Class Reference

Public Member Functions

- [FI_Grid_Align](#) **align** () const
- void **align** ([FI_Grid_Align](#) align)
- **Cell** ([FI_Widget](#) *w, int row, int col)
- **Cell** (int row, int col)
- void **Cell_** ()
- short **col** () const
- short **colspan** () const
- void **colspan** (short v)
- void **minimum_size** (int *w, int *h) const
- void **minimum_size** (int w, int h)
- short **row** () const
- short **rowspan** () const
- void **rowspan** (short v)
- [FI_Widget](#) * **widget** () const

Friends

- class [FI_Grid](#)

The documentation for this class was generated from the following file:

- [FI_Grid.H](#)

12.2 FI_Terminal::CharStyle Class Reference

Public Member Functions

- void **attrib** ([uchar](#) val)
- [uchar](#) **attrib** (void) const
- void **bgcolor** ([FI_Color](#) val)
- void **bgcolor** (int r, int g, int b)
- [FI_Color](#) **bgcolor** (void) const
- void **bgcolor_uchar** ([uchar](#) val)
- void **charflags** ([uchar](#) val)
- [uchar](#) **charflags** (void) const
- **CharStyle** (bool fontsize_defer)
- int **charwidth** (void) const
- void **clr_charflag** ([uchar](#) val)

- [uchar](#) **colorbits_only** ([uchar](#) inflags) const
- void **defaultbgcolor** ([FI_Color](#) val)
- [FI_Color](#) **defaultbgcolor** (void) const
- void **defaultfgcolor** ([FI_Color](#) val)
- [FI_Color](#) **defaultfgcolor** (void) const
- void **fgcolor** ([FI_Color](#) val)
- void **fgcolor** (int r, int g, int b)
- [FI_Color](#) **fgcolor** (void) const
- void **fgcolor_uchar** ([uchar](#) val)
- int **fontdescent** (void) const
- void **fontface** ([FI_Font](#) val)
- [FI_Font](#) **fontface** (void) const
- int **fontheight** (void) const
- void **fontsize** ([FI_Fontsize](#) val)
- [FI_Fontsize](#) **fontsize** (void) const
- int **onoff** (bool flag, [Attrib](#) a)
- void **set_charflag** ([uchar](#) val)
- void **sgr_blink** (bool val)
- void **sgr_bold** (bool val)
- void **sgr_dbl_under** (bool val)
- void **sgr_dim** (bool val)
- void **sgr_inverse** (bool val)
- void **sgr_italic** (bool val)
- void **sgr_reset** (void)
- void **sgr_strike** (bool val)
- void **sgr_underline** (bool val)
- void **update** (void)
- void **update_fake** (void)

The documentation for this class was generated from the following files:

- [FI_Terminal.H](#)
- [FI_Terminal.cxx](#)

12.3 FI_GIF_Image::GIF_FRAME::CPAL Struct Reference

Public Attributes

- [uchar](#) **b**
- [uchar](#) **g**
- [uchar](#) **r**

The documentation for this struct was generated from the following file:

- [FI_GIF_Image.H](#)

12.4 FI_Terminal::Cursor Class Reference

Public Member Functions

- void **bgcolor** ([FI_Color](#) val)
- [FI_Color](#) **bgcolor** (void) const
- void **col** (int val)
- int **col** (void) const
- int **down** (void)
- void **fgcolor** ([FI_Color](#) val)

- [FI_Color fgcolor](#) (void) const
- void **h** (int val)
- int **h** (void) const
- void **home** (void)
- bool **is_rowcol** (int drow, int dcol) const
- int **left** (void)
- int **right** (void)
- void **row** (int val)
- int **row** (void) const
- void **scroll** (int nrows)
- int **up** (void)

The documentation for this class was generated from the following files:

- [FI_Terminal.H](#)
- FI_Terminal.cxx

12.5 FI_Preferences::Entry Struct Reference

Public Attributes

- char * **name**
- char * **value**

The documentation for this struct was generated from the following file:

- FI_Preferences.H

12.6 FI_Terminal::EscapeSeq Class Reference

Public Member Functions

- int **defvalmax** (int dval, int max) const
- void **esc_mode** (char val)
- char **esc_mode** (void) const
- bool **is_csi** (void) const
- int **parse** (char c)
- bool **parse_in_progress** (void) const
- void **reset** (void)
- void **restore_cursor** (int &row, int &col)
- void **save_cursor** (int row, int col)
- int **total_vals** (void) const
- int **val** (int i) const

Static Public Attributes

- static const int **completed** = 1
- static const int **fail** = -1
- static const int **maxbuff** = 80
- static const int **maxvals** = 20
- static const int **success** = 0

The documentation for this class was generated from the following files:

- [FI_Terminal.H](#)
- FI_Terminal.cxx

12.7 FI Class Reference

The `FI` is the FLTK global (static) class containing state information and global methods for the current application.

```
#include <Fl.H>
```

Public Types

- enum `FI_Option` {
`OPTION_ARROW_FOCUS = 0`, `OPTION_VISIBLE_FOCUS`, `OPTION_DND_TEXT`, `OPTION_SHOW_TOOLTIPS`
`,`
`OPTION_FNFC_USES_GTK`, `OPTION_PRINTER_USES_GTK`, `OPTION_SHOW_SCALING`, `OPTION_FNFC_USES_ZENITY`
`,`
`OPTION_LAST` }

Enumerator for global FLTK options.

Static Public Member Functions

- static int `abi_check` (const int val=`FL_ABI_VERSION`)
Returns whether the runtime library ABI version is correct.
- static int `abi_version` ()
Returns the compiled-in value of the `FL_ABI_VERSION` constant.
- static int `add_awake_handler_` (`FI_Awake_Handler`, void *)
Adds an awake handler for use in `awake()`.
- static void `add_check` (`FI_Timeout_Handler`, void *=0)
FLTK will call this callback just before it flushes the display and waits for events.
- static void `add_clipboard_notify` (`FI_Clipboard_Notify_Handler` h, void *data=0)
FLTK will call the registered callback whenever there is a change to the selection buffer or the clipboard.
- static void `add_fd` (int fd, `FI_FD_Handler` cb, void *=0)
Adds file descriptor fd to listen to.
- static void `add_fd` (int fd, int when, `FI_FD_Handler` cb, void *=0)
Adds file descriptor fd to listen to.
- static void `add_handler` (`FI_Event_Handler` h)
Install a function to parse unrecognized events.
- static void `add_idle` (`FI_Idle_Handler` cb, void *data=0)
Adds a callback function that is called every time by `Fl::wait()` and also makes it act as though the timeout is zero (this makes `Fl::wait()` return immediately, so if it is in a loop it is called repeatedly, and thus the idle function is called repeatedly).
- static void `add_system_handler` (`FI_System_Handler` h, void *data)
Install a function to intercept system events.
- static void `add_timeout` (double t, `FI_Timeout_Handler` cb, void *data=0)
Adds a one-shot timeout callback.
- static int `api_version` ()
Returns the compiled-in value of the `FL_API_VERSION` constant.
- static int `arg` (int argc, char **argv, int &i)
Parse a single switch from `argv`, starting at word `i`.
- static void `args` (int argc, char **argv)
Parse all command line switches matching standard FLTK options only.
- static int `args` (int argc, char **argv, int &i, `FI_Args_Handler` cb=0)
Parse command line switches using the `cb` argument handler.
- static int `args_to_utf8` (int argc, char **&argv)
Convert Windows commandline arguments to UTF-8.
- static int `awake` (`FI_Awake_Handler` cb, void *message=0)
See void `awake(void message=0)`.*

- static void [awake](#) (void *message=0)

Sends a message pointer to the main thread, causing any pending [Fl::wait\(\)](#) call to terminate so that the main thread can retrieve the message and any pending redraws can be processed.
- static void [background](#) (uchar, uchar, uchar)

Changes [fl_color\(FL_BACKGROUND_COLOR\)](#) to the given color, and changes the gray ramp from 32 to 56 to black to white.
- static void [background2](#) (uchar, uchar, uchar)

Changes the alternative background color.
- static [Fl_Widget](#) * [belowmouse](#) ()

Gets the widget that is below the mouse.
- static void [belowmouse](#) ([Fl_Widget](#) *)

Sets the widget that is below the mouse.
- static int [box_border_radius_max](#) ()

Get the maximum border radius of all "rounded" boxtypes in pixels.
- static void [box_border_radius_max](#) (int R)

Set the maximum border radius of all "rounded" boxtypes in pixels.
- static [Fl_Color](#) [box_color](#) ([Fl_Color](#))

Gets the drawing color to be used for the background of a box.
- static int [box_dh](#) ([Fl_Boxtype](#))

Returns the height offset for the given boxtype.
- static int [box_dw](#) ([Fl_Boxtype](#))

Returns the width offset for the given boxtype.
- static int [box_dx](#) ([Fl_Boxtype](#))

Returns the X offset for the given boxtype.
- static int [box_dy](#) ([Fl_Boxtype](#))

Returns the Y offset for the given boxtype.
- static int [box_shadow_width](#) ()

Get the box shadow width of all "shadow" boxtypes in pixels.
- static void [box_shadow_width](#) (int W)

Set the box shadow width of all "shadow" boxtypes in pixels.
- static bool [cairo_autolink_context](#) ()

Gets the current autolink mode for Cairo support.
- static void [cairo_autolink_context](#) (bool alink)

When [FLTK_HAVE_CAIRO](#) is defined and [cairo_autolink_context\(\)](#) is true, any current window dc is linked to a current Cairo context.
- static [cairo_t](#) * [cairo_cc](#) ()

Gets the current Cairo context linked with a fltk window.
- static void [cairo_cc](#) ([cairo_t](#) *c, bool own=false)

Sets the current Cairo context to c.
- static void [cairo_flush](#) ([cairo_t](#) *c)

Flush Cairo drawings on Cairo context c.
- static [cairo_t](#) * [cairo_make_current](#) ([Fl_Window](#) *w)

Provides a Cairo context for window wi.
- static [Fl_Callback_Reason](#) [callback_reason](#) ()

Give the reason for calling a callback.
- static int [check](#) ()

Same as [Fl::wait\(0\)](#).
- static void [clear_widget_pointer](#) ([Fl_Widget](#) const *w)

Clears a widget pointer in the watch list.
- static int [clipboard_contains](#) (const char *type)

Returns non 0 if the clipboard contains data matching type.

- static int `compose` (int &del)
Any text editing widget should call this for each FL_KEYBOARD event.
- static void `compose_reset` ()
If the user moves the cursor, be sure to call `Fl::compose_reset()`.
- static void `copy` (const char *stuff, int len, int destination=0, const char *type=`Fl::clipboard_plain_text`)
Copies the data pointed to by `stuff` to the selection buffer (`destination` is 0), the clipboard (`destination` is 1), or both (`destination` is 2).
- static int `damage` ()
If true then `flush()` will do something.
- static void `damage` (int d)
If true then `flush()` will do something.
- static void `default_atclose` (`Fl_Window` *, void *)
Default callback for window widgets.
- static void `delete_widget` (`Fl_Widget` *w)
Schedules a widget for deletion at the next call to the event loop.
- static void `disable_im` ()
Disables the system input methods facilities.
- static void `display` (const char *)
Sets the X or Wayland display to use for all windows.
- static int `dnd` ()
Initiate a Drag And Drop operation.
- static int `dnd_text_ops` ()
Gets whether drag and drop text operations are supported.
- static void `dnd_text_ops` (int v)
Sets whether drag and drop text operations are supported.
- static void `do_widget_deletion` ()
Deletes widgets previously scheduled for deletion.
- static int `draw_box_active` ()
Determines if the currently drawn box is active or inactive.
- static int `draw_GL_text_with_textures` ()
returns whether whether OpenGL uses textures to draw all text.
- static void `draw_GL_text_with_textures` (int val)
sets whether OpenGL uses textures to draw all text.
- static void `enable_im` ()
Enables the system input methods facilities.
- static int `event` ()
Returns the last event that was processed.
- static int `event_alt` ()
Returns non-zero if the Alt key is pressed.
- static int `event_button` ()
Gets which particular mouse button caused the current event.
- static int `event_button1` ()
Returns non-zero if mouse button 1 is currently held down.
- static int `event_button2` ()
Returns non-zero if button 2 is currently held down.
- static int `event_button3` ()
Returns non-zero if button 3 is currently held down.
- static int `event_buttons` ()
Returns the mouse buttons state bits; if non-zero, then at least one button is pressed now.
- static int `event_clicks` ()
Returns non zero if we had a double click event.

- static void `event_clicks` (int i)
Manually sets the number returned by `Fl::event_clicks()`.
- static void * `event_clipboard` ()
During an `FL_PASTE` event of non-textual data, returns a pointer to the pasted data.
- static const char * `event_clipboard_type` ()
Returns the type of the pasted data during an `FL_PASTE` event.
- static int `event_command` ()
Returns non-zero if the `FL_COMMAND` key is pressed, either `FL_CTRL` or on OSX `FL_META`.
- static int `event_ctrl` ()
Returns non-zero if the Control key is pressed.
- static `Fl_Event_Dispatch` `event_dispatch` ()
Return the current event dispatch function.
- static void `event_dispatch` (`Fl_Event_Dispatch` d)
Set a new event dispatch function.
- static int `event_dx` ()
Returns the current horizontal mouse scrolling associated with the `FL_MOUSEWHEEL` event.
- static int `event_dy` ()
Returns the current vertical mouse scrolling associated with the `FL_MOUSEWHEEL` event.
- static int `event_inside` (const `Fl_Widget` *)
Returns whether or not the mouse event is inside a given child widget.
- static int `event_inside` (int, int, int, int)
Returns whether or not the mouse event is inside the given rectangle.
- static int `event_is_click` ()
Returns non-zero if the mouse has not moved far enough and not enough time has passed since the last `FL_PUSH` or `FL_KEYBOARD` event for it to be considered a "drag" rather than a "click".
- static void `event_is_click` (int i)
Clears the value returned by `Fl::event_is_click()`.
- static int `event_key` ()
Gets which key on the keyboard was last pushed.
- static int `event_key` (int key)
Returns true if the given `key` was held down (or pressed) during the last event.
- static int `event_length` ()
Returns the length of the text in `Fl::event_text()`.
- static int `event_original_key` ()
Returns the keycode of the last key event, regardless of the NumLock state.
- static int `event_shift` ()
Returns non-zero if the Shift key is pressed.
- static int `event_state` ()
Returns the keyboard and mouse button states of the last event.
- static int `event_state` (int mask)
Returns non-zero if any of the passed event state bits are turned on.
- static const char * `event_text` ()
Returns the text associated with the current event, including `FL_PASTE` or `FL_DND_RELEASE` events.
- static int `event_x` ()
Returns the mouse position of the event relative to the `Fl_Window` it was passed to.
- static int `event_x_root` ()
Returns the mouse position on the screen of the event.
- static int `event_y` ()
Returns the mouse position of the event relative to the `Fl_Window` it was passed to.
- static int `event_y_root` ()
Returns the mouse position on the screen of the event.

- static `Fl_Window * first_window ()`
Returns the first top-level window in the list of shown() windows.
- static void `first_window (Fl_Window *)`
Sets the window that is returned by first_window().
- static void `flush ()`
Causes all the windows that need it to be redrawn and graphics forced out through the pipes.
- static `Fl_Widget * focus ()`
Gets the current Fl::focus() widget.
- static void `focus (Fl_Widget *)`
Sets the widget that will receive FL_KEYBOARD events.
- static void `foreground (uchar, uchar, uchar)`
Changes fl_color(FL_FOREGROUND_COLOR).
- static void `free_color (Fl_Color i, int overlay=0)`
Frees the specified color from the colormap, if applicable.
- static int `get_awesome_handler_ (Fl_Awake_Handler &, void *&)`
Gets the last stored awake handler for use in awake().
- static `Fl_Box_Draw_F * get_boxytype (Fl_Boxtype)`
Gets the current box drawing function for the specified box type.
- static unsigned `get_color (Fl_Color i)`
Returns the RGB value(s) for the given FLTK color index.
- static void `get_color (Fl_Color i, uchar &red, uchar &green, uchar &blue)`
Returns the RGB value(s) for the given FLTK color index.
- static void `get_color (Fl_Color i, uchar &red, uchar &green, uchar &blue, uchar &alpha)`
Returns the RGBA value(s) for the given FLTK color index.
- static const char * `get_font (Fl_Font)`
Gets the string for this face.
- static const char * `get_font_name (Fl_Font, int *attributes=0)`
Get a human-readable string describing the family of this face.
- static int `get_font_sizes (Fl_Font, int *&sizep)`
Return an array of sizes in sizep.
- static int `get_key (int key)`
Returns true if the given key is held down now.
- static void `get_mouse (int &, int &)`
Return where the mouse is on the screen by doing a round-trip query to the server.
- static void `get_system_colors ()`
Read the user preference colors from the system and use them to call Fl::foreground(), Fl::background(), and Fl::background2().
- static int `gl_visual (int, int *alist=0)`
This does the same thing as Fl::visual(int) but also requires OpenGL drawing to work.
- static `Fl_Window * grab ()`
Returns the window that currently receives all events.
- static void `grab (Fl_Window &win)`
See grab(Fl_Window)*
- static void `grab (Fl_Window *)`
Selects the window to grab.
- static int `h ()`
Returns the height in pixels of the main screen work area.
- static int `handle (int, Fl_Window *)`
Handle events from the window system.
- static int `handle_ (int, Fl_Window *)`
Handle events from the window system.

- static int **has_check** ([FL_Timeout_Handler](#), void *=0)
Returns 1 if the check exists and has not been called yet, 0 otherwise.
- static int **has_idle** ([FL_Idle_Handler](#) cb, void *data=0)
Returns true if the specified idle callback is currently installed.
- static int **has_timeout** ([FL_Timeout_Handler](#) cb, void *data=0)
Returns true if the timeout exists and has not been called yet.
- static void **hide_all_windows** ()
Hide all visible windows to make FLTK leave [FL::run\(\)](#).
- static int **is_scheme** (const char *name)
Returns whether the current scheme is the given name.
- static void **keyboard_screen_scaling** (int value)
Controls the possibility to scale all windows by `ctrl/+/-/0/` or `cmd/+/-/0/`.
- static int **lock** ()
The [lock\(\)](#) method blocks the current thread until it can safely access FLTK widgets and data.
- static int **menu_linespacing** ()
Gets the default line spacing used by menus.
- static void **menu_linespacing** (int H)
Sets the default line spacing used by menus.
- static [FL_Window](#) * **modal** ()
Returns the top-most [modal\(\)](#) window currently shown.
- static [FL_Window](#) * **next_window** (const [FL_Window](#) *)
Returns the next top-level window in the list of [shown\(\)](#) windows.
- static [FL_Timestamp](#) **now** (double offset=0)
Set a time stamp at this point in time with optional signed offset in seconds.
- static bool **option** ([FL_Option](#) opt)
FLTK library options management.
- static void **option** ([FL_Option](#) opt, bool val)
Override an option while the application is running.
- static void **own_colormap** ()
Makes FLTK use its `own colormap`.
- static void **paste** ([FL_Widget](#) &receiver)
Backward compatibility only.
- static void **paste** ([FL_Widget](#) &receiver, int source, const char *type=[FL::clipboard_plain_text](#))
Pastes the data from the selection buffer (`source is 0`) or the clipboard (`source is 1`) into receiver.
- static int **program_should_quit** ()
Returns non-zero when a request for program termination was received and accepted.
- static void **program_should_quit** (int should_i)
Indicate to the FLTK library whether a program termination request was received and accepted.
- static [FL_Widget](#) * **pushed** ()
Gets the widget that is being pushed.
- static void **pushed** ([FL_Widget](#) *)
Sets the widget that is being pushed.
- static [FL_Widget](#) * **readqueue** ()
Reads the default callback queue and returns the first widget.
- static int **ready** ()
This is similar to [FL::check\(\)](#) except this does not call [FL::flush\(\)](#) or any callbacks, which is useful if your program is in a state where such callbacks are illegal.
- static void **redraw** ()
Redraws all widgets.
- static void **release** ()
Releases the current grabbed window, equals [grab\(0\)](#).

- static void [release_widget_pointer](#) ([FI_Widget](#) *&w)
 - Releases a widget pointer from the watch list.*
- static int [reload_scheme](#) ()
 - Called internally when setting a new scheme according to scheme name.*
- static void [remove_check](#) ([FI_Timeout_Handler](#), void *=0)
 - Removes a check callback.*
- static void **remove_clipboard_notify** ([FI_Clipboard_Notify_Handler](#) h)
 - Stop calling the specified callback when there are changes to the selection buffer or the clipboard.*
- static void **remove_fd** (int)
 - Removes a file descriptor handler.*
- static void **remove_fd** (int, int when)
 - Removes a file descriptor handler.*
- static void [remove_handler](#) ([FI_Event_Handler](#) h)
 - Removes a previously added event handler.*
- static void **remove_idle** ([FI_Idle_Handler](#) cb, void *data=0)
 - Removes the specified idle callback, if it is installed.*
- static void [remove_system_handler](#) ([FI_System_Handler](#) h)
 - Removes a previously added system event handler.*
- static void [remove_timeout](#) ([FI_Timeout_Handler](#) cb, void *data=0)
 - Removes a timeout callback from the timer queue.*
- static void [repeat_timeout](#) (double t, [FI_Timeout_Handler](#) cb, void *data=0)
 - Repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.*
- static int [run](#) ()
 - Calls [FI::wait\(\)](#) repeatedly as long as any windows are displayed.*
- static void **run_checks** ()
- static void **run_idle** ()
- static const char * **scheme** ()
 - See void [scheme\(const char *name\)](#)*
- static int [scheme](#) (const char *name)
 - Sets the current widget scheme.*
- static int [screen_count](#) ()
 - Gets the total count of available screens.*
- static void [screen_dpi](#) (float &h, float &v, int n=0)
 - Gets the screen resolution in dots-per-inch for the given screen.*
- static [FI_Screen_Driver](#) * **screen_driver** ()
 - Returns a pointer to the unique [FI_Screen_Driver](#) object of the platform.*
- static int [screen_num](#) (int x, int y)
 - Gets the screen number of a screen that contains the specified screen position x, y.*
- static int [screen_num](#) (int x, int y, int w, int h)
 - Gets the screen number for the screen which intersects the most with the rectangle defined by x, y, w, h.*
- static float **screen_scale** (int n)
 - Current value of the GUI scaling factor for screen number n (n [0, [FI::screen_count\(\)](#)]-1)*
- static void [screen_scale](#) (int n, float factor)
 - Sets the value of the GUI scaling factor for screen number n (n [0, [FI::screen_count\(\)](#)]-1).*
- static int [screen_scaling_supported](#) ()
 - See if scaling factors are supported by this platform.*
- static void [screen_work_area](#) (int &X, int &Y, int &W, int &H)
 - Gets the bounding box of the work area of the screen that contains the mouse pointer.*
- static void [screen_work_area](#) (int &X, int &Y, int &W, int &H, int mx, int my)
 - Gets the bounding box of the work area of a screen that contains the specified screen position mx, my.*
- static void [screen_work_area](#) (int &X, int &Y, int &W, int &H, int n)

- Gets the bounding box of the work area of the given screen.*

 - static void `screen_xywh` (int &X, int &Y, int &W, int &H)
- Gets the bounding box of a screen that contains the mouse pointer.*

 - static void `screen_xywh` (int &X, int &Y, int &W, int &H, int mx, int my)
- Gets the bounding box of a screen that contains the specified screen position *mx*, *my*.*

 - static void `screen_xywh` (int &X, int &Y, int &W, int &H, int mx, int my, int mw, int mh)
- Gets the screen bounding rect for the screen which intersects the most with the rectangle defined by *mx*, *my*, *mw*, *mh*.*

 - static void `screen_xywh` (int &X, int &Y, int &W, int &H, int n)
- Gets the screen bounding rect for the given screen.*

 - static int `scrollbar_size` ()
- Gets the default scrollbar size used by *Fl_Browser_*, *Fl_Help_View*, *Fl_Scroll*, and *Fl_Text_Display* widgets.*

 - static void `scrollbar_size` (int W)
- Sets the default scrollbar size that is used by the *Fl_Browser_*, *Fl_Help_View*, *Fl_Scroll*, and *Fl_Text_Display* widgets.*

 - static double `seconds_between` (*Fl_Timestamp* &back, *Fl_Timestamp* &further_back)
- Return the time in seconds between two time stamps.*

 - static double `seconds_since` (*Fl_Timestamp* &then)
- Return the time in seconds between now and a previously taken time stamp.*

 - static void `selection` (*Fl_Widget* &owner, const char *, int len)
- Changes the current selection.*

 - static *Fl_Widget* * `selection_owner` ()
- back-compatibility only: Gets the widget owning the current selection*

 - static void `selection_owner` (*Fl_Widget* *)
- Back-compatibility only: The single-argument call can be used to move the selection to another widget or to set the owner to NULL, without changing the actual text of the selection.*

 - static int `selection_to_clipboard` ()
- Returns the current selection_to_clipboard mode.*

 - static void `selection_to_clipboard` (int mode)
- Copies selections on X11 directly to the clipboard if enabled.*

 - static void `set_abort` (*Fl_Abort_Handler* f)
- For back compatibility, sets the void *Fl::fatal* handler callback.*

 - static void `set_atclose` (*Fl_Atclose_Handler* f)
- For back compatibility, sets the *Fl::atclose* handler callback.*

 - static void `set_box_color` (*Fl_Color*)
- Sets the drawing color for the box that is currently drawn.*

 - static void `set_boxtype` (*Fl_Boxtype*, *Fl_Box_Draw_F* *, *uchar*, *uchar*, *uchar*, *uchar*)
- Sets the function to call to draw a specific boxtype.*

 - static void `set_boxtype` (*Fl_Boxtype*, *Fl_Boxtype* from)
- Copies the from boxtype.*

 - static void `set_color` (*Fl_Color* i, unsigned c)
- Sets an entry in the *fl_color* index table.*

 - static void `set_color` (*Fl_Color*, *uchar*, *uchar*, *uchar*)
- Sets an entry in the *fl_color* index table.*

 - static void `set_color` (*Fl_Color*, *uchar*, *uchar*, *uchar*, *uchar*)
- Sets an entry in the *fl_color* index table.*

 - static void `set_color` (*Fl_Color*, *uchar*, *uchar*, *uchar*, *uchar*)
- Sets an entry in the *fl_color* index table.*

 - static void `set_font` (*Fl_Font*, const char *)
- Changes a face.*

 - static void `set_font` (*Fl_Font*, *Fl_Font*)
- Copies one face to another.*

 - static *Fl_Font* `set_fonts` (const char *=0)
- FLTK will open the display, and add every fonts on the server to the face table.*

 - static void `set_idle` (*Fl_Old_Idle_Handler* cb)

- Sets an idle callback.*

 - static void **set_labeltype** ([FI_Labeltype](#), [FI_Label_Draw_F](#) *, [FI_Label_Measure_F](#) *)

Sets the functions to call to draw and measure a specific labeltype.
- static void **set_labeltype** ([FI_Labeltype](#), [FI_Labeltype](#) from)

Sets the functions to call to draw and measure a specific labeltype.
- static int **system** (const char *command)

Run a command line on the computer.
- static [FI_System_Driver](#) * **system_driver** ()

Returns a pointer to the unique [FI_System_Driver](#) object of the platform.
- static int **test_shortcut** ([FI_Shortcut](#))

Tests the current event, which must be an [FL_KEYBOARD](#) or [FL_SHORTCUT](#), against a shortcut value (described in [FI_Button](#)).
- static void * **thread_message** ()

The [thread_message\(\)](#) method returns the last message that was sent from a child by the [awake\(\)](#) method.
- static long **ticks_between** ([FI_Timestamp](#) &back, [FI_Timestamp](#) &further_back)

Return the time in ticks (60Hz) between two time stamps.
- static long **ticks_since** ([FI_Timestamp](#) &then)

Return the time in ticks (60Hz) between now and a previously taken time stamp.
- static void **unlock** ()

The [unlock\(\)](#) method releases the lock that was set using the [lock\(\)](#) method.
- static int **use_high_res_GL** ()

returns whether GL windows should be drawn at high resolution on Apple computers with retina displays.
- static void **use_high_res_GL** (int val)

sets whether GL windows should be drawn at high resolution on Apple computers with retina displays
- static double **version** ()

Returns the compiled-in value of the [FL_VERSION](#) constant.
- static int **visible_focus** ()

Gets or sets the visible keyboard focus on buttons and other non-text widgets.
- static void **visible_focus** (int v)

Gets or sets the visible keyboard focus on buttons and other non-text widgets.
- static int **visual** (int)

Selects a visual so that your graphics are drawn correctly.
- static int **w** ()

Returns the width in pixels of the main screen work area.
- static int **wait** ()

Waits until "something happens" and then returns.
- static double **wait** (double time)

Waits a maximum of [time_to_wait](#) seconds or until "something happens".
- static void **watch_widget_pointer** ([FI_Widget](#) *&w)

Adds a widget pointer to the widget watch list.
- static int **x** ()

Returns the leftmost x coordinate of the main screen work area.
- static int **y** ()

Returns the topmost y coordinate of the main screen work area.

Static Public Attributes

- static void(* [atclose](#))(FI_Window *, void *)
Back compatibility: default window callback handler.
- static char const *const [clipboard_image](#) = "image"
Denotes image data.
- static char const *const [clipboard_plain_text](#) = "text/plain"
Denotes plain textual data.
- static void(* [error](#))(const char *,...) = FI_System_Driver::error
FLTK calls [Fl::error\(\)](#) to output a normal error message.
- static void(* [fatal](#))(const char *,...) = FI_System_Driver::fatal
FLTK calls [Fl::fatal\(\)](#) to output a fatal error message.
- static const char *const [help](#) = helpmsg+13
Usage string displayed if [Fl::args\(\)](#) detects an invalid argument.
- static void(* [idle](#))()
The currently executing idle callback function: DO NOT USE THIS DIRECTLY!
- static void(* [warning](#))(const char *,...) = FI_System_Driver::warning
FLTK calls [Fl::warning\(\)](#) to output a warning message.

Friends

- class [FI_System_Driver](#)

12.7.1 Detailed Description

The [Fl](#) is the FLTK global (static) class containing state information and global methods for the current application.

12.7.2 Member Enumeration Documentation

12.7.2.1 Fl_Option

enum [Fl::Fl_Option](#)

Enumerator for global FLTK options.

These options can be set system wide, per user, or for the running application only.

See also

[Fl::option\(Fl_Option, bool\)](#)

[Fl::option\(Fl_Option\)](#)

Enumerator

OPTION_ARROW_FOCUS	When switched on, moving the text cursor beyond the start or end of a text in a text widget will change focus to the next text widget. (This is considered 'old' behavior) When switched off (default), the cursor will stop at the end of the text. Pressing Tab or Ctrl-Tab will advance the keyboard focus. See also: Fl_Input_::tab_nav()
OPTION_VISIBLE_FOCUS	If visible focus is switched on (default), FLTK will draw a dotted rectangle inside the widget that will receive the next keystroke. If switched off, no such indicator will be drawn and keyboard navigation is disabled.
OPTION_DND_TEXT	If text drag-and-drop is enabled (default), the user can select and drag text from any text widget. If disabled, no dragging is possible, however dropping text from other applications still works.
OPTION_SHOW_TOOLTIPS	If tooltips are enabled (default), hovering the mouse over a widget with a tooltip text will open a little tooltip window until the mouse leaves the widget. If disabled, no tooltip is shown.

Enumerator

OPTION_FNFC_USES_GTK	When switched on (default), Fl_Native_File_Chooser runs GTK file dialogs if the GTK library is available on the platform (linux/unix only). When switched off, GTK file dialogs aren't used even if the GTK library is available.
OPTION_PRINTER_USES_GTK	When switched on (default), Fl_Printer runs the GTK printer dialog if the GTK library is available on the platform (linux/unix only). When switched off, the GTK printer dialog isn't used even if the GTK library is available.
OPTION_SHOW_SCALING	When switched on (default), the library shows in a transient yellow window the zoom factor value. When switched off, no such window gets displayed.
OPTION_FNFC_USES_ZENITY	Meaningful for the Wayland/X11 platform only. When switched on (default), the library uses a Zenity-based file dialog. When switched off, the GTK file dialog is used instead.
OPTION_LAST	For internal use only.

12.7.3 Member Function Documentation

12.7.3.1 `abi_check()`

```
static int Fl::abi_check (
    const int val = FL_ABI_VERSION ) [inline], [static]
```

Returns whether the runtime library ABI version is correct.

This enables you to check the ABI version of the linked FLTK library at runtime.

Returns 1 (true) if the compiled ABI version (in the header files) and the linked library ABI version (used at runtime) are the same, 0 (false) otherwise.

Argument `val` can be used to query a particular library ABI version. Use for instance 10303 to query if the runtime library is compatible with FLTK ABI version 1.3.3. This is rarely useful.

The default `val` argument is `FL_ABI_VERSION`, which checks the version defined at configure time (i.e. in the header files at program compilation time) against the linked library version used at runtime. This is particularly useful if you linked with a shared object library, but it also concerns static linking.

See also

[Fl::abi_version\(\)](#)

12.7.3.2 `abi_version()`

```
int Fl::abi_version ( ) [static]
```

Returns the compiled-in value of the `FL_ABI_VERSION` constant.

This is useful for checking the version of a shared library.

12.7.3.3 `add_check()`

```
void Fl::add_check (
    Fl_Timeout_Handler cb,
    void * argp = 0 ) [static]
```

FLTK will call this callback just before it flushes the display and waits for events.

This is different than an idle callback because it is only called once, then FLTK calls the system and tells it not to return until an event happens.

This can be used by code that wants to monitor the application's state, such as to keep a display up to date. The advantage of using a check callback is that it is called only when no events are pending. If events are coming in quickly, whole blocks of them will be processed before this is called once. This can save significant time and avoid the application falling behind the events.

Sample code:

```
bool state_changed; // anything that changes the display turns this on

void callback(void*) {
```

```

if (!state_changed) return;
state_changed = false;
do_expensive_calculation();
widget->redraw();
}

main() {
    Fl::add_check(callback);
    return Fl::run();
}

```

12.7.3.4 add_fd() [1/2]

```

void Fl::add_fd (
    int fd,
    Fl_FD_Handler cb,
    void * d = 0 ) [static]

```

Adds file descriptor `fd` to listen to.

See [Fl::add_fd\(int fd, int when, Fl_FD_Handler cb, void* = 0\)](#) for details

12.7.3.5 add_fd() [2/2]

```

void Fl::add_fd (
    int fd,
    int when,
    Fl_FD_Handler cb,
    void * d = 0 ) [static]

```

Adds file descriptor `fd` to listen to.

When the `fd` becomes ready for reading [Fl::wait\(\)](#) will call the callback and then return. The callback is passed the `fd` and the arbitrary `void*` argument.

This version takes a `when` bitfield, with the bits `FL_READ`, `FL_WRITE`, and `FL_EXCEPT` defined, to indicate when the callback should be done.

There can only be one callback of each type for a file descriptor. [Fl::remove_fd\(\)](#) gets rid of *all* the callbacks for a given file descriptor.

Under UNIX/Linux/macOS *any* file descriptor can be monitored (files, devices, pipes, sockets, etc.). Due to limitations in Microsoft Windows, Windows applications can only monitor sockets.

Under macOS, [Fl::add_fd\(\)](#) opens the display if that's not been done before.

12.7.3.6 add_idle()

```

void Fl::add_idle (
    Fl_Idle_Handler cb,
    void * data = 0 ) [static]

```

Adds a callback function that is called every time by [Fl::wait\(\)](#) and also makes it act as though the timeout is zero (this makes [Fl::wait\(\)](#) return immediately, so if it is in a loop it is called repeatedly, and thus the idle function is called repeatedly).

The idle function can be used to get background processing done.

You can have multiple idle callbacks. To remove an idle callback use [Fl::remove_idle\(\)](#).

[Fl::wait\(\)](#) and [Fl::check\(\)](#) call idle callbacks, but [Fl::ready\(\)](#) does not.

The idle callback can call any FLTK functions, including [Fl::wait\(\)](#), [Fl::check\(\)](#), and [Fl::ready\(\)](#).

FLTK will not recursively call the idle callback.

12.7.3.7 add_timeout()

```

void Fl::add_timeout (
    double time,
    Fl_Timeout_Handler cb,
    void * data = 0 ) [static]

```

Adds a one-shot timeout callback.

The callback function `cb` will be called by [Fl::wait\(\)](#) at `time` seconds after this function is called. The callback function must have the signature `Fl_Timeout_Handler`. The optional `data` argument is passed to the callback (default: `NULL`).

The timer is removed from the timer queue before the callback function is called. It is safe to reschedule the timeout inside the callback function.

You can have multiple timeout callbacks, even the same timeout callback with different timeout values and/or different `data` values. They are all considered different timer objects.

To remove a timeout while it is active (pending) use [Fl::remove_timeout\(\)](#).

If you need more accurate, repeated timeouts, use [Fl::repeat_timeout\(\)](#) to reschedule the subsequent timeouts. Please see [Fl::repeat_timeout\(\)](#) for an example.

Since version 1.4, a timeout can be started from a child thread under the condition that the call to [Fl::add_timeout](#) is wrapped in [Fl::lock\(\)](#) and [Fl::unlock\(\)](#).

Parameters

in	<i>time</i>	delta time in seconds until the timer expires
in	<i>cb</i>	callback function
in	<i>data</i>	optional user data (default: NULL)

See also

[Fl_Timeout_Handler](#)

[Fl::repeat_timeout\(double time, Fl_Timeout_Handler cb, void *data\)](#)

[Fl::remove_timeout\(Fl_Timeout_Handler cb, void *data\)](#)

[Fl::has_timeout\(Fl_Timeout_Handler cb, void *data\)](#)

12.7.3.8 api_version()

```
int Fl::api_version ( ) [static]
```

Returns the compiled-in value of the `FL_API_VERSION` constant.

This is useful for checking the version of a shared library.

12.7.3.9 arg()

```
int Fl::arg (
    int argc,
    char ** argv,
    int & i ) [static]
```

Parse a single switch from `argv`, starting at word `i`.

Returns the number of words eaten (1 or 2, or 0 if it is not recognized) and adds the same value to `i`.

This is the default argument handler used internally by `Fl::args(...)`, but you can use this function if you prefer to step through the standard FLTK switches yourself.

All standard FLTK switches except `-bg2` may be abbreviated to just one letter and case is ignored:

- `-bg color` or `-background color`
Sets the background color using [Fl::background\(\)](#).
- `-bg2 color` or `-background2 color`
Sets the secondary background color using [Fl::background2\(\)](#).
- `-display host:n.n`
Sets the X display to use; this option is silently ignored under Windows and MacOS.
- `-dnd` and `-nodnd`
Enables or disables drag and drop text operations using [Fl::dnd_text_ops\(\)](#).
- `-fg color` or `-foreground color`
Sets the foreground color using [Fl::foreground\(\)](#).
- `-geometry WxH+X+Y`
Sets the initial window position and size according to the standard X geometry string.

- `-iconic`
Iconifies the window using `Fl_Window::iconize()`.
- `-kbd` and `-nokbd`
Enables or disables visible keyboard focus for non-text widgets using `Fl::visible_focus()`.
- `-name string`
Sets the window class using `Fl_Window::xclass()`.
- `-scheme string`
Sets the widget scheme using `Fl::scheme()`.
- `-title string`
Sets the window title using `Fl_Window::label()`.
- `-tooltips` and `-notooltips`
Enables or disables tooltips using `Fl_Tooltip::enable()`.

Color values are commonly given as three digit or six digit hex numbers.

- The order of `fg`, `bg`, and `bg2` in the command line does not matter
- There is no way at the moment to set the selection color.
- Setting the `bg2` color also changes the `fg` color to have sufficient contrast
- Explicitly setting `fg` color overrides the `bg2/contrast` constraint.
- Setting the `bg` color will update the color lookup table for the gray ramp, so color index values can stay the same for all apps, it's just mapped to different RGB values.
- The calculation of the gray ramp is only based on the `bg` color, so there is no way at the moment to create an inverted (dark mode) ramp.
- Consequently, setting `bg` to black creates a an all-black ramp, setting a somewhat dark `bg` color creates a extremely dark ramp.
- Setting the `bg` has no influence on `bg2` or `fg`.

If your program requires other switches in addition to the standard FLTK options, you will need to pass your own argument handler to `Fl::args(int,char**,int&,Fl_Args_Handler)` explicitly.

See also

`fl_parse_color(const char* p, uchar& r, uchar& g, uchar& b)` to see how color values can be defined

12.7.3.10 args() [1/2]

```
void Fl::args (
    int argc,
    char ** argv ) [static]
```

Parse all command line switches matching standard FLTK options only.

It parses all the switches, and if any are not recognized it calls `Fl::abort(Fl::help)`, i.e. unlike the long form, an unrecognized switch generates an error message and causes the program to exit.

12.7.3.11 args() [2/2]

```
int Fl::args (
    int argc,
    char ** argv,
    int & i,
    Fl_Args_Handler cb = 0 ) [static]
```

Parse command line switches using the `cb` argument handler.

Returns 0 on error, or the number of words processed.

FLTK provides this as an *entirely optional* command line switch parser. You don't have to call it if you don't want to. Everything it can do can be done with other calls to FLTK.

To use the switch parser, call `Fl::args(...)` near the start of your program. This does **not** open the display, instead switches that need the display open are stashed into static variables. Then you **must** display your first window by calling `window->show(argc, argv)`, which will do anything stored in the static variables.

Providing an argument handler callback `cb` lets you define your own switches. It is called with the same `argc` and `argv`, and with `i` set to the index of the switch to be processed. The `cb` handler should return zero if the switch is unrecognized, and not change `i`. It should return non-zero to indicate the number of words processed if the switch is recognized, i.e. 1 for just the switch, and more than 1 for the switch plus associated parameters. `i` should be incremented by the same amount.

The `cb` handler is called **before** any other tests, so *you can also override any standard FLTK switch* (this is why FLTK can use very short switches instead of the long ones all other toolkits force you to use). See [Fl::arg\(\)](#) for descriptions of the standard switches.

On return `i` is set to the index of the first non-switch. This is either:

- The first word that does not start with '-'.
- The word '-' (used by many programs to name stdin as a file)
- The first unrecognized switch (return value is 0).
- `argc`

The return value is `i` unless an unrecognized switch is found, in which case it is zero. If your program takes no arguments other than switches you should produce an error if the return value is less than `argc`.

A usage string is displayed if [Fl::args\(\)](#) detects an invalid argument on the command-line. You can change the message by setting the [Fl::help](#) pointer.

A very simple command line parser can be found in `examples/howto-parse-args.cxx`

The simpler [Fl::args\(int argc, char **argv\)](#) form is useful if your program does not have command line switches of its own.

12.7.3.12 args_to_utf8()

```
int Fl::args_to_utf8 (
    int argc,
    char **& argv ) [static]
```

Convert Windows commandline arguments to UTF-8.

Note

This function does nothing on other (non-Windows) platforms, hence you may call it on all platforms or only on Windows by using platform specific code like `'#ifdef _WIN32'` etc. - it's your choice. Calling it on other platforms returns quickly w/o wasting much CPU time.

This function *must be called on Windows platforms* in `main()` before the array `argv` is used if your program uses any commandline argument strings (these should be UTF-8 encoded). This applies also to standard FLTK commandline arguments like `"-name"` (class name) and `"-title"` (window title in the title bar).

Unfortunately Windows **neither** provides commandline arguments in UTF-8 encoding **nor** as Windows "Wide Character" strings in the standard `main()` and/or the Windows specific `WinMain()` function.

On Windows platforms (no matter which build system) this function calls a Windows specific function to retrieve commandline arguments as Windows "Wide Character" strings, converts these strings to an internally allocated buffer (or multiple buffers) and returns the result in `argv`. For implementation details please refer to the source code; however these details may be changed in the future.

Note that `argv` is provided by reference so it can be overwritten.

In the recommended simple form the function overwrites the variable `argv` and allocates a new array of strings pointed to by `argv`. You may use this form on all platforms and it is as simple as adding one line to old programs to make them work with international (UTF-8) commandline arguments.

```
int main(int argc, char **argv) {
    Fl::args_to_utf8(argc, argv); // add this line
    // ... use argc and argv, e.g. for commandline parsing
    window->show(argc, argv);
    return Fl::run();
}
```

```
}

```

For an example see 'examples/howto-parse-args.cxx' in the FLTK sources.

If you want to retain the original `argc` and `argv` variables the following slightly longer and more complicated code works as well on all platforms.

```
int main(int argc, char **argv) {
    char **argvn = argv;           // must copy argv to work on all platforms
    int argcn = Fl::args_to_utf8(argc, argvn);
    // ... use argcn and argvn, e.g. for commandline parsing
    window->show(argcn, argvn);
    return Fl::run();
}
```

Parameters

in	<code>argc</code>	used only on non-Windows platforms
out	<code>argv</code>	modified only on Windows platforms

Returns

argument count (always the same as `argc`)

Since

1.4.0

12.7.3.13 background()

```
void Fl::background (
    uchar r,
    uchar g,
    uchar b ) [static]
```

Changes `fl_color(FL_BACKGROUND_COLOR)` to the given color, and changes the gray ramp from 32 to 56 to black to white.

These are the colors used as backgrounds by almost all widgets and used to draw the edges of all the boxtypes.

12.7.3.14 background2()

```
void Fl::background2 (
    uchar r,
    uchar g,
    uchar b ) [static]
```

Changes the alternative background color.

This color is used as a background by [Fl_Input](#) and other text widgets.

This call may change `fl_color(FL_FOREGROUND_COLOR)` if it does not provide sufficient contrast to `FL_BACKGROUND2_COLOR`.

12.7.3.15 box_border_radius_max() [1/2]

```
static int Fl::box_border_radius_max ( ) [inline], [static]
```

Get the maximum border radius of all "rounded" boxtypes in pixels.

Since

1.4.0

12.7.3.16 box_border_radius_max() [2/2]

```
static void Fl::box_border_radius_max (
    int R ) [inline], [static]
```

Set the maximum border radius of all "rounded" boxtypes in pixels.

Must be at least 5, default = 15.

Note

This does **not** apply to the "round" boxtypes which have really round sides (i.e. composed of half circles) as opposed to "rounded" boxtypes that have only rounded corners with a straight border between corners.

The box border radius of "rounded" boxtypes is typically calculated as about 2/5 of the box height or width, whichever is smaller. The upper limit can be set by this method for all "rounded" boxtypes.

Since

1.4.0

12.7.3.17 box_color()

```
Fl_Color Fl::box_color (
    Fl_Color c ) [static]
```

Gets the drawing color to be used for the background of a box.

This method is only useful inside box drawing code. It returns the color to be used, either `fl_inactive(c)` if the widget is `!active_r()` or `c` otherwise.

12.7.3.18 box_dh()

```
int Fl::box_dh (
    Fl_Boxtype t ) [static]
```

Returns the height offset for the given boxtype.

See also

[box_dy\(\)](#).

12.7.3.19 box_dw()

```
int Fl::box_dw (
    Fl_Boxtype t ) [static]
```

Returns the width offset for the given boxtype.

See also

[box_dy\(\)](#).

12.7.3.20 box_dx()

```
int Fl::box_dx (
    Fl_Boxtype t ) [static]
```

Returns the X offset for the given boxtype.

See also

[box_dy\(\)](#)

12.7.3.21 box_dy()

```
int Fl::box_dy (
    Fl_Boxtype t ) [static]
```

Returns the Y offset for the given boxtype.

These functions return the offset values necessary for a given boxtype, useful for computing the area inside a box's borders, to prevent overdrawing the borders.

For instance, in the case of a boxtype like `FL_DOWN_BOX` where the border width might be 2 pixels all around, the above functions would return 2, 2, 4, and 4 for `box_dx`, `box_dy`, `box_dw`, and `box_dh` respectively.

An example to compute the area inside a widget's box():

```
int X = yourwidget->x() + Fl::box_dx(yourwidget->box());
```



```
int Y = yourwidget->y() + Fl::box_dy(yourwidget->box());
int W = yourwidget->w() - Fl::box_dw(yourwidget->box());
int H = yourwidget->h() - Fl::box_dh(yourwidget->box());
```

These functions are mainly useful in the `draw()` code for deriving custom widgets, where one wants to avoid drawing over the widget's own border `box()`.

12.7.3.22 `box_shadow_width()` [1/2]

```
static int Fl::box_shadow_width ( ) [inline], [static]
```

Get the box shadow width of all "shadow" boxtypes in pixels.

Since

1.4.0

12.7.3.23 `box_shadow_width()` [2/2]

```
static void Fl::box_shadow_width (
    int W ) [inline], [static]
```

Set the box shadow width of all "shadow" boxtypes in pixels.

Must be at least 1, default = 3. There is no upper limit.

Since

1.4.0

12.7.3.24 `check()`

```
int Fl::check ( ) [static]
```

Same as `Fl::wait(0)`.

Calling this during a big calculation will keep the screen up to date and the interface responsive:

```
while (!calculation_done()) {
    calculate();
    Fl::check();
    if (user_hit_abort_button()) break;
}
```

This returns non-zero if any windows are displayed, and 0 if no windows are displayed (this is likely to change in future versions of FLTK).

12.7.3.25 `display()`

```
void Fl::display (
    const char * d ) [static]
```

Sets the X or Wayland display to use for all windows.

This sets the environment variable `$DISPLAY` or `$WAYLAND_DISPLAY` to the passed string, so this only works before you `show()` the first window or otherwise open the display.

This does nothing on other platforms.

12.7.3.26 `dnd_text_ops()` [1/2]

```
static int Fl::dnd_text_ops ( ) [inline], [static]
```

Gets whether drag and drop text operations are supported.

This returns whether selected text can be dragged from text fields or dragged within a text field as a cut/paste shortcut.

12.7.3.27 `dnd_text_ops()` [2/2]

```
static void Fl::dnd_text_ops (
    int v ) [inline], [static]
```

Sets whether drag and drop text operations are supported.

This specifically affects whether selected text can be dragged from text fields or dragged within a text field as a cut/paste shortcut.

12.7.3.28 draw_box_active()

```
int Fl::draw_box_active ( ) [static]
```

Determines if the currently drawn box is active or inactive.
If inactive, the box color should be changed to the inactive color.

See also

[Fl::box_color\(Fl_Color c\)](#)

12.7.3.29 draw_GL_text_with_textures() [1/2]

```
static int Fl::draw_GL_text_with_textures ( ) [inline], [static]
```

returns whether whether OpenGL uses textures to draw all text.
Default is yes.

See also

[draw_GL_text_with_textures\(int val\)](#)

Version

1.4.0

12.7.3.30 draw_GL_text_with_textures() [2/2]

```
static void Fl::draw_GL_text_with_textures (
    int val ) [inline], [static]
```

sets whether OpenGL uses textures to draw all text.

By default, FLTK draws OpenGL text using textures, if the necessary hardware support is available. Call `Fl::draw_GL_text_with_textures(0)` once in your program before the first call to `gl_font()` to have FLTK draw instead OpenGL text using a legacy, platform-dependent procedure. It's recommended not to deactivate textures under the MacOS platform because the MacOS legacy procedure is extremely rudimentary.

Parameters

<i>val</i>	use 0 to prevent FLTK from drawing GL text with textures
------------	--

See also

[gl_texture_pile_height\(int max\)](#)

Version

1.4.0

12.7.3.31 flush()

```
void Fl::flush ( ) [static]
```

Causes all the windows that need it to be redrawn and graphics forced out through the pipes.

This is what `wait()` does before looking for events.

Note: in multi-threaded applications you should only call `Fl::flush()` from the main thread. If a child thread needs to trigger a redraw event, it should instead call `Fl::awake()` to get the main thread to process the event queue.

12.7.3.32 get_system_colors()

```
void Fl::get_system_colors ( ) [static]
```

Read the user preference colors from the system and use them to call `Fl::foreground()`, `Fl::background()`, and `Fl::background2()`.

This is done by `Fl_Window::show(argc,argv)` before applying the `-fg` and `-bg` switches.

On X this reads some common values from the Xdefaults database. KDE users can set these values by running the "krdb" program, and newer versions of KDE set this automatically if you check the "apply style to other X programs" switch in their control panel.

12.7.3.33 `gl_visual()`

```
static int Fl::gl_visual (
    int ,
    int * alist = 0 ) [static]
```

This does the same thing as `Fl::visual(int)` but also requires OpenGL drawing to work.

This *must* be done if you want to draw in normal windows with OpenGL with `gl_start()` and `gl_end()`. It may be useful to call this so your X windows use the same visual as an `Fl_Gl_Window`, which on some servers will reduce colormap flashing.

See `Fl_Gl_Window` for a list of additional values for the argument.

12.7.3.34 `has_timeout()`

```
int Fl::has_timeout (
    Fl_Timeout_Handler cb,
    void * data = 0 ) [static]
```

Returns true if the timeout exists and has not been called yet.

Both arguments `cb` and `data` must match with at least one timer in the queue of active timers to return true (1).

Note

It is a known inconsistency that `Fl::has_timeout()` does not use the `data` argument as a wildcard (match all) if it is zero (NULL) which `Fl::remove_timeout()` does. This is so for backwards compatibility with FLTK 1.3.x. Therefore using 0 (zero, NULL) as the timeout `data` value is discouraged unless you're sure that you don't need to use `Fl::has_timeout(callback, (void *)0)`; or `Fl::remove_timeout(callback, (void *)0)`;

Parameters

in	<i>cb</i>	Timer callback
in	<i>data</i>	User data

Returns

whether the timer was found in the queue

Return values

0	not found
1	found

12.7.3.35 `hide_all_windows()`

```
void Fl::hide_all_windows ( ) [static]
```

Hide all visible windows to make FLTK leave `Fl::run()`.

`Fl::run()` will run as long as there are visible windows. Call `Fl::hide_all_windows()` to hide (close) all currently shown (visible) windows, effectively terminating the `Fl::run()` loop.

See also

[Fl::run\(\)](#)

Since

1.4.0

12.7.3.36 is_scheme()

```
static int Fl::is_scheme (
    const char * name ) [inline], [static]
```

Returns whether the current scheme is the given name.

This is a fast inline convenience function to support scheme-specific code in widgets, e.g. in their draw() methods, if required.

Use a valid scheme name, not NULL (although NULL is allowed, this is not a useful argument - see below).

If [Fl::scheme\(\)](#) has not been set or has been set to the default scheme ("none" or "base"), then this will always return 0 regardless of the argument, because [Fl::scheme\(\)](#) is NULL in this case.

Note

The stored scheme name is always lowercase, and this method will do a case-sensitive compare, so you **must** provide a lowercase string to return the correct value. This is intentional for performance reasons.

Example:

```
if (Fl::is_scheme("gtk+")) { your_code_here(); }
```

Parameters

in	<i>name</i>	lowercase string of requested scheme name.
----	-------------	--

Returns

1 if the given scheme is active, 0 otherwise.

See also

[Fl::scheme\(const char *name\)](#)

12.7.3.37 menu_linespacing() [1/2]

```
int Fl::menu_linespacing ( ) [static]
```

Gets the default line spacing used by menus.

Returns

The default line spacing, in pixels.

12.7.3.38 menu_linespacing() [2/2]

```
void Fl::menu_linespacing (
    int H ) [static]
```

Sets the default line spacing used by menus.

Default is 4.

Parameters

in	<i>H</i>	The new default line spacing between menu items, in pixels.
----	----------	---

12.7.3.39 now()

```
Fl_Timestamp Fl::now (
```

```
double offset = 0 ) [static]
```

Set a time stamp at this point in time with optional signed offset in seconds.

The time stamp is an opaque type and does not represent the time of day or some time and date in the calendar. It is used with `Fl::seconds_between()` and `Fl::seconds_since()` to measure elapsed time.

```
Fl_Timestamp start = Fl::now();
// do something
double s = Fl::seconds_since(start);
printf("That operation took %g seconds\n", s);
```

Depending on the system the resolution may be milliseconds or microseconds. Under certain conditions (particularly on Windows) the value in member `sec` may wrap around and does not represent a real time (maybe runtime of the system). Function `seconds_since()` below uses this to subtract two timestamps which is always a correct delta time with milliseconds or microseconds resolution.

Parameters

<code>offset</code>	optional signed offset in seconds added to the current time
---------------------	---

Returns

this moment in time offset by `offset` as an opaque time stamp

Todo `Fl::system_driver()->gettime()` was implemented for the Forms library and has a limited resolution (on Windows: milliseconds). On POSIX platforms it uses `gettimeofday()` with microsecond resolution. A new function could use a better resolution on Windows with its multimedia timers which requires a new dependency: `winmm.lib` (dll). This could be a future improvement, maybe set as a build option or generally (requires Win95 or 98?).

See also

[Fl::seconds_since\(Fl_Timestamp& then\)](#)

[Fl::seconds_between\(Fl_Timestamp& back, Fl_Timestamp& further_back\)](#)

[Fl::ticks_since\(Fl_Timestamp& then\)](#)

[Fl::ticks_between\(Fl_Timestamp& back, Fl_Timestamp& further_back\)](#)

12.7.3.40 option() [1/2]

```
bool Fl::option (
    Fl_Option opt ) [static]
```

FLTK library options management.

This function needs to be documented in more detail. It can be used for more optional settings, such as using a native file chooser instead of the FLTK one wherever possible, disabling tooltips, disabling visible focus, disabling FLTK file chooser preview, etc. .

There should be a command line option interface.

There should be an application that manages options system wide, per user, and per application.

Example:

```
if ( Fl::option(Fl::OPTION_ARROW_FOCUS) )
{ ..on.. }
else
{ ..off.. }
```

Note

As of FLTK 1.3.0, options can be managed within fluid, using the menu *Edit/Global FLTK Settings*.

Parameters

<code>opt</code>	which option
------------------	--------------

Returns

true or false

See also

enum [Fl::Fl_Option](#)
[Fl::option\(Fl_Option, bool\)](#)

Since

FLTK 1.3.0

12.7.3.41 option() [2/2]

```
void Fl::option (
    Fl_Option opt,
    bool val ) [static]
```

Override an option while the application is running.
 This function does not change any system or user settings.

Example:

```
Fl::option(Fl::OPTION_ARROW_FOCUS, true);    // on
Fl::option(Fl::OPTION_ARROW_FOCUS, false);  // off
```

Parameters

<i>opt</i>	which option
<i>val</i>	set to true or false

See also

enum [Fl::Fl_Option](#)
 bool [Fl::option\(Fl_Option\)](#)

12.7.3.42 own_colormap()

```
void Fl::own_colormap ( ) [static]
```

Makes FLTK use its [own colormap](#).

This may make FLTK display better and will reduce conflicts with other programs that want lots of colors. However the colors may flash as you move the cursor between windows.

This does nothing if the current visual is not colormapped.

12.7.3.43 program_should_quit() [1/2]

```
static int Fl::program_should_quit ( ) [inline], [static]
```

Returns non-zero when a request for program termination was received and accepted.

On the MacOS platform, the "Quit xxx" item of the application menu is such a request, that is considered accepted when all windows are closed. On other platforms, this function returns 0 until `Fl::program_should_quit(1)` is called.

Version

1.4.0

12.7.3.44 program_should_quit() [2/2]

```
static void Fl::program_should_quit (
    int should_i ) [inline], [static]
```

Indicate to the FLTK library whether a program termination request was received and accepted.

A program may set this to 1, for example, while performing a platform-independent command asking the program to cleanly terminate, similarly to the "Quit xxx" item of the application menu under MacOS.

Version

1.4.0

12.7.3.45 readqueue()

```
Fl_Widget * Fl::readqueue ( ) [static]
```

Reads the default callback queue and returns the first widget.

All `Fl_Widget`s that don't have a callback defined use the default callback `static Fl_Widget::default_callback()` that puts a pointer to the widget in a queue. This method reads the oldest widget out of this queue.

The queue (FIFO) is limited (currently 20 items). If the queue overflows, the oldest entry (`Fl_Widget *`) is discarded. Relying on the default callback and reading the callback queue with `Fl::readqueue()` is not recommended. If you need a callback, you should set one with `Fl_Widget::callback(Fl_Callback *cb, void *data)` or one of its variants.

See also

[Fl_Widget::callback\(\)](#)

[Fl_Widget::callback\(Fl_Callback *cb, void *data\)](#)

[Fl_Widget::default_callback\(\)](#)

12.7.3.46 ready()

```
int Fl::ready ( ) [static]
```

This is similar to `Fl::check()` except this does *not* call `Fl::flush()` or any callbacks, which is useful if your program is in a state where such callbacks are illegal.

This returns true if `Fl::check()` would do anything (it will continue to return true until you call `Fl::check()` or `Fl::wait()`).

```
while (!calculation_done()) {
    calculate();
    if (Fl::ready()) {
        do_expensive_cleanup();
        Fl::check();
        if (user_hit_abort_button()) break;
    }
}
```

12.7.3.47 release()

```
static void Fl::release ( ) [inline], [static]
```

Releases the current grabbed window, equals `grab(0)`.

Deprecated Use `Fl::grab(0)` instead.

See also

[grab\(Fl_Window*\)](#)

12.7.3.48 reload_scheme()

```
int Fl::reload_scheme ( ) [static]
```

Called internally when setting a new scheme according to scheme name.

Loads or reloads the current scheme selection.

Returns

Always 1 (this may change in the future)

See void [Fl::scheme\(const char *name\)](#)

12.7.3.49 remove_check()

```
void Fl::remove_check (
    Fl_Timeout_Handler cb,
    void * argp = 0 ) [static]
```

Removes a check callback.

It is harmless to remove a check callback that no longer exists.

12.7.3.50 remove_timeout()

```
void Fl::remove_timeout (
    Fl_Timeout_Handler cb,
    void * data = 0 ) [static]
```

Removes a timeout callback from the timer queue.

This method removes all matching timeouts, not just the first one. This may change in the future.

If the `data` argument is `NULL` (the default!) only the callback `cb` must match, i.e. all timer entries with this callback are removed.

It is harmless to remove a timeout callback that no longer exists.

Parameters

in	<i>cb</i>	Timer callback to be removed (must match)
in	<i>data</i>	Wildcard if <code>NULL</code> (default), must match otherwise

12.7.3.51 repeat_timeout()

```
void Fl::repeat_timeout (
    double time,
    Fl_Timeout_Handler cb,
    void * data = 0 ) [static]
```

Repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.

You should call this method only inside a timeout callback of the same or a logically related timer from whose expiration time the new timeout shall be scheduled. Otherwise the timing accuracy can't be improved and the exact behavior is undefined.

If you call this outside a timeout callback the behavior is the same as [Fl::add_timeout\(\)](#).

Example: The following code will print "TICK" each second on stdout with a fair degree of accuracy:

```
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <stdio.h>

void callback(void *) {
    printf("TICK\n");
    Fl::repeat_timeout(1.0, callback); // retrigger timeout
}

int main() {
    Fl_Window win(100, 100);
    win.show();
    Fl::add_timeout(1.0, callback); // set up first timeout
    return Fl::run();
}
```

Parameters

in	<i>time</i>	delta time in seconds until the timer expires
in	<i>cb</i>	callback function
in	<i>data</i>	optional user data (default: <code>NULL</code>)

12.7.3.52 run()

```
int Fl::run ( ) [static]
```


Calls `Fl::wait()` repeatedly as long as any windows are displayed.

When all the windows are closed it returns zero (supposedly it would return non-zero on any errors, but FLTK calls `exit` directly for these). A normal program will end `main()` with `return Fl::run();`.

Note

`Fl::run()` and `Fl::wait()` (but not `Fl::wait(double)`) both return when all FLTK windows are closed. Therefore, a MacOS FLTK application possessing `Fl_Sys_Menu_Bar` items able to create new windows and expected to keep running without any open window cannot use these two functions. One solution is to run the event loop as follows:

```
while (!Fl::program_should_quit()) Fl::wait(1e20);
```

12.7.3.53 `scheme()`

```
int Fl::scheme (
    const char * s ) [static]
```

Sets the current widget scheme.

NULL will use the scheme defined in the `FLTK_SCHEME` environment variable or the scheme resource under X11. Otherwise, any of the following schemes can be used:

- "none" - This is the default look-n-feel which resembles old Windows (95/98/Me/NT/2000) and old GTK/KDE
- "base" - This is an alias for "none"
- "plastic" - This scheme is inspired by the Aqua user interface on macOS
- "gtk+" - This scheme is inspired by the Red Hat Bluecurve theme
- "gleam" - This scheme is inspired by the Clearlooks Glossy scheme. (Colin Jones and Edmanuel Torres).
- "oxy" - This is a subset of Dmitrij K's oxy scheme (STR 2675, 3477)

If the given scheme name is unknown, the default scheme will be used.

Setting the scheme (name) is case insensitive, but the stored scheme name will always be lowercase and `Fl::scheme()` will return this lowercase name or NULL if no scheme or the default scheme ("none" or "base") was set.

Parameters

in	s	Scheme name or NULL
----	---	---------------------

Returns

Current scheme name or NULL

Return values

NULL	if the scheme has not been set or is the default scheme
------	---

See also

[Fl::is_scheme\(\)](#)

12.7.3.54 `scrollbar_size()` [1/2]

```
int Fl::scrollbar_size ( ) [static]
```

Gets the default scrollbar size used by `Fl_Browser_`, `Fl_Help_View`, `Fl_Scroll`, and `Fl_Text_Display` widgets.

Returns

The default size for widget scrollbars, in pixels.

12.7.3.55 scrollbar_size() [2/2]

```
void Fl::scrollbar_size (
    int W ) [static]
```

Sets the default scrollbar size that is used by the [Fl_Browser_](#), [Fl_Help_View](#), [Fl_Scroll](#), and [Fl_Text_Display](#) widgets.

Parameters

in	<i>W</i>	The new default size for widget scrollbars, in pixels.
----	----------	--

12.7.3.56 seconds_between()

```
double Fl::seconds_between (
    Fl_Timestamp & back,
    Fl_Timestamp & further_back ) [static]
```

Return the time in seconds between two time stamps.

Parameters

in	<i>back</i>	a previously taken time stamp
in	<i>further_back</i>	an even earlier time stamp

Returns

elapsed seconds and fractions of a second

See also

[Fl::seconds_since\(Fl_Timestamp& then\)](#)

[Fl::now\(\)](#)

12.7.3.57 seconds_since()

```
double Fl::seconds_since (
    Fl_Timestamp & then ) [static]
```

Return the time in seconds between now and a previously taken time stamp.

Parameters

in	<i>then</i>	a previously taken time stamp
----	-------------	-------------------------------

Returns

elapsed seconds and fractions of a second

See also

[Fl::seconds_between\(Fl_Timestamp& back, Fl_Timestamp& further_back\)](#)

[Fl::now\(\)](#)

[Fl::distant_past\(\)](#)

12.7.3.58 set_box_color()

```
void Fl::set_box_color (
    Fl_Color c ) [static]
```

Sets the drawing color for the box that is currently drawn.

This method sets the current drawing color `fl_color()` depending on the widget's state to either `c` or `fl_inactive(c)`.

It should be used whenever a box background is drawn in the box (type) drawing code instead of calling `fl_color(Fl_Color bg)` with the background color `bg`, usually `Fl_Widget::color()`.

This method is only useful inside box drawing code. Whenever a box is drawn with one of the standard box drawing methods, a static variable is set depending on the widget's current state - if the widget is `!active_r()` then the internal variable is false (0), otherwise it is true (1). This is faster than calling `Fl_Widget::active_r()` because the state is cached.

See also

[Fl::draw_box_active\(\)](#)

[Fl::box_color\(Fl_Color\)](#)

12.7.3.59 set_idle()

```
static void Fl::set_idle (
    Fl_Old_Idle_Handler cb ) [inline], [static]
```

Sets an idle callback.

Deprecated This method is obsolete - use the `add_idle()` method instead.

12.7.3.60 ticks_between()

```
long Fl::ticks_between (
    Fl_Timestamp & back,
    Fl_Timestamp & further_back ) [static]
```

Return the time in ticks (60Hz) between two time stamps.

Parameters

in	<i>back</i>	a previously taken time stamp
in	<i>further_back</i>	an even earlier time stamp

Returns

elapsed ticks in 60th of a second

See also

[Fl::ticks_since\(Fl_Timestamp& then\)](#)

[Fl::now\(\)](#)

12.7.3.61 ticks_since()

```
long Fl::ticks_since (
    Fl_Timestamp & then ) [static]
```

Return the time in ticks (60Hz) between now and a previously taken time stamp.

Ticks are a convenient way to time animations 'per frame'. Even though modern computers use all kinds of screen refresh rates, 60Hz is a very good base for animation that is typically shown in user interface graphics.

Parameters

in	<i>then</i>	a previously taken time stamp
----	-------------	-------------------------------

Returns

elapsed ticks in 60th of a second

See also

[Fl::ticks_between\(Fl_Timestamp& back, Fl_Timestamp& further_back\)](#)

[Fl::now\(\)](#)

12.7.3.62 use_high_res_GL() [1/2]

```
static int Fl::use_high_res_GL ( ) [inline], [static]
```

returns whether GL windows should be drawn at high resolution on Apple computers with retina displays. Default is no.

Version

1.3.4

12.7.3.63 use_high_res_GL() [2/2]

```
static void Fl::use_high_res_GL (
    int val ) [inline], [static]
```

sets whether GL windows should be drawn at high resolution on Apple computers with retina displays

Version

1.3.4

12.7.3.64 version()

```
double Fl::version ( ) [static]
```

Returns the compiled-in value of the FL_VERSION constant. This is useful for checking the version of a shared library.

Deprecated Use int [Fl::api_version\(\)](#) instead.

12.7.3.65 visible_focus() [1/2]

```
static int Fl::visible_focus ( ) [inline], [static]
```

Gets or sets the visible keyboard focus on buttons and other non-text widgets. The default mode is to enable keyboard focus for all widgets.

12.7.3.66 visible_focus() [2/2]

```
static void Fl::visible_focus (
    int v ) [inline], [static]
```

Gets or sets the visible keyboard focus on buttons and other non-text widgets. The default mode is to enable keyboard focus for all widgets.

12.7.3.67 visual()

```
int Fl::visual (
    int flags ) [static]
```

Selects a visual so that your graphics are drawn correctly.

This is only allowed before you call `show()` on any windows. This does nothing if the default visual satisfies the capabilities, or if no visual satisfies the capabilities, or on systems that don't have such brain-dead notions.

Only the following combinations do anything useful:

- `Fl::visual(FL_RGB)`
Full/true color (if there are several depths FLTK chooses the largest). Do this if you use `fl_draw_image` for much better (non-dithered) output.
- `Fl::visual(FL_RGB8)`
Full color with at least 24 bits of color. `FL_RGB` will always pick this if available, but if not it will happily return a less-than-24 bit deep visual. This call fails if 24 bits are not available.

This returns true if the system has the capabilities by default or FLTK succeeded in turning them on. Your program will still work even if this returns false (it just won't look as good).

12.7.3.68 `wait()` [1/2]

```
int Fl::wait ( ) [static]
```

Waits until "something happens" and then returns.

Call this repeatedly to "run" your program. You can also check what happened each time after this returns, which is quite useful for managing program state.

What this really does is call all idle callbacks, all elapsed timeouts, call `Fl::flush()` to get the screen to update, and then wait some time (zero if there are idle callbacks, the shortest of all pending timeouts, or infinity), for any events from the user or any `Fl::add_fd()` callbacks. It then handles the events and calls the callbacks and then returns.

Returns

non-zero if there are any visible windows - this may change in future versions of FLTK.

12.7.3.69 `wait()` [2/2]

```
double Fl::wait (
    double time_to_wait ) [static]
```

Waits a maximum of `time_to_wait` seconds or until "something happens".

See `Fl::wait()` for the description of operations performed when "something happens".

Returns

Always 1 on Windows. Otherwise, it is positive if an event or fd happens before the time elapsed. It is zero if nothing happens. It is negative if an error occurs (this will happen on X11 if a signal happens).

12.7.4 Member Data Documentation

12.7.4.1 `help`

```
const char *const Fl::help = helpmsg+13 [static]
```

Usage string displayed if `Fl::args()` detects an invalid argument.

This may be changed to point to customized text at run-time.

12.7.4.2 `idle`

```
void(* Fl::idle) () [static]
```

The currently executing idle callback function: DO NOT USE THIS DIRECTLY!

This is now used as part of a higher level system allowing multiple idle callback functions to be called.

See also

[add_idle\(\)](#), [remove_idle\(\)](#)

The documentation for this class was generated from the following files:

- [Fl.H](#)
- [Fl.cxx](#)
- [Fl_abort.cxx](#)

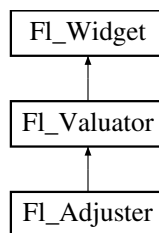
- [Fl_add_idle.cxx](#)
- [Fl_arg.cxx](#)
- [fl_boxytype.cxx](#)
- [Fl_Cairo.cxx](#)
- [fl_color.cxx](#)
- [Fl_compose.cxx](#)
- [Fl_display.cxx](#)
- [Fl_get_system_colors.cxx](#)
- [Fl_grab.cxx](#)
- [fl_labeltype.cxx](#)
- [Fl_lock.cxx](#)
- [Fl_own_colormap.cxx](#)
- [fl_set_font.cxx](#)
- [fl_shortcut.cxx](#)
- [Fl_Timeout.cxx](#)
- [Fl_visual.cxx](#)
- [Fl_Widget.cxx](#)
- [Fl_Window.cxx](#)
- [screen_xywh.cxx](#)

12.8 FL_Adjuster Class Reference

The [Fl_Adjuster](#) widget was stolen from Prisms, and has proven to be very useful for values that need a large dynamic range.

```
#include <Fl_Adjuster.H>
```

Inheritance diagram for [Fl_Adjuster](#):



Public Member Functions

- [Fl_Adjuster](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Adjuster](#) widget using the given position, size, and label string.
- int [soft](#) () const
If "soft" is turned on, the user is allowed to drag the value outside the range.
- void [soft](#) (int s)
If "soft" is turned on, the user is allowed to drag the value outside the range.

Public Member Functions inherited from [Fl_Valuator](#)

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int [format](#) (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double [increment](#) (double, int)

- Adds n times the step value to the passed value.*
- double **maximum** () const
 - Gets the maximum value for the valuator.*
- void **maximum** (double a)
 - Sets the maximum value for the valuator.*
- double **minimum** () const
 - Gets the minimum value for the valuator.*
- void **minimum** (double a)
 - Sets the minimum value for the valuator.*
- void **precision** (int digits)
 - Sets the step value to $1.0 / 10^{\text{digits}}$.*
- void **range** (double a, double b)
 - Sets the minimum and maximum values for the valuator.*
- double **round** (double)
 - Round the passed value to the nearest step increment.*
- double **step** () const
 - Gets or sets the step value.*
- void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
- void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
- void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double **value** () const
 - Gets the floating point(double) value.*
- int **value** (double)
 - Sets the current value.*

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) **align** () const
 - Gets the label alignment.*
- void **align** ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()

- Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*

 - virtual [FI_Group](#) const * **as_group** () const
 - virtual [FI_Window](#) * **as_window** ()
- Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*

 - virtual [FI_Window](#) const * **as_window** () const
 - void **bind_deimage** ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.

 - void **bind_deimage** (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

 - void **bind_image** ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.

 - void **bind_image** (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) **box** () const
- Gets the box type of the widget.*

 - void **box** ([FI_Boxtype](#) new_box)

Sets the box type for the widget.
- [FI_Callback_p](#) **callback** () const
- Gets the current callback function for the widget.*

 - void **callback** ([FI_Callback](#) *cb)

Sets the current callback function for the widget.

 - void **callback** ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)

Sets the current callback function and managed user data for the widget.

 - void **callback** ([FI_Callback](#) *cb, void *p)

Sets the current callback function and data for the widget.

 - void **callback** ([FI_Callback0](#) *cb)

Sets the current callback function for the widget.

 - void **callback** ([FI_Callback1](#) *cb, long p=0)

Sets the current callback function for the widget.
- unsigned int **changed** () const
- Checks if the widget value changed since the last callback.*

 - void **clear_active** ()

Marks the widget as inactive without sending events or changing focus.
- void **clear_changed** ()
- Marks the value of the widget as unchanged.*

 - void **clear_damage** (uchar c=0)

Clears or sets the damage flags.
- void **clear_output** ()
- Sets a widget to accept input.*

 - void **clear_visible** ()

Hides the widget.
- void **clear_visible_focus** ()
- Disables keyboard focus navigation with this widget.*

 - [FI_Color](#) **color** () const

Gets the background color of the widget.

 - void **color** ([FI_Color](#) bg)

Sets the background color of the widget.

 - void **color** ([FI_Color](#) bg, [FI_Color](#) sel)

Sets the background and selection color of the widget.
- [FI_Color](#) **color2** () const
- For back compatibility only.*

- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const `FI_Widget *w`) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- `uchar damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)
Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const

- Checks if this widget is a child of `wgt`.*

 - int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.
- void `label` (const char *text)

Sets the current label pointer.
- void `label` (FI_Labeltype a, const char *b)

Shortcut to set the label text and type in one call.
- FI_Color `labelcolor` () const

Gets the label color.
- void `labelcolor` (FI_Color c)

Sets the label color.
- FI_Font `labelfont` () const

Gets the font to use.
- void `labelfont` (FI_Font f)

Sets the font to use.
- FI_Fontsize `labelsize` () const

Gets the font size in pixels.
- void `labelsize` (FI_Fontsize pix)

Sets the font size in pixels.
- FI_Labeltype `labeltype` () const

Gets the label type.
- void `labeltype` (FI_Labeltype a)

Sets the label type.
- void `measure_label` (int &ww, int &hh) const

Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const

Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)

Sets whether this widget needs a keyboard.
- unsigned int `output` () const

Returns if a widget is used for output only.
- FI_Group * `parent` () const

Returns a pointer to the parent widget.
- void `parent` (FI_Group *p)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
- FI_Color `selection_color` () const

Gets the selection color.
- void `selection_color` (FI_Color a)

Sets the selection color.
- void `set_active` ()

Marks the widget as active without sending events or changing focus.

- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const

- Gets the widget width.*
- [FL_When](#) `when` () const
 - Returns the conditions under which the callback is called.*
- void `when` (`uchar` `i`)
 - Sets the flags used to decide when a callback is called.*
- [FL_Window](#) * `window` () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int `x` () const
 - Gets the widget position in its window.*
- int `y` () const
 - Gets the widget position in its window.*
- virtual `~FL_Widget` ()
 - Destroys the widget.*

Protected Member Functions

- void `draw` () [FL_OVERRIDE](#)
 - Draws the widget.*
- int `handle` (int) [FL_OVERRIDE](#)
 - Handles the specified event.*
- void `value_damage` () [FL_OVERRIDE](#)
 - Asks for partial redraw.*

Protected Member Functions inherited from [FL_Valuator](#)

- [FL_Valuator](#) (int `X`, int `Y`, int `W`, int `H`, const char *`L`)
 - Creates a new [FL_Valuator](#) widget using the given position, size, and label string.*
- void `handle_drag` (double `newvalue`)
 - Called during a drag operation, after an `FL_WHEN_CHANGED` event is received and before the callback.*
- void `handle_push` ()
 - Stores the current value in the previous value.*
- void `handle_release` ()
 - Called after an `FL_WHEN_RELEASE` event is received and before the callback.*
- int `horizontal` () const
 - Tells if the valuator is an `FL_HORIZONTAL` one.*
- double `previous_value` () const
 - Gets the previous floating point value before an event changed it.*
- void `set_value` (double `v`)
 - Sets the current floating point value.*
- double `softclamp` (double)
 - Clamps the value, but accepts `v` if the previous value is not already out of range.*

Protected Member Functions inherited from [FL_Widget](#)

- void `clear_flag` (unsigned int `c`)
 - Clears a flag in the flags mask.*
- void `draw_backdrop` () const
 - If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.*
- void `draw_box` () const
 - Draws the widget box according its box style.*
- void `draw_box` ([FL_Boxtype](#) `t`, [FL_Color](#) `c`) const
 - Draws a box of type `t`, of color `c` at the widget's position and size.*

- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
,
OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
,
MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
,
GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

12.8.1 Detailed Description

The `Fl_Adjuster` widget was stolen from Prisms, and has proven to be very useful for values that need a large dynamic range.

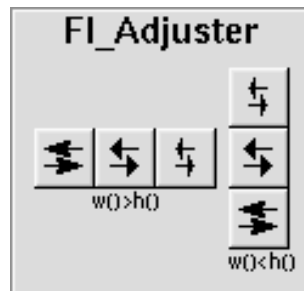


Figure 12.1 `Fl_Adjuster`

When you press a button and drag to the right the value increases. When you drag to the left it decreases. The largest button adjusts by $100 * \text{step}()$, the next by $10 * \text{step}()$ and that smallest button by $\text{step}()$. Clicking on the buttons increments by 10 times the amount dragging by a pixel does. Shift + click decrements by 10 times the amount.

12.8.2 Constructor & Destructor Documentation

12.8.2.1 `Fl_Adjuster()`

```
Fl_Adjuster::Fl_Adjuster (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Adjuster` widget using the given position, size, and label string.

It looks best if one of the dimensions is 3 times the other.

Inherited destructor destroys the Valuator.

12.8.3 Member Function Documentation

12.8.3.1 `draw()`

```
void Fl_Adjuster::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                 // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

12.8.3.2 `handle()`

```
int Fl_Adjuster::handle (
    int event ) [protected], [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

12.8.3.3 `soft()` [1/2]

```
int Fl_Adjuster::soft ( ) const [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. Default is one.

12.8.3.4 `soft()` [2/2]

```
void Fl_Adjuster::soft (
    int s ) [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. Default is one.

12.8.3.5 `value_damage()`

```
void Fl_Adjuster::value_damage ( ) [protected], [virtual]
```

Asks for partial redraw.

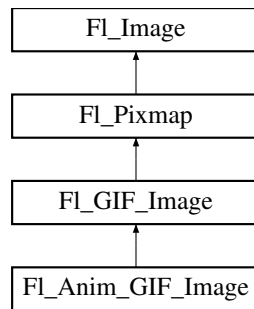
Reimplemented from [FI_Valuator](#).

The documentation for this class was generated from the following files:

- `FI_Adjuster.H`
- `FI_Adjuster.cxx`

12.9 FI_Anim_GIF_Image Class Reference

The [FI_Anim_GIF_Image](#) class supports loading, caching, and drawing of animated Compuserve GIFSM images. Inheritance diagram for [FI_Anim_GIF_Image](#):



Public Types

- enum `Flags` {
`DONT_START` = 1 , `DONT_RESIZE_CANVAS` = 2 , `DONT_SET_AS_IMAGE` = 4 , `OPTIMIZE_MEMORY` = 8 ,
`LOG_FLAG` = 64 , `DEBUG_FLAG` = 128 }

When opening an `Fl_Anim_GIF_Image` there are some options that can be passed in a `flags` value.

Public Member Functions

- `Fl_Widget * canvas ()` const
Gets the current widget, that is used to display the frame images.
- void `canvas (Fl_Widget *canvas, unsigned short flags=0)`
Link the image back to a widget for automated animation.
- int `canvas_h ()` const
Return the height of the animation canvas.
- int `canvas_w ()` const
Return the width of the animation canvas.
- void `color_average (Fl_Color c, float i) FL_OVERRIDE`
Applies a color average to all frames.
- `Fl_Image * copy ()` const
- `Fl_Image * copy (int W, int H) const FL_OVERRIDE`
Copy and resize the animation frames.
- int `debug ()` const
- void `delay (int frame, double delay)`
Set the delay of frame [0-frames() -1] in seconds.
- double `delay (int frame_)` const
Return the delay of frame [0-frames() -1] in seconds.
- void `desaturate () FL_OVERRIDE`
Desaturate to all frames of the animation.
- void `draw (int x, int y, int w, int h, int cx=0, int cy=0) FL_OVERRIDE`
Draw the current frame of the animation.
- `Fl_Anim_GIF_Image ()`
Create an empty animated GIF image shell.
- `Fl_Anim_GIF_Image (const char *filename, Fl_Widget *canvas=0, unsigned short flags=0)`
Load an animated GIF image from a file.
- `Fl_Anim_GIF_Image (const char *imagenname, const unsigned char *data, const size_t length, Fl_Widget *canvas=0, unsigned short flags=0)`
Load an animated GIF image from memory.
- int `frame ()` const
Return the current frame.
- void `frame (int frame)`

- Set the current frame.*

 - int `frame_h` (int `frame`) const

Return the frame dimensions of a frame.
- bool `frame_uncache` () const

Return the active `frame_uncache()` setting.
- void `frame_uncache` (bool `uncache`)

Use `frame_uncache()` to set or forbid frame image uncaching.
- int `frame_w` (int `frame`) const

Return the frame dimensions of a frame.
- int `frame_x` (int `frame`) const

Return the frame position of a frame.
- int `frame_y` (int `frame`) const

Return the frame position of a frame.
- int `frames` () const

Get the number of frames in the animation.
- `FI_Image * image` () const

Return the current frame image.
- `FI_Image * image` (int `frame`) const

Return the image of the given frame index.
- bool `is_animated` () const

Check if this is a valid animation with more than one frame.
- bool `load` (const char *`name`, const unsigned char *`imgdata`=NULL, size_t `imglength`=0)

Load an animation from a file or from a memory block.
- const char * `name` () const

Return the name of the played file as specified in the constructor.
- bool `next` ()

Show the next frame if the animation is stopped.
- bool `playing` () const

Return if the animation is currently running or stopped.
- `FI_Anim_GIF_Image & resize` (double `scale`)

Resizes the image to the specified size, replacing the current image.
- `FI_Anim_GIF_Image & resize` (int `w`, int `h`)

Resizes the image to the specified size, replacing the current image.
- double `speed` () const

Get the animation speed factor.
- void `speed` (double `speed`)

Set the animation speed factor.
- bool `start` ()

The `start()` method (re-)starts the playing of the frames.
- bool `stop` ()

The `stop()` method stops the playing of the frames.
- void `uncache` () `FL_OVERRIDE`

Uncache all cached image data now.
- bool `valid` () const

Check if animation is valid.
- `~FI_Anim_GIF_Image` () `FL_OVERRIDE`

Release the image and all cached data.

Public Member Functions inherited from [FI_GIF_Image](#)

- [FI_GIF_Image](#) (const char *filename)
This constructor loads a GIF image from the given file.
- [FI_GIF_Image](#) (const char *imagename, const unsigned char *data)
This constructor loads a GIF image from memory (deprecated).
- [FI_GIF_Image](#) (const char *imagename, const unsigned char *data, const size_t length)
This constructor loads a GIF image from memory.

Public Member Functions inherited from [FI_Pixmap](#)

- int [cache_h](#) ()
- int [cache_w](#) ()
- void [color_average](#) ([FI_Color](#) c, float i) [FL_OVERRIDE](#)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [FI_Image](#) * [copy](#) () const
- [FI_Image](#) * [copy](#) (int W, int H) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void [desaturate](#) () [FL_OVERRIDE](#)
The [desaturate\(\)](#) method converts an image to grayscale.
- void [draw](#) (int X, int Y)
- void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0) [FL_OVERRIDE](#)
Draws the image to the current drawing surface with a bounding box.
- [FI_Pixmap](#) (char *const *D)
The constructors create a new pixmap from the specified XPM data.
- [FI_Pixmap](#) (const char *const *D)
The constructors create a new pixmap from the specified XPM data.
- [FI_Pixmap](#) (const uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- [FI_Pixmap](#) (uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- void [label](#) ([FI_Menu_Item](#) *m) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a menu item.
- void [label](#) ([FI_Widget](#) *w) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a widget or menu item.
- void [uncache](#) () [FL_OVERRIDE](#)
If the image has been cached for display, delete the cache data.
- virtual ~[FI_Pixmap](#) ()
The destructor frees all memory and server resources that are used by the pixmap.

Public Member Functions inherited from [FI_Image](#)

- virtual class [FI_Shared_Image](#) * [as_shared_image](#) ()
Returns whether an image is an [FI_Shared_Image](#) or not.
- [FI_Image](#) * [copy](#) () const
Creates a copy of the image in the same size.
- int [count](#) () const
Returns the number of data values associated with the image.
- int [d](#) () const
Returns the image depth.
- const char *const * [data](#) () const
Returns a pointer to the current image data array.

- int **data_h** () const
Returns the height of the image data.
- int **data_w** () const
Returns the width of the image data.
- void **draw** (int X, int Y)
Draws the image to the current drawing surface.
- int **fail** () const
Returns a value that is not 0 if there is currently no image available.
- **FI_Image** (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int **h** () const
Returns the current image drawing height in FLTK units.
- void **inactive** ()
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- int **ld** () const
Returns the current line data size in bytes.
- virtual void **release** ()
Releases an `FI_Image` - the same as 'delete this'.
- virtual void **scale** (int width, int height, int proportional=1, int can_expand=0)
Sets the drawing size of the image.
- int **w** () const
Returns the current image drawing width in FLTK units.
- virtual **~FI_Image** ()
The destructor is a virtual method that frees all memory used by the image.

Static Public Member Functions

- static int **frame_count** (const char *name, const unsigned char *imgdata=NULL, size_t imglength=0)
Get the number of frames in a GIF file or in a GIF compressed data block.

Static Public Member Functions inherited from [FI_GIF_Image](#)

- static bool **is_animated** (const char *name_)

Static Public Member Functions inherited from [FI_Image](#)

- static [FI_Labeltype](#) **define_FL_IMAGE_LABEL** ()
- static [FI_RGB_Scaling](#) **RGB_scaling** ()
Returns the currently used RGB image scaling method.
- static void **RGB_scaling** ([FI_RGB_Scaling](#))
Sets the RGB image scaling method used for copy(int, int).
- static [FI_RGB_Scaling](#) **scaling_algorithm** ()
Gets what algorithm is used when resizing a source image to draw it.
- static void **scaling_algorithm** ([FI_RGB_Scaling](#) algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Static Public Attributes

- static bool **loop** = true
The loop flag can be used to (dis-)allow loop count.
- static double **min_delay** = 0.
The min_delay value can be used to set a minimum value for the frame delay for playback.

Static Public Attributes inherited from [FI_GIF_Image](#)

- static bool `animate` = false
Sets how the shared image core routine should treat animated GIF files.

Static Public Attributes inherited from [FI_Image](#)

- static const int `ERR_FILE_ACCESS` = -2
- static const int `ERR_FORMAT` = -3
- static const int `ERR_MEMORY_ACCESS` = -4
- static const int `ERR_NO_IMAGE` = -1
- static bool `register_images_done` = false
True after [fi_register_images\(\)](#) was called, false before.

Protected Member Functions

- void `clear_frames` ()
- bool `next_frame` ()
- void `on_extension_data` ([FI_GIF_Image::GIF_FRAME](#) &f) [FL_OVERRIDE](#)
- void `on_frame_data` ([FI_GIF_Image::GIF_FRAME](#) &f) [FL_OVERRIDE](#)
- void `scale_frame` ()
- void `set_frame` ()
- void `set_frame` (int `frame`)

Protected Member Functions inherited from [FI_GIF_Image](#)

- [FI_GIF_Image](#) ()
The default constructor creates an empty GIF image.
- [FI_GIF_Image](#) (const char *filename, bool anim)
- [FI_GIF_Image](#) (const char *imagename, const unsigned char *data, const size_t length, bool anim)
- void `load` (const char *filename, bool anim)
The protected `load()` methods are used by [FI_Anim_GIF_Image](#) to request loading of animated GIF's.
- void `load` (const char *imagename, const unsigned char *data, const size_t length, bool anim)
- void `load_gif_` (class [FI_Image_Reader](#) &rdr, bool anim=false)

Protected Member Functions inherited from [FI_Pixmap](#)

- void `measure` ()

Protected Member Functions inherited from [FI_Image](#)

- void `d` (int D)
Sets the current image depth.
- void `data` (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void `draw_empty` (int X, int Y)
The protected method `draw_empty()` draws a box with an X in it.
- int `draw_scaled` (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void `h` (int H)
Sets the height of the image data.
- void `ld` (int LD)
Sets the current line data size in bytes.
- void `w` (int W)
Sets the width of the image data.

Static Protected Member Functions

- static void **cb_animate** (void *d)

Static Protected Member Functions inherited from [Fl_Image](#)

- static void **labeltype** (const [Fl_Label](#) *lo, int lx, int ly, int lw, int lh, [Fl_Align](#) la)
- static void **measure** (const [Fl_Label](#) *lo, int &lw, int &lh)

Additional Inherited Members

Public Attributes inherited from [Fl_Pixmap](#)

- int **alloc_data**

12.9.1 Detailed Description

The [Fl_Anim_GIF_Image](#) class supports loading, caching, and drawing of animated Compuserve GIFSM images. The class loads all images contained in the file and animates them by cycling through them as defined by the delay times in the image file.

The user must supply an FLTK widget as "container" in order to see the animation by specifying it in the constructor or later using the [canvas\(\)](#) method.

12.9.2 Member Enumeration Documentation

12.9.2.1 Flags

enum [Fl_Anim_GIF_Image::Flags](#)

When opening an [Fl_Anim_GIF_Image](#) there are some options that can be passed in a `flags` value.

Enumerator

DONT_START	This flag indicates to the loader that it should not start the animation immediately after successful load, which is the default. It can be started later using the start() method.
DONT_RESIZE_CANVAS	This flag indicates to the loader that it should not resize the canvas widget of the animation to the dimensions of the animation, which is the default. Needed for special use cases.
DONT_SET_AS_IMAGE	This flag indicates to the loader that it should not set the animation as image() member of the canvas widget, which is the default. Needed for special use cases.
OPTIMIZE_MEMORY	Often frames change just a small area of the animation canvas. This flag indicates to the loader to try using less memory by storing frame data not as canvas-sized images but use the sizes defined in the GIF file. The drawbacks are higher cpu usage during playback and maybe minor artifacts when resized.
LOG_FLAG	This flag can be used to print informations about the decoding process to the console.
DEBUG_FLAG	This flag can be used to print even more informations about the decoding process to the console.

12.9.3 Constructor & Destructor Documentation

12.9.3.1 [Fl_Anim_GIF_Image\(\)](#) [1/2]

```
Fl_Anim_GIF_Image::Fl_Anim_GIF_Image (
    const char * filename,
    Fl\_Widget * canvas = 0,
    unsigned short flags = 0 )
```

Load an animated GIF image from a file.

This constructor creates an animated image from a GIF-formatted file. Optionally it applies the [canvas\(\)](#) method after successful load. If [DONT_START](#) is not specified in the `flags` parameter it calls [start\(\)](#) after successful load.

Parameters

in	<i>filename</i>	path and name of GIF file in the file system
in	<i>canvas</i>	a widget that will show and animate the GIF, or NULL
in	<i>flags</i>	see Flags for details, or 0

Note

The GIF image must be decoupled from the canvas by calling `myGif->canvas (NULL) ;` before deleting the canvas.

12.9.3.2 Fl_Anim_GIF_Image() [2/2]

```
Fl_Anim_GIF_Image::Fl_Anim_GIF_Image (
    const char * imagename,
    const unsigned char * data,
    const size_t length,
    Fl_Widget * canvas = 0,
    unsigned short flags = 0 )
```

Load an animated GIF image from memory.

This constructor creates an animated image from a GIF-formatted block in memory. Optionally it applies the [canvas\(\)](#) method after successful load. If [DONT_START](#) is not specified in the `flags` parameter it calls [start\(\)](#) after successful load.

`imagename` can be NULL. If a name is given, the image is added to the list of shared images and will be available by that name.

Parameters

in	<i>imagename</i>	a name given to this image or NULL
in	<i>data</i>	pointer to the start of the GIF image in memory
in	<i>length</i>	length of the GIF image in memory
in	<i>canvas</i>	a widget that will show and animate the GIF, or NULL
in	<i>flags</i>	see Flags for details, or 0

Note

The GIF image must be decoupled from the canvas by calling `myGif->canvas (NULL) ;` before deleting the canvas.

12.9.3.3 ~Fl_Anim_GIF_Image()

```
Fl_Anim_GIF_Image::~Fl_Anim_GIF_Image ( )
```

Release the image and all cached data.

Also removes the animation timer.

12.9.4 Member Function Documentation

12.9.4.1 canvas() [1/2]

```
Fl_Widget * Fl_Anim_GIF_Image::canvas ( ) const
```

Gets the current widget, that is used to display the frame images.

Returns

a pointer to a widget

12.9.4.2 canvas() [2/2]

```
void Fl_Anim_GIF_Image::canvas (
    Fl_Widget * canvas,
    unsigned short flags = 0 )
```

Link the image back to a widget for automated animation.

This method sets current widget, that is used to display the frame images. The `flags` parameter specifies whether the canvas widget is resized to the animation dimensions and/or its `image()` method will be used to set the current frame image during animation.

Parameters

in	<code>canvas</code>	a pointer to the widget that will show the animation
in	<code>flags</code>	see Flags

Note

The GIF image must be decoupled from the canvas by calling `myGif->canvas(NULL)`; before deleting the canvas.

12.9.4.3 canvas_h()

```
int Fl_Anim_GIF_Image::canvas_h ( ) const
```

Return the height of the animation canvas.

Returns

the width in pixel units

12.9.4.4 canvas_w()

```
int Fl_Anim_GIF_Image::canvas_w ( ) const
```

Return the width of the animation canvas.

Returns

the width in pixel units

12.9.4.5 color_average()

```
void Fl_Anim_GIF_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

Applies a color average to all frames.

The `color_average()` method averages the colors in the image with the provided FLTK color value.

Parameters

in	<code>c</code>	blend color
in	<code>i</code>	a value between 0.0 and 1.0 where 0 results in the blend color, and 1 returns the original image

Reimplemented from [Fl_Image](#).

12.9.4.6 copy()

```
Fl_Image * Fl_Anim_GIF_Image::copy (
    int W,
    int H ) const [virtual]
```

Copy and resize the animation frames.

The virtual `copy()` method makes a copy of the animated image and resizes all of its frame images to W x H using the current resize method.

Parameters

in	<i>W,H</i>	new size in FLTK pixel units
----	------------	------------------------------

Returns

the resized copy of the animation

Reimplemented from [Fl_Image](#).

12.9.4.7 delay() [1/2]

```
void Fl_Anim_GIF_Image::delay (
    int frame,
    double delay )
```

Set the delay of frame [0-`frames()` -1] in seconds.

Parameters

in	<i>frame</i>	index into frame list
in	<i>delay</i>	to next frame in seconds

12.9.4.8 delay() [2/2]

```
double Fl_Anim_GIF_Image::delay (
    int frame ) const
```

Return the delay of frame [0-`frames()` -1] in seconds.

Parameters

in	<i>frame</i>	index into frame list
----	--------------	-----------------------

Returns

delay to next frame in seconds

12.9.4.9 desaturate()

```
void Fl_Anim_GIF_Image::desaturate ( ) [virtual]
```

Desaturate to all frames of the animation.

Reimplemented from [Fl_Image](#).

12.9.4.10 draw()

```
void Fl_Anim_GIF_Image::draw (
    int x,
    int y,
    int w,
```



```

    int h,
    int cx = 0,
    int cy = 0 ) [virtual]

```

Draw the current frame of the animation.

Parameters

in	<i>x,y,w,h</i>	target rectangle
in	<i>cx,cy</i>	source offset

Reimplemented from [Fl_Image](#).

12.9.4.11 frame() [1/2]

```
int Fl_Anim_GIF_Image::frame ( ) const
```

Return the current frame.

Returns

- the current frame index in the range for 0 to [frames\(\)](#) -1.
- 1 if the image has no frames.

12.9.4.12 frame() [2/2]

```
void Fl_Anim_GIF_Image::frame (
    int frame )
```

Set the current frame.

Parameters

in	<i>frame</i>	index into list of frames
----	--------------	---------------------------

12.9.4.13 frame_count()

```
int Fl_Anim_GIF_Image::frame_count (
    const char * name,
    const unsigned char * imgdata = NULL,
    size_t imglength = 0 ) [static]
```

Get the number of frames in a GIF file or in a GIF compressed data block.

The static [frame_count\(\)](#) method is just a convenience method for getting the number of images (frames) stored in a GIF file.

As this count is not readily available in the GIF header, the whole GIF file has be parsed (which is done here by using a temporary [Fl_Anim_GIF_Image](#) object for simplicity). So this call may be slow with large files.

If *imgdata* is NULL, the image will be read from the file. Otherwise, it will be read from memory.

Parameters

in	<i>name</i>	path and name of GIF file in the file system, ignored when reading from memeory
in	<i>imgdata</i>	pointer to the start of the GIF image in memory, or NULL to read from a file
in	<i>imglength</i>	length of the GIF image in memory, or 0

Returns

the number of frames in the animation

12.9.4.14 frame_h()

```
int Fl_Anim_GIF_Image::frame_h (
    int frame ) const
```

Return the frame dimensions of a frame.

Usefull only if loaded with 'optimize_mem' and the animation also has size optimized frames.

Parameters

in	<i>frame</i>	index into frame list
----	--------------	-----------------------

Returns

height in FLTK pixle units

12.9.4.15 frame_uncache() [1/2]

```
bool Fl_Anim_GIF_Image::frame_uncache ( ) const
```

Return the active [frame_uncache\(\)](#) setting.

Returns

true if caching is disabled

12.9.4.16 frame_uncache() [2/2]

```
void Fl_Anim_GIF_Image::frame_uncache (
    bool uncache )
```

Use [frame_uncache\(\)](#) to set or forbid frame image uncaching.

If frame uncaching is set, frame images are not offscreen cached for re-use and will be re-created every time they are displayed. This saves a lot of memory on the expense of cpu usage and should be carefully considered. Per default frame caching will be done.

Parameters

in	<i>uncache</i>	true to disable caching
----	----------------	-------------------------

12.9.4.17 frame_w()

```
int Fl_Anim_GIF_Image::frame_w (
    int frame ) const
```

Return the frame dimensions of a frame.

Usefull only if loaded with 'optimize_mem' and the animation also has size optimized frames.

Parameters

in	<i>frame</i>	index into frame list
----	--------------	-----------------------

Returns

width in FLTK pixle units

12.9.4.18 frame_x()

```
int Fl_Anim_GIF_Image::frame_x (
    int frame ) const
```

Return the frame position of a frame.

Usefull only if loaded with 'optimize_mem' and the animation also has size optimized frames.

Parameters

in	<i>frame</i>	index into frame list
----	--------------	-----------------------

Returns

x position in FLTK pixle units

12.9.4.19 frame_y()

```
int Fl_Anim_GIF_Image::frame_y (
    int frame ) const
```

Return the frame position of a frame.

Usefull only if loaded with 'optimize_mem' and the animation also has size optimized frames.

Parameters

in	<i>frame</i>	index into frame list
----	--------------	-----------------------

Returns

y position in FLTK pixle units

12.9.4.20 frames()

```
int Fl_Anim_GIF_Image::frames ( ) const
```

Get the number of frames in the animation.

Returns

the number of frames

12.9.4.21 image() [1/2]

```
Fl_Image * Fl_Anim_GIF_Image::image ( ) const
```

Return the current frame image.

Returns

a pointer to the image or NULL if this is not an animation.

12.9.4.22 image() [2/2]

```
Fl_Image * Fl_Anim_GIF_Image::image (
    int frame_ ) const
```

Return the image of the given frame index.

Parameters

in	<i>frame</i> ↔	index into list of frames
	-	

Returns

image data or NULL if the frame number is not valid.

12.9.4.23 is_animated()

```
bool Fl_Anim_GIF_Image::is_animated ( ) const
```

Check if this is a valid animation with more than one frame.

The `is_animated()` method is just a convenience method for testing the valid flag and the frame count being greater 1.

Returns

true if the animation is valid and has multiple frames.

12.9.4.24 load()

```
bool Fl_Anim_GIF_Image::load (
    const char * name,
    const unsigned char * imgdata = NULL,
    size_t imglength = 0 )
```

Load an animation from a file or from a memory block.

The `load()` method is either used from the constructor to load the image from the given file, or to re-load an existing animation from another file.

Parameters

in	<i>name</i>	path and name of GIF file in the file system, or the image name when reading from memory
in	<i>imgdata</i>	pointer to the start of the GIF image in memory, or NULL to read from a file
in	<i>imglength</i>	length of the GIF image in memory, or 0

Returns

true if the animation loaded correctly

12.9.4.25 name()

```
const char * Fl_Anim_GIF_Image::name ( ) const
```

Return the name of the played file as specified in the constructor.

If read from a memory block, this returns the name of the animation.

Returns

pointer to a C string

12.9.4.26 next()

```
bool Fl_Anim_GIF_Image::next ( )
```

Show the next frame if the animation is stopped.

Returns

true if the animation has frames

12.9.4.27 on_extension_data()

```
void Fl_Anim_GIF_Image::on_extension_data (
    Fl_GIF_Image::GIF_FRAME & f ) [protected], [virtual]
```

Reimplemented from [Fl_GIF_Image](#).

12.9.4.28 on_frame_data()

```
void Fl_Anim_GIF_Image::on_frame_data (
    Fl_GIF_Image::GIF_FRAME & f ) [protected], [virtual]
```

Reimplemented from [Fl_GIF_Image](#).

12.9.4.29 playing()

```
bool Fl_Anim_GIF_Image::playing ( ) const [inline]
```

Return if the animation is currently running or stopped.

Returns

true if the animation is running

12.9.4.30 resize() [1/2]

```
Fl_Anim_GIF_Image & Fl_Anim_GIF_Image::resize (
    double scale )
```

Resizes the image to the specified size, replacing the current image.

If [DONT_RESIZE_CANVAS](#) is not set, the canvas widget will also be resized.

Parameters

in	<i>scale</i>	rescale factor in relation to current size
----	--------------	--

12.9.4.31 resize() [2/2]

```
Fl_Anim_GIF_Image & Fl_Anim_GIF_Image::resize (
    int w,
    int h )
```

Resizes the image to the specified size, replacing the current image.

If [DONT_RESIZE_CANVAS](#) is not set, the canvas widget will also be resized.

Parameters

in	<i>w,h</i>	new size of teh naimtion frames
----	------------	---------------------------------

12.9.4.32 speed() [1/2]

```
double Fl_Anim_GIF_Image::speed ( ) const
```

Get the animation speed factor.

Returns

the current speed factor

12.9.4.33 speed() [2/2]

```
void Fl_Anim_GIF_Image::speed (
    double speed )
```

Set the animation speed factor.

The [speed\(\)](#) method changes the playing speed to *speed* x original speed. E.g. to play at half speed call it with 0.5, for double speed with 2.

Parameters

in	<i>speed</i>	floating point speed factor
----	--------------	-----------------------------

12.9.4.34 start()

```
bool Fl_Anim_GIF_Image::start ( )
```

The [start\(\)](#) method (re-)starts the playing of the frames.

Returns

true if the animation has frames

12.9.4.35 stop()

```
bool Fl_Anim_GIF_Image::stop ( )
```

The [stop\(\)](#) method stops the playing of the frames.

Returns

true if the animation has frames

12.9.4.36 uncache()

```
void Fl_Anim_GIF_Image::uncache ( ) [virtual]
```

Uncache all cached image data now.

Re-implemented from [Fl_Pixmap](#).

Reimplemented from [Fl_Image](#).

12.9.4.37 valid()

```
bool Fl_Anim_GIF_Image::valid ( ) const
```

Check if animation is valid.

Returns

true if the class has successfully loaded and the image has at least one frame.

12.9.5 Member Data Documentation

12.9.5.1 loop

```
bool Fl_Anim_GIF_Image::loop = true [static]
```

The loop flag can be used to (dis-)allow loop count.

If set (which is the default), the animation will be stopped after the number of repeats specified in the GIF file (typically this count is set to 'forever' anyway). If cleared the animation will always be 'forever', regardless of what is specified in the GIF file.

12.9.5.2 min_delay

```
double Fl_Anim_GIF_Image::min_delay = 0. [static]
```

The min_delay value can be used to set a minimum value for the frame delay for playback.

This is to prevent CPU hogs caused by images with very low delay rates. This is a global value for all [Fl_Anim_GIF_Image](#) objects.

The documentation for this class was generated from the following files:

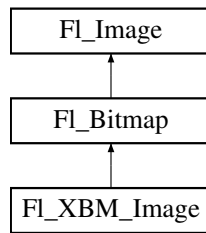
- [Fl_Anim_GIF_Image.H](#)
- [Fl_Anim_GIF_Image.cxx](#)

12.10 Fl_Bitmap Class Reference

The [Fl_Bitmap](#) class supports caching and drawing of mono-color (bitmap) images.

```
#include <Fl_Bitmap.H>
```

Inheritance diagram for [Fl_Bitmap](#):



Public Member Functions

- int **cache_h** ()
- int **cache_w** ()
- [Fl_Image](#) * **copy** () const
- [Fl_Image](#) * **copy** (int W, int H) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void **draw** (int X, int Y)
- void **draw** (int X, int Y, int W, int H, int cx=0, int cy=0) [FL_OVERRIDE](#)
Draws the image to the current drawing surface with a bounding box.
- [Fl_Bitmap](#) (const char *bits, int bits_length, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- [Fl_Bitmap](#) (const char *bits, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- [Fl_Bitmap](#) (const uchar *bits, int bits_length, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- [Fl_Bitmap](#) (const uchar *bits, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- void **label** ([Fl_Menu_Item](#) *m) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a menu item.
- void **label** ([Fl_Widget](#) *w) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a widget or menu item.
- void **uncache** () [FL_OVERRIDE](#)
If the image has been cached for display, delete the cache data.
- virtual ~[Fl_Bitmap](#) ()
The destructor frees all memory and server resources that are used by the bitmap.

Public Member Functions inherited from [Fl_Image](#)

- virtual class [Fl_Shared_Image](#) * **as_shared_image** ()
Returns whether an image is an [Fl_Shared_Image](#) or not.
- virtual void **color_average** ([Fl_Color](#) c, float i)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [Fl_Image](#) * **copy** () const
Creates a copy of the image in the same size.
- int **count** () const
Returns the number of data values associated with the image.
- int **d** () const
Returns the image depth.
- const char *const * **data** () const
Returns a pointer to the current image data array.
- int **data_h** () const
Returns the height of the image data.
- int **data_w** () const

- Returns the width of the image data.*

 - virtual void **desaturate** ()

*The **desaturate()** method converts an image to grayscale.*
- void **draw** (int X, int Y)

Draws the image to the current drawing surface.
- int **fail** () const

Returns a value that is not 0 if there is currently no image available.
- **FI_Image** (int W, int H, int D)

The constructor creates an empty image with the specified width, height, and depth.
- int **h** () const

Returns the current image drawing height in FLTK units.
- void **inactive** ()

*The **inactive()** method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.*
- int **ld** () const

Returns the current line data size in bytes.
- virtual void **release** ()

*Releases an **FI_Image** - the same as 'delete this'.*
- virtual void **scale** (int width, int height, int proportional=1, int can_expand=0)

Sets the drawing size of the image.
- int **w** () const

Returns the current image drawing width in FLTK units.
- virtual **~FI_Image** ()

The destructor is a virtual method that frees all memory used by the image.

Public Attributes

- int **alloc_array**

Non-zero if array points to bitmap data allocated internally.
- const **uchar** * **array**

pointer to raw bitmap data

Friends

- class **FI_Graphics_Driver**

Additional Inherited Members

Static Public Member Functions inherited from **FI_Image**

- static **FI_Labeltype** **define_FL_IMAGE_LABEL** ()
- static **FI_RGB_Scaling** **RGB_scaling** ()

Returns the currently used RGB image scaling method.
- static void **RGB_scaling** (**FI_RGB_Scaling**)

Sets the RGB image scaling method used for copy(int, int).
- static **FI_RGB_Scaling** **scaling_algorithm** ()

Gets what algorithm is used when resizing a source image to draw it.
- static void **scaling_algorithm** (**FI_RGB_Scaling** algorithm)

Sets what algorithm is used when resizing a source image to draw it.

Static Public Attributes inherited from FI_Image

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
True after [fl_register_images\(\)](#) was called, false before.

Protected Member Functions inherited from FI_Image

- void **d** (int D)
Sets the current image depth.
- void **data** (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void **draw_empty** (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int **draw_scaled** (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void **h** (int H)
Sets the height of the image data.
- void **ld** (int LD)
Sets the current line data size in bytes.
- void **w** (int W)
Sets the width of the image data.

Static Protected Member Functions inherited from FI_Image

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

12.10.1 Detailed Description

The [FI_Bitmap](#) class supports caching and drawing of mono-color (bitmap) images. Images are drawn using the current color.

12.10.2 Constructor & Destructor Documentation

12.10.2.1 FI_Bitmap() [1/4]

```
FI_Bitmap::FI_Bitmap (
    const uchar * bits,
    int W,
    int H ) [inline]
```

The constructors create a new bitmap from the specified bitmap data.

See also

[FI_Bitmap\(const uchar *bits, int bits_length, int W, int H\)](#)

12.10.2.2 FI_Bitmap() [2/4]

```
FI_Bitmap::FI_Bitmap (
    const char * bits,
    int W,
    int H ) [inline]
```

The constructors create a new bitmap from the specified bitmap data.

See also

[Fl_Bitmap\(const char *bits, int bits_length, int W, int H\)](#)

12.10.2.3 Fl_Bitmap() [3/4]

```
Fl_Bitmap::Fl_Bitmap (
    const uchar * bits,
    int bits_length,
    int W,
    int H )
```

The constructors create a new bitmap from the specified bitmap data.

If the provided array is too small to contain all the image data, the constructor will not generate the bitmap to avoid illegal memory read access and instead set `data` to `NULL` and `ld` to `ERR_MEMORY_ACCESS`.

Parameters

<i>bits</i>	bitmap data, one pixel per bit, rows are rounded to the next byte
<i>bits_length</i>	length of the <code>bits</code> array in bytes
<i>W</i>	image width in pixels
<i>H</i>	image height in pixels

See also

[Fl_Bitmap\(const char *bits, int bits_length, int W, int H\)](#), [Fl_Bitmap\(const uchar *bits, int W, int H\)](#)

12.10.2.4 Fl_Bitmap() [4/4]

```
Fl_Bitmap::Fl_Bitmap (
    const char * bits,
    int bits_length,
    int W,
    int H )
```

The constructors create a new bitmap from the specified bitmap data.

If the provided array is too small to contain all the image data, the constructor will not generate the bitmap to avoid illegal memory read access and instead set `data` to `NULL` and `ld` to `ERR_MEMORY_ACCESS`.

Parameters

<i>bits</i>	bitmap data, one pixel per bit, rows are rounded to the next byte
<i>bits_length</i>	length of the <code>bits</code> array in bytes
<i>W</i>	image width in pixels
<i>H</i>	image height in pixels

See also

[Fl_Bitmap\(const uchar *bits, int bits_length, int W, int H\)](#), [Fl_Bitmap\(const char *bits, int W, int H\)](#)

12.10.3 Member Function Documentation

12.10.3.1 copy()

```
Fl_Image * Fl_Bitmap::copy (
    int W,
    int H ) const [virtual]
```

Creates a resized copy of the image.

The new image should be released when you are done with it.

Note: since FLTK 1.4.0 you can use `Fl_Image::release()` for all types of images (i.e. all subclasses of `Fl_Image`) instead of operator `delete` for `Fl_Image`'s and `Fl_Image::release()` for `Fl_Shared_Image`'s.

The new image data will be converted to the requested size. RGB images are resized using the algorithm set by `Fl_Image::RGB_scaling()`.

For the new image the following equations are true:

- $w() == \text{data_}w() == \bar{W}$
- $h() == \text{data_}h() == \bar{H}$

Parameters

in	W, H	Requested width and height of the new image
----	--------	---

Note

The returned image can be safely cast to the same image type as that of the source image provided this type is one of `Fl_RGB_Image`, `Fl_SVG_Image`, `Fl_Pixmap`, `Fl_Bitmap`, `Fl_Tiled_Image`, `Fl_Anim_GIF_Image` and `Fl_Shared_Image`. Returned objects copied from images of other, derived, image classes belong to the parent class appearing in this list. For example, the copy of an `Fl_GIF_Image` is an object of class `Fl_Pixmap`.

Since FLTK 1.4.0 this method is 'const'. If you derive your own class from `Fl_Image` or any subclass your overridden methods of '`Fl_Image::copy() const`' and '`Fl_Image::copy(int, int) const`' **must** also be 'const' for inheritance to work properly. This is different than in FLTK 1.3.x and earlier where these methods have not been 'const'.

Reimplemented from `Fl_Image`.

12.10.3.2 draw()

```
void Fl_Bitmap::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image to the current drawing surface with a bounding box.

Arguments X, Y, W, H specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the cx and cy arguments.

In other words: `fl_push_clip(X, Y, W, H)` is applied, the image is drawn with its upper-left corner at $X-cx, Y-cy$ and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from `Fl_Image`.

12.10.3.3 label() [1/2]

```
void Fl_Bitmap::label (
    Fl_Menu_Item * m ) [virtual]
```

This method is an obsolete way to set the image attribute of a menu item.

Deprecated Please use `Fl_Menu_Item::image()` instead.

Reimplemented from `Fl_Image`.

12.10.3.4 label() [2/2]

```
void Fl_Bitmap::label (
    Fl_Widget * widget ) [virtual]
```

This method is an obsolete way to set the image attribute of a widget or menu item.

Deprecated Please use `Fl_Widget::image()` or `Fl_Widget::deimage()` instead.

Reimplemented from `Fl_Image`.

12.10.3.5 uncache()

```
void Fl_Bitmap::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented from `Fl_Image`.

The documentation for this class was generated from the following files:

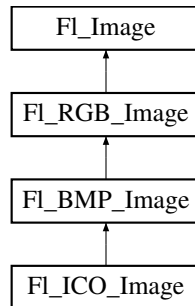
- `Fl_Bitmap.H`
- `Fl_Bitmap.cxx`

12.11 FI_BMP_Image Class Reference

The `Fl_BMP_Image` class supports loading, caching, and drawing of Windows Bitmap (BMP) image files.

```
#include <Fl_BMP_Image.H>
```

Inheritance diagram for `Fl_BMP_Image`:



Public Member Functions

- `Fl_BMP_Image` (const char *filename)
This constructor loads the named BMP image from the given BMP filename.
- `Fl_BMP_Image` (const char *imagename, const unsigned char *data, const long length=-1)
This constructor loads a BMP image from memory.

Public Member Functions inherited from Fl_RGB_Image

- virtual `Fl_SVG_Image * as_svg_image ()`
Returns whether an image is an `Fl_SVG_Image` or not.
- int `cache_h ()`
- int `cache_w ()`
- void `color_average` (`Fl_Color` c, float i) `FL_OVERRIDE`
The `color_average()` method averages the colors in the image with the provided FLTK color value.
- `Fl_Image * copy ()` const
- `Fl_Image * copy` (int W, int H) const `FL_OVERRIDE`
Creates a resized copy of the image.
- void `desaturate ()` `FL_OVERRIDE`
The `desaturate()` method converts an image to grayscale.
- void `draw` (int X, int Y)
- void `draw` (int X, int Y, int W, int H, int cx=0, int cy=0) `FL_OVERRIDE`
Draws the image to the current drawing surface with a bounding box.

- [FI_RGB_Image](#) (const [FI_Pixmap](#) *pxm, [FI_Color](#) bg=FL_GRAY)
The constructor creates a new RGBA image from the specified [FI_Pixmap](#).
- [FI_RGB_Image](#) (const [uchar](#) *bits, int bits_length, int W, int H, int D, int LD)
The constructor creates a new image from the specified data.
- [FI_RGB_Image](#) (const [uchar](#) *bits, int W, int H, int D=3, int LD=0)
The constructor creates a new image from the specified data.
- void [label](#) ([FI_Menu_Item](#) *m) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a menu item.
- void [label](#) ([FI_Widget](#) *w) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a widget or menu item.
- virtual void [normalize](#) ()
Makes sure the object is fully initialized.
- void [uncache](#) () [FL_OVERRIDE](#)
If the image has been cached for display, delete the cache data.
- [~FI_RGB_Image](#) () [FL_OVERRIDE](#)
The destructor frees all memory and server resources that are used by the image.

Public Member Functions inherited from [FI_Image](#)

- virtual class [FI_Shared_Image](#) * [as_shared_image](#) ()
Returns whether an image is an [FI_Shared_Image](#) or not.
- [FI_Image](#) * [copy](#) () const
Creates a copy of the image in the same size.
- int [count](#) () const
Returns the number of data values associated with the image.
- int [d](#) () const
Returns the image depth.
- const [char](#) *const * [data](#) () const
Returns a pointer to the current image data array.
- int [data_h](#) () const
Returns the height of the image data.
- int [data_w](#) () const
Returns the width of the image data.
- void [draw](#) (int X, int Y)
Draws the image to the current drawing surface.
- int [fail](#) () const
Returns a value that is not 0 if there is currently no image available.
- [FI_Image](#) (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int [h](#) () const
Returns the current image drawing height in FLTK units.
- void [inactive](#) ()
The [inactive\(\)](#) method calls [color_average\(FL_BACKGROUND_COLOR, 0.33f\)](#) to produce an image that appears grayed out.
- int [ld](#) () const
Returns the current line data size in bytes.
- virtual void [release](#) ()
Releases an [FI_Image](#) - the same as 'delete this'.
- virtual void [scale](#) (int width, int height, int proportional=1, int can_expand=0)
Sets the drawing size of the image.
- int [w](#) () const
Returns the current image drawing width in FLTK units.
- virtual [~FI_Image](#) ()
The destructor is a virtual method that frees all memory used by the image.

Protected Member Functions

- void `load_bmp_` (class `FI_Image_Reader` &rdr, int ico_height=0, int ico_width=0)

Protected Member Functions inherited from `FI_Image`

- void `d` (int D)
Sets the current image depth.
- void `data` (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void `draw_empty` (int X, int Y)
The protected method `draw_empty()` draws a box with an X in it.
- int `draw_scaled` (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void `h` (int H)
Sets the height of the image data.
- void `ld` (int LD)
Sets the current line data size in bytes.
- void `w` (int W)
Sets the width of the image data.

Additional Inherited Members

Static Public Member Functions inherited from `FI_RGB_Image`

- static size_t `max_size` ()
Returns the maximum allowed image size in bytes when creating an `FI_RGB_Image` object.
- static void `max_size` (size_t size)
Sets the maximum allowed image size in bytes when creating an `FI_RGB_Image` object.

Static Public Member Functions inherited from `FI_Image`

- static `FI_Labeltype` `define_FL_IMAGE_LABEL` ()
- static `FI_RGB_Scaling` `RGB_scaling` ()
Returns the currently used RGB image scaling method.
- static void `RGB_scaling` (`FI_RGB_Scaling`)
Sets the RGB image scaling method used for copy(int, int).
- static `FI_RGB_Scaling` `scaling_algorithm` ()
Gets what algorithm is used when resizing a source image to draw it.
- static void `scaling_algorithm` (`FI_RGB_Scaling` algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Public Attributes inherited from `FI_RGB_Image`

- int `alloc_array`
If non-zero, the object's data array is delete[]'d when deleting the object.
- const `uchar` * `array`
Points to the start of the object's data array.

Static Public Attributes inherited from FI_Image

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
True after [fl_register_images\(\)](#) was called, false before.

Static Protected Member Functions inherited from FI_Image

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

12.11.1 Detailed Description

The [FI_BMP_Image](#) class supports loading, caching, and drawing of Windows Bitmap (BMP) image files.

12.11.2 Constructor & Destructor Documentation

12.11.2.1 FI_BMP_Image() [1/2]

```
FI_BMP_Image::FI_BMP_Image (
    const char * filename )
```

This constructor loads the named BMP image from the given BMP filename.

The destructor frees all memory and server resources that are used by the image.

Use [FI_Image::fail\(\)](#) to check if [FI_BMP_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the BMP format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

Parameters

in	<i>filename</i>	a full path and name pointing to a BMP file.
----	-----------------	--

See also

[FI_BMP_Image::FI_BMP_Image](#)(const char* imagename, const unsigned char *data, const long length = -1);

12.11.2.2 FI_BMP_Image() [2/2]

```
FI_BMP_Image::FI_BMP_Image (
    const char * imagename,
    const unsigned char * data,
    const long length = -1 )
```

This constructor loads a BMP image from memory.

Construct an image from a block of memory inside the application. Fluid offers "binary data" chunks as a great way to add image data into the C++ source code. *imagename* can be NULL. If a name is given, the image is added to the list of shared images and will be available by that name.

The destructor frees all memory and server resources that are used by the image.

The (new and optional) third parameter *length* **should** be used so buffer overruns (i.e. truncated images) can be checked. See note below.

If *length* is not used

- it defaults to -1 (unlimited size)
- buffer overruns will not be checked.

Note

The optional parameter `length` is available since FLTK 1.4.0. Not using it is deprecated and old code should be modified to use it. This parameter will likely become mandatory in a future FLTK version.

Use `Fl_Image::fail()` to check if `Fl_BMP_Image` failed to load. `fail()` returns `ERR_FILE_ACCESS` if the image could not be read from memory, `ERR_FORMAT` if the BMP format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

Parameters

in	<i>imagename</i>	A name given to this image or NULL
in	<i>data</i>	Pointer to the start of the BMP image in memory.
in	<i>length</i>	Length of the BMP image in memory.

See also

[Fl_BMP_Image::Fl_BMP_Image\(const char *filename\)](#)

[Fl_Shared_Image](#)

The documentation for this class was generated from the following files:

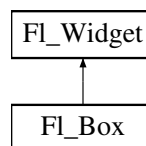
- `Fl_BMP_Image.H`
- `Fl_BMP_Image.cxx`

12.12 Fl_Box Class Reference

This widget simply draws its box, and possibly its label.

```
#include <Fl_Box.H>
```

Inheritance diagram for `Fl_Box`:

**Public Member Functions**

- `Fl_Box` ([Fl_Boxtype](#) b, int X, int Y, int W, int H, const char *l)
See [Fl_Box::Fl_Box\(int x, int y, int w, int h, const char * = 0\)](#)
- `Fl_Box` (int X, int Y, int W, int H, const char *l=0)
- int `handle` (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [Fl_Widget](#)

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.

- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#), [FI_Callback_User_Data *p](#), bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback *cb](#), void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0 *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1 *cb](#), long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) (uchar c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.

- void `clear_visible ()`
Hides the widget.
- void `clear_visible_focus ()`
Disables keyboard focus navigation with this widget.
- `FL_Color color () const`
Gets the background color of the widget.
- void `color (FL_Color bg)`
Sets the background color of the widget.
- void `color (FL_Color bg, FL_Color sel)`
Sets the background and selection color of the widget.
- `FL_Color color2 () const`
For back compatibility only.
- void `color2 (unsigned a)`
For back compatibility only.
- int `contains (const FL_Widget *w) const`
Checks if w is a child of this widget.
- void `copy_label (const char *new_label)`
Sets the current label.
- void `copy_tooltip (const char *text)`
Sets the current tooltip text.
- `uchar damage () const`
Returns non-zero if `draw()` needs to be called.
- void `damage (uchar c)`
Sets the damage bits for the widget.
- void `damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- int `damage_resize (int, int, int, int)`
Internal use only.
- void `deactivate ()`
Deactivates the widget.
- `FL_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FL_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage (FL_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage (FL_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- void `do_callback (FL_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- void `do_callback (FL_Widget *widget, long arg, FL_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `do_callback (FL_Widget *widget, void *arg=0, FL_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `draw_label (int, int, int, int, FL_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h () const`
Gets the widget height.
- virtual void `hide ()`

- Makes a widget invisible.*

 - `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
 - `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
 - `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
 - `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
 - `int image_bound () const`
Returns whether the image is managed by the widget.
 - `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
 - `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
 - `const char * label () const`
Gets the current label text.
 - `void label (const char *text)`
Sets the current label pointer.
 - `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
 - `FI_Color labelcolor () const`
Gets the label color.
 - `void labelcolor (FI_Color c)`
Sets the label color.
 - `FI_Font labelfont () const`
Gets the font to use.
 - `void labelfont (FI_Font f)`
Sets the font to use.
 - `FI_Fontsize labelsize () const`
Gets the font size in pixels.
 - `void labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
 - `FI_Labeltype labeltype () const`
Gets the label type.
 - `void labeltype (FI_Labeltype a)`
Sets the label type.
 - `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
 - `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
 - `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
 - `unsigned int output () const`
Returns if a widget is used for output only.
 - `FI_Group * parent () const`
Returns a pointer to the parent widget.
 - `void parent (FI_Group *p)`
Internal use only - "for hacks only".
 - `void position (int X, int Y)`
Repositions the window or widget.

- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int `x`, int `y`, int `w`, int `h`)
Changes the size or position of the widget.
- `FL_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FL_Color` `a`)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int `value`)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int `W`, int `H`)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *`text`)
Sets the current tooltip text.
- `FL_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FL_Window` * `top_window_offset` (int &`xoff`, int &`yoff`) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` `t`)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FL_Callback_User_Data` *`v`, bool `auto_free`)

- Sets the user data for this widget.*

 - void **user_data** (void *v)

Sets the user data for this widget.
- unsigned int **visible** () const

Returns whether a widget is visible.
- unsigned int **visible_focus** () const

Checks whether this widget has a visible focus.
- void **visible_focus** (int v)

Modifies keyboard focus navigation.
- int **visible_r** () const

Returns whether a widget and all its parents are visible.
- int **w** () const

Gets the widget width.
- **Fl_When when** () const

Returns the conditions under which the callback is called.
- void **when** (uchar i)

Sets the flags used to decide when a callback is called.
- **Fl_Window * window** () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const

Gets the widget position in its window.
- int **y** () const

Gets the widget position in its window.
- virtual **~Fl_Widget** ()

Destroys the widget.

Protected Member Functions

- void **draw** () **FL_OVERRIDE**

Draws the widget.

Protected Member Functions inherited from Fl_Widget

- void **clear_flag** (unsigned int c)

Clears a flag in the flags mask.
- void **draw_backdrop** () const

If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const

Draws the widget box according its box style.
- void **draw_box** (Fl_Boxtype t, Fl_Color c) const

Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (Fl_Boxtype t, int x, int y, int w, int h, Fl_Color c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const

Draws a focus rectangle around the widget.
- void **draw_focus** (Fl_Boxtype t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void **draw_focus** (Fl_Boxtype t, int x, int y, int w, int h, Fl_Color bg) const

Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const

- Draws the label in an arbitrary bounding box.*

 - `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)
 - Creates a widget at the given position and size.*
 - unsigned int `flags` () const
 - Gets the widget flags mask.*
 - void `h` (int `v`)
 - Internal use only.*
 - void `set_flag` (unsigned int `c`)
 - Sets a flag in the flags mask.*
 - void `w` (int `v`)
 - Internal use only.*
 - void `x` (int `v`)
 - Internal use only.*
 - void `y` (int `v`)
 - Internal use only.*

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *`widget`, void *`data`)
 - The default callback for all widgets that don't set a callback.*
- static unsigned int `label_shortcut` (const char *`t`)
 - Returns the Unicode value of the '&x' shortcut in a given text.*
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
 - Returns true if the given text `t` contains the entered '&x' shortcut.*

Protected Types inherited from `FI_Widget`

- enum {
 - `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
 - `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 - ,
 - `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 - ,
 - `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 - ,
 - `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU` = 1<<19 ,
 - `NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
 - `AUTO_DELETE_USER_DATA` = 1<<23 ,
 - `MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
 - `USERFLAG1` = 1<<31 }
 - flags possible values enumeration.*

12.12.1 Detailed Description

This widget simply draws its box, and possibly its label.

Putting it before some other widgets and making it big enough to surround them will let you draw a frame around them.

12.12.2 Constructor & Destructor Documentation

12.12.2.1 Fl_Box()

```
Fl_Box::Fl_Box (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

- The first constructor sets `box()` to `FL_NO_BOX`, which means it is invisible. However such widgets are useful as placeholders or `Fl_Group::resizable()` values. To change the box to something visible, use `box(n)`.
- The second form of the constructor sets the box to the specified box type.

The destructor removes the box.

12.12.3 Member Function Documentation

12.12.3.1 draw()

```
void Fl_Box::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

12.12.3.2 handle()

```
int Fl_Box::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

The documentation for this class was generated from the following files:

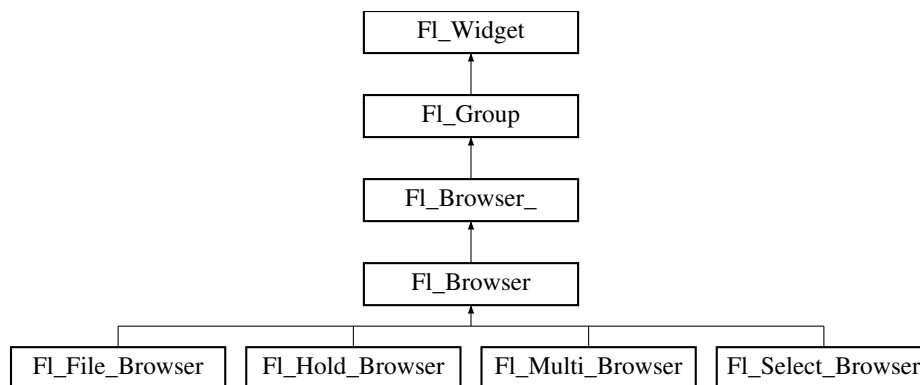
- [FI_Box.H](#)
- [FI_Box.cxx](#)

12.13 FI_Browser Class Reference

The [FI_Browser](#) widget displays a scrolling list of text lines, and manages all the storage for the text.

```
#include <FI_Browser.H>
```

Inheritance diagram for [FI_Browser](#):



Public Types

- enum [FI_Line_Position](#) { **TOP** , **BOTTOM** , **MIDDLE** }
- For internal use only?*

Public Types inherited from [FI_Browser_](#)

- enum {
[HORIZONTAL](#) = 1 , [VERTICAL](#) = 2 , [BOTH](#) = 3 , [ALWAYS_ON](#) = 4 ,
[HORIZONTAL_ALWAYS](#) = 5 , [VERTICAL_ALWAYS](#) = 6 , [BOTH_ALWAYS](#) = 7 }
Values for [has_scrollbar\(\)](#).

Public Member Functions

- void [add](#) (const char *newtext, void *d=0)
Adds a new line to the end of the browser.
- void [bottomline](#) (int line)
*Scrolls the browser so the bottom item in the browser is showing the specified *line*.*
- void [clear](#) ()
Removes all the lines in the browser.
- char [column_char](#) () const
Gets the current column separator character.
- void [column_char](#) (char c)
*Sets the column separator to *c*.*
- const int * [column_widths](#) () const
Gets the current column width array.
- void [column_widths](#) (const int *arr)

- Sets the current array to `arr`.*

 - void * `data` (int line) const

Returns the user `data()` for specified `line`.
- void `data` (int line, void *d)

Sets the user data for specified `line` to `d`.
- void `display` (int line, int val=1)

For back compatibility.
- int `displayed` (int line) const

Returns non-zero if `line` has been scrolled to a position where it is being displayed.
- `Fl_Browser` (int X, int Y, int W, int H, const char *L=0)

The constructor makes an empty browser.
- char `format_char` () const

Gets the current format code prefix character, which by default is '@'.
- void `format_char` (char c)

Sets the current format code prefix character to `c`.
- void `hide` () `FL_OVERRIDE`

Hides the entire `Fl_Browser` widget – opposite of `show()`.
- void `hide` (int line)

Makes `line` invisible, preventing selection by the user.
- `Fl_Image` * `icon` (int line) const

Returns the icon currently defined for `line`.
- void `icon` (int line, `Fl_Image` *icon)

Set the image icon for `line` to the value `icon`.
- void `insert` (int line, const char *newtext, void *d=0)

Insert a new entry whose label is `newtext` above given `line`, optional data `d`.
- void `lineposition` (int line, `Fl_Line_Position` pos)

Updates the browser so that `line` is shown at position `pos`.
- int `load` (const char *filename)

Clears the browser and reads the file, adding each line from the file to the browser.
- void `make_visible` (int line)

Make the item at the specified `line` `visible()`.
- void `middleline` (int line)

Scrolls the browser so the middle item in the browser is showing the specified `line`.
- void `move` (int to, int from)

Line `from` is removed and reinserted at `to`.
- void `remove` (int line)

Remove entry for given `line` number, making the browser one line shorter.
- void `remove_icon` (int line)

Removes the icon for `line`.
- void `replace` (int a, const char *b)

For back compatibility only.
- int `select` (int line, int val=1)

Sets the selection state of the item at `line` to the value `val`.
- int `selected` (int line) const

Returns 1 if specified `line` is selected, 0 if not.
- void `show` () `FL_OVERRIDE`

Shows the entire `Fl_Browser` widget – opposite of `hide()`.
- void `show` (int line)

Makes `line` visible, and available for selection by user.
- int `size` () const

Returns how many lines are in the browser.

- void **size** (int W, int H)
- void **swap** (int a, int b)
Swaps two browser lines a and b.
- const char * **text** (int line) const
Returns the label text for the specified line.
- void **text** (int line, const char *newtext)
Sets the text for the specified line to newtext.
- **FI_Fontsize** **textsize** () const
Gets the default text size (in pixels) for the lines in the browser.
- void **textsize** (**FI_Fontsize** newSize)
Sets the default text size (in pixels) for the lines in the browser to newSize.
- int **topline** () const
Returns the line that is currently visible at the top of the browser.
- void **topline** (int line)
Scrolls the browser so the top item in the browser is showing the specified line.
- int **value** () const
Returns the line number of the currently selected line, or 0 if none selected.
- void **value** (int line)
Sets the browser's value(), which selects the specified line.
- int **visible** (int line) const
Returns non-zero if the specified line is visible, 0 if hidden.
- **~FI_Browser** ()
The destructor deletes all list items and destroys the browser.

Public Member Functions inherited from **FI_Browser_**

- int **deselect** (int docallbacks=0)
Deselects all items in the list and returns 1 if the state changed or 0 if it did not.
- void **display** (void *item)
Displays the item, scrolling the list as necessary.
- int **handle** (int event) **FL_OVERRIDE**
Handles the event within the normal widget bounding box.
- **uchar** **has_scrollbar** () const
Returns the current scrollbar mode, see [FI_Browser_::has_scrollbar\(uchar\)](#)
- void **has_scrollbar** (**uchar** mode)
Sets whether the widget should have scrollbars or not (default [FI_Browser_::BOTH](#)).
- int **hposition** () const
Gets the horizontal scroll position of the list as a pixel position pos.
- void **hposition** (int)
Sets the horizontal scroll position of the list to pixel position pos.
- int **linespacing** () const
Return the height of additional spacing between browser lines.
- void **linespacing** (int pixels)
Add some space between browser lines.
- int **position** () const
- void **position** (int pos)
- void **position** (int x, int y)
- void **resize** (int X, int Y, int W, int H) **FL_OVERRIDE**
Repositions and/or resizes the browser.
- void **scrollbar_left** ()
Moves the vertical scrollbar to the lefthand side of the list.

- void `scrollbar_right` ()
Moves the vertical scrollbar to the righthand side of the list.
- int `scrollbar_size` () const
Gets the current size of the scrollbars' troughs, in pixels.
- void `scrollbar_size` (int newSize)
Sets the pixel size of the scrollbars' troughs to newSize, in pixels.
- int `scrollbar_width` () const
Returns the global value `FL::scrollbar_size()`.
- void `scrollbar_width` (int width)
Sets the global `FL::scrollbar_size()`, and forces this instance of the widget to use it.
- int `select` (void *item, int val=1, int docallbacks=0)
Sets the selection state of item to val, and returns 1 if the state changed or 0 if it did not.
- int `select_only` (void *item, int docallbacks=0)
Selects item and returns 1 if the state changed or 0 if it did not.
- void `sort` (int flags=0)
Sort the items in the browser based on flags.
- `FL_Color` `textcolor` () const
Gets the default text color for the lines in the browser.
- void `textcolor` (`FL_Color` col)
Sets the default text color for the lines in the browser to color col.
- `FL_Font` `textfont` () const
Gets the default text font for the lines in the browser.
- void `textfont` (`FL_Font` font)
Sets the default text font for the lines in the browser to font.
- `FL_Fontsize` `textsize` () const
Gets the default text size (in pixels) for the lines in the browser.
- void `textsize` (`FL_Fontsize` newSize)
Sets the default text size (in pixels) for the lines in the browser to size.
- int `vposition` () const
Gets the vertical scroll position of the list as a pixel position pos.
- void `vposition` (int pos)
Sets the vertical scroll position of the list to pixel position pos.

Public Member Functions inherited from `FL_Group`

- `FL_Widget` *`&_ddfdesign_kludge` ()
This is for forms compatibility only.
- void `add` (`FL_Widget` &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void `add` (`FL_Widget` *o)
See void `FL_Group::add(FL_Widget &w)`
- void `add_resizable` (`FL_Widget` &o)
Adds a widget to the group and makes it the resizable widget.
- `FL_Widget` *const * `array` () const
Returns a pointer to the array of children.
- `FL_Group` const * `as_group` () const `FL_OVERRIDE`
- `FL_Group` * `as_group` () `FL_OVERRIDE`
Returns an `FL_Group` pointer if this widget is an `FL_Group`.
- void `begin` ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- `FL_Widget` * `child` (int n) const

- Returns `array()[n]`.*
- int **children** () const
 - Returns how many child widgets the group has.*
- void **clear** ()
 - Deletes all child widgets from memory recursively.*
- unsigned int **clip_children** ()
 - Returns the current clipping mode.*
- void **clip_children** (int c)
 - Controls whether the group widget clips the drawing of child widgets to its bounding box.*
- virtual int **delete_child** (int n)
 - Removes the widget at `index` from the group and deletes it.*
- void **end** ()
 - Exactly the same as `current(this->parent())`.*
- int **find** (const `FL_Widget` &o) const
 - See `int FL_Group::find(const FL_Widget *w) const`.*
- int **find** (const `FL_Widget` *) const
 - Searches the child array for the widget and returns the index.*
- `FL_Group` (int, int, int, int, const char *s=0)
 - Creates a new `FL_Group` widget using the given position, size, and label string.*
- void **focus** (`FL_Widget` *W)
- void **forms_end** ()
 - This is for forms compatibility only.*
- int **handle** (int) `FL_OVERRIDE`
 - Handles the specified event.*
- void **init_sizes** ()
 - Resets the internal array of widget sizes and positions.*
- void **insert** (`FL_Widget` &, int i)
 - The widget is removed from its current group (if any) and then inserted into this group.*
- void **insert** (`FL_Widget` &o, `FL_Widget` *before)
 - This does `insert(w, find(before))`.*
- void **remove** (`FL_Widget` &)
 - Removes a widget from the group but does not delete it.*
- void **remove** (`FL_Widget` *o)
 - Removes the widget `o` from the group.*
- void **remove** (int index)
 - Removes the widget at `index` from the group but does not delete it.*
- `FL_Widget` * **resizable** () const
 - Returns the group's resizable widget.*
- void **resizable** (`FL_Widget` &o)
 - Sets the group's resizable widget.*
- void **resizable** (`FL_Widget` *o)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- void **resize** (int, int, int, int) `FL_OVERRIDE`
 - Resizes the `FL_Group` widget and all of its children.*
- virtual `~FL_Group` ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (**FI_Align** alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window * as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window const * as_gl_window** () const
- virtual **FI_Window * as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window const * as_window** () const
- void **bind_deimage** (**FI_Image *img**)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (**FI_Image *img**)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (**FI_Boxtype** new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (**FI_Callback *cb**)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback *cb**, **FI_Callback_User_Data *p**, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (**FI_Callback *cb**, void *p)
Sets the current callback function and data for the widget.
- void **callback** (**FI_Callback0 *cb**)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback1 *cb**, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const
Checks if the widget value changed since the last callback.
- void **clear_active** ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FI_Color bg`, `FI_Color sel`)
- Sets the background and selection color of the widget.*

 - `FI_Color color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image * deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image * deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image &img`)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image *img`)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h` () `const`
Gets the widget height.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- `int image_bound` () `const`
Returns whether the image is managed by the widget.
- `int inside` (`const FI_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- `int is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- `bool needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- `unsigned int output` () `const`
Returns if a widget is used for output only.
- `FI_Group * parent` () `const`

- Returns a pointer to the parent widget.*

 - void `parent` (`FI_Group *p`)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- `FI_Color selection_color` () const

Gets the selection color.
- void `selection_color` (`FI_Color a`)

Sets the selection color.
- void `set_active` ()

Marks the widget as active without sending events or changing focus.
- void `set_changed` ()

Marks the value of the widget as changed.
- void `set_output` ()

Sets a widget to output only.
- void `set_visible` ()

Makes the widget visible.
- void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window * top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const

Gets the widget type.
- void `type` (`uchar t`)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.

- void **user_data** ([Fl_Callback_User_Data](#) *v, bool auto_free)
 - Sets the user data for this widget.*
- void **user_data** (void *v)
 - Sets the user data for this widget.*
- unsigned int **visible** () const
 - Returns whether a widget is visible.*
- unsigned int **visible_focus** () const
 - Checks whether this widget has a visible focus.*
- void **visible_focus** (int v)
 - Modifies keyboard focus navigation.*
- int **visible_r** () const
 - Returns whether a widget and all its parents are visible.*
- int **w** () const
 - Gets the widget width.*
- [Fl_When](#) **when** () const
 - Returns the conditions under which the callback is called.*
- void **when** ([uchar](#) i)
 - Sets the flags used to decide when a callback is called.*
- [Fl_Window](#) * **window** () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int **x** () const
 - Gets the widget position in its window.*
- int **y** () const
 - Gets the widget position in its window.*
- virtual [~Fl_Widget](#) ()
 - Destroys the widget.*

Protected Member Functions

- [Fl_BLINE](#) * **_remove** (int line)
 - Removes the item at the specified `line`.*
- [Fl_BLINE](#) * **find_line** (int line) const
 - Returns the item for specified `line`.*
- int **full_height** () const [FL_OVERRIDE](#)
 - The height of the entire list of all `visible()` items in pixels.*
- int **incr_height** () const [FL_OVERRIDE](#)
 - The default 'average' item height (including inter-item spacing) in pixels.*
- void **insert** (int line, [Fl_BLINE](#) *item)
 - Insert specified `item` above `line`.*
- void * **item_at** (int line) const [FL_OVERRIDE](#)
 - Return the item at specified `line`.*
- void **item_draw** (void *item, int X, int Y, int W, int H) const [FL_OVERRIDE](#)
 - Draws `item` at the position specified by `X Y W H`.*
- void * **item_first** () const [FL_OVERRIDE](#)
 - Returns the very first item in the list.*
- int **item_height** (void *item) const [FL_OVERRIDE](#)
 - Returns height of `item` in pixels.*
- void * **item_last** () const [FL_OVERRIDE](#)
 - Returns the very last item in the list.*
- void * **item_next** (void *item) const [FL_OVERRIDE](#)
 - Returns the next item after `item`.*

- void * [item_prev](#) (void *item) const [FL_OVERRIDE](#)
Returns the previous item before `item`.
- void [item_select](#) (void *item, int val) [FL_OVERRIDE](#)
Change the selection state of `item` to the value `val`.
- int [item_selected](#) (void *item) const [FL_OVERRIDE](#)
See if `item` is selected.
- void [item_swap](#) (void *a, void *b) [FL_OVERRIDE](#)
Swap the items `a` and `b`.
- const char * [item_text](#) (void *item) const [FL_OVERRIDE](#)
Returns the label text for `item`.
- int [item_width](#) (void *item) const [FL_OVERRIDE](#)
Returns width of `item` in pixels.
- int [lineno](#) (void *item) const
Returns line number corresponding to `item`, or zero if not found.
- void [swap](#) (FL_BLINE *a, FL_BLINE *b)
Swap the two items `a` and `b`.

Protected Member Functions inherited from [FI_Browser_](#)

- void [bbox](#) (int &X, int &Y, int &W, int &H) const
Returns the bounding box for the interior of the list's display window, inside the scrollbars.
- void [deleting](#) (void *item)
This method should be used when `item` is being deleted from the list.
- int [displayed](#) (void *item) const
Returns non-zero if `item` has been scrolled to a position where it is being displayed.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the list within the normal widget bounding box.
- void * [find_item](#) (int ypos)
This method returns the item under mouse `y` position `ypos`.
- [FI_Browser_](#) (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- virtual int [full_width](#) () const
This method may be provided by the subclass to indicate the full width of the item list, in pixels.
- void [inserting](#) (void *a, void *b)
This method should be used when an item is in the process of being inserted into the list.
- virtual int [item_quick_height](#) (void *item) const
This method may be provided by the subclass to return the height of the `item`, in pixels.
- int [leftedge](#) () const
This method returns the `X` position of the left edge of the list area after adjusting for the scrollbar and border, if any.
- void [new_list](#) ()
This method should be called when the list data is completely replaced or cleared.
- void [redraw_line](#) (void *item)
This method should be called when the contents of `item` has changed, but not its height.
- void [redraw_lines](#) ()
This method will cause the entire list to be redrawn.
- void [replacing](#) (void *a, void *b)
This method should be used when item `a` is being replaced by item `b`.
- void * [selection](#) () const
Returns the item currently selected, or NULL if there is no selection.
- void [swapping](#) (void *a, void *b)
This method should be used when two items `a` and `b` are being swapped.
- void * [top](#) () const
Returns the item that appears at the top of the list.

Protected Member Functions inherited from FI_Group

- `FI_Rect * bounds ()`
Returns the internal array of widget sizes and positions.
- `void draw () FL_OVERRIDE`
Draws the widget.
- `void draw_child (FI_Widget &widget) const`
Forces a child to redraw.
- `void draw_children ()`
Draws all children of the group.
- `void draw_outside_label (const FI_Widget &widget) const`
Parents normally call this to draw outside labels of child widgets.
- `virtual int on_insert (FI_Widget *, int)`
Allow derived groups to act when a widget is added as a child.
- `virtual int on_move (int, int)`
Allow derived groups to act when a widget is moved within the group.
- `virtual void on_remove (int)`
Allow derived groups to act when a child widget is removed from the group.
- `int * sizes ()`
Returns the internal array of widget sizes and positions.
- `void update_child (FI_Widget &widget) const`
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- `void clear_flag (unsigned int c)`
Clears a flag in the flags mask.
- `void draw_backdrop () const`
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- `void draw_box () const`
Draws the widget box according its box style.
- `void draw_box (FI_Boxtype t, FI_Color c) const`
Draws a box of type t, of color c at the widget's position and size.
- `void draw_box (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const`
Draws a box of type t, of color c at the position X,Y and size W,H.
- `void draw_focus () const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int X, int Y, int W, int H) const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const`
Draws a focus box for the widget at the given position and size.
- `void draw_label () const`
Draws the widget's label at the defined label position.
- `void draw_label (int, int, int, int) const`
Draws the label in an arbitrary bounding box.
- `FI_Widget (int x, int y, int w, int h, const char *label=0L)`
Creates a widget at the given position and size.
- `unsigned int flags () const`
Gets the widget flags mask.
- `void h (int v)`
Internal use only.
- `void set_flag (unsigned int c)`

Sets a flag in the flags mask.

- void `w` (int v)

Internal use only.

- void `x` (int v)

Internal use only.

- void `y` (int v)

Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Group`

- static `FI_Group * current` ()

Returns the currently active group.

- static void `current` (`FI_Group *g`)

Sets the current group.

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget *widget`, void *data)

The default callback for all widgets that don't set a callback.

- static unsigned int `label_shortcut` (const char *t)

Returns the Unicode value of the '&x' shortcut in a given text.

- static int `test_shortcut` (const char *, const bool require_alt=false)

Returns true if the given text t contains the entered '&x' shortcut.

Public Attributes inherited from `FI_Browser_`

- `FI_Scrollbar hscrollbar`

Horizontal scrollbar.

- `FI_Scrollbar scrollbar`

Vertical scrollbar.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
 ,
`OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
 ,
`MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
 ,
`GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,
`AUTO_DELETE_USER_DATA = 1<<23` ,
`MAXIMIZED = 1<<24` , `POPUP = 1<<25` , `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` ,
`USERFLAG1 = 1<<31` }

flags possible values enumeration.

12.13.1 Detailed Description

The `FI_Browser` widget displays a scrolling list of text lines, and manages all the storage for the text. This is not a text editor or spreadsheet! But it is useful for showing a vertical list of named objects to the user.



Figure 12.2 FI_Hold_Browser



Figure 12.3 FI_Multi_Browser

Each line in the browser is identified by number. *The numbers start at one* (this is so that zero can be reserved for "no line" in the selective browsers). *Unless otherwise noted, the methods do not check to see if the passed line number is in range and legal. It must always be greater than zero and \leq size()*.

Each line contains a null-terminated string of text and a void * data pointer. The text string is displayed, the void * pointer can be used by the callbacks to reference the object the text describes.

The base class does nothing when the user clicks on it. The subclasses `FI_Select_Browser`, `FI_Hold_Browser`, and `FI_Multi_Browser` react to user clicks to select lines in the browser and do callbacks.

The base class `FI_Browser_` provides the scrolling and selection mechanisms of this and all the subclasses, but the dimensions and appearance of each item are determined by the subclass. You can use `FI_Browser_` to display information other than text, or text that is dynamically produced from your own data structures. If you find that loading the browser is a lot of work or is inefficient, you may want to make a subclass of `FI_Browser_`.

Some common coding patterns used for working with `FI_Browser`:

```
// How to loop through all the items in the browser
for ( int t=1; t<=browser->size(); t++ ) { // index 1 based..!
    printf("item #%d, label='%s'\n", t, browser->text(t));
}
```

Note: If you are *subclassing* `FI_Browser`, it's more efficient to use the protected methods `item_first()` and `item_next()`, since `FI_Browser` internally uses linked lists to manage the browser's items. For more info, see `find_item(int)`.

12.13.2 Constructor & Destructor Documentation

12.13.2.1 FI_Browser()

```
Fl_Browser::Fl_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor makes an empty browser.

Parameters

in	<i>X,Y,W,H</i>	position and size.
in	<i>L</i>	label string, may be NULL.

12.13.3 Member Function Documentation

12.13.3.1 `_remove()`

```
FL_BLINE * Fl_Browser::_remove (
    int line ) [protected]
```

Removes the item at the specified `line`.

Caveat: See efficiency note in [find_line\(\)](#). You must call [redraw\(\)](#) to make any changes visible.

Parameters

<code>in</code>	<code>line</code>	The line number to be removed. (1 based) Must be in range!
-----------------	-------------------	--

Returns

Pointer to browser item that was removed (and is no longer valid).

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

12.13.3.2 `add()`

```
void Fl_Browser::add (
    const char * newtext,
    void * d = 0 )
```

Adds a new line to the end of the browser.

The text string `newtext` may contain format characters; see [format_char\(\)](#) for details. `newtext` is copied using the `strdup()` function, and can be `NULL` to make a blank line.

The optional `void*` argument `d` will be the [data\(\)](#) for the new item.

Parameters

<code>in</code>	<code>newtext</code>	The label text used for the added item
<code>in</code>	<code>d</code>	Optional user data() for the item (0 if unspecified)

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

12.13.3.3 `bottomline()`

```
void Fl_Browser::bottomline (
    int line ) [inline]
```

Scrolls the browser so the bottom item in the browser is showing the specified `line`.

Parameters

<code>in</code>	<code>line</code>	The line to be displayed at the bottom.
-----------------	-------------------	---

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

12.13.3.4 `clear()`

```
void Fl_Browser::clear ( )
```

Removes all the lines in the browser.

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

12.13.3.5 column_char() [1/2]

```
char Fl_Browser::column_char ( ) const [inline]
```

Gets the current column separator character.

The default is '\t' (tab).

See also

[column_char\(\)](#), [column_widths\(\)](#)

12.13.3.6 column_char() [2/2]

```
void Fl_Browser::column_char (
    char c ) [inline]
```

Sets the column separator to c.

This will only have an effect if you also set [column_widths\(\)](#). The default is '\t' (tab).

See also

[column_char\(\)](#), [column_widths\(\)](#)

12.13.3.7 column_widths() [1/2]

```
const int * Fl_Browser::column_widths ( ) const [inline]
```

Gets the current column width array.

This array is zero-terminated and specifies the widths in pixels of each column. The text is split at each [column_char\(\)](#) and each part is formatted into it's own column. After the last column any remaining text is formatted into the space between the last column and the right edge of the browser, even if the text contains instances of [column_char\(\)](#) . The default value is a one-element array of just a zero, which means there are no columns.

Example:

```
Fl_Browser *b = new Fl_Browser(..);
static int widths[] = { 50, 50, 50, 70, 70, 40, 40, 70, 70, 50, 0 }; // widths for each column
b->column_widths(widths); // assign array to widget
b->column_char('\t'); // use tab as the column character
b->add("USER\tPID\tCPU\tMEM\tVSZ\tRSS\tTTY\tSTAT\tSTART\tTIME\tCOMMAND");
b->add("root\t2888\t0.0\t0.0\t1352\t0\ttty3\tSW\tAug15\t0:00\t@b@f/sbin/mingetty tty3");
b->add("root\t13115\t0.0\t0.0\t1352\t0\ttty2\tSW\tAug30\t0:00\t@b@f/sbin/mingetty tty2");
[...]
```

See also

[column_char\(\)](#), [column_widths\(\)](#)

12.13.3.8 column_widths() [2/2]

```
void Fl_Browser::column_widths (
    const int * arr ) [inline]
```

Sets the current array to arr.

Make sure the last entry is zero.

See also

[column_char\(\)](#), [column_widths\(\)](#)

12.13.3.9 data() [1/2]

```
void * Fl_Browser::data (
    int line ) const
```

Returns the user [data\(\)](#) for specified *line*.

Return value can be NULL if *line* is out of range or no user [data\(\)](#) was defined. The parameter *line* is 1 based (1 will be the first item in the list).

Parameters

in	<i>line</i>	The line number of the item whose data() is returned. (1 based)
----	-------------	---

Returns

The user data pointer (can be NULL)

12.13.3.10 data() [2/2]

```
void Fl_Browser::data (
    int line,
    void * d )
```

Sets the user data for specified *line* to *d*.
Does nothing if *line* is out of range.

Parameters

in	<i>line</i>	The line of the item whose data() is to be changed. (1 based)
in	<i>d</i>	The new data to be assigned to the item. (can be NULL)

12.13.3.11 display()

```
void Fl_Browser::display (
    int line,
    int val = 1 )
```

For back compatibility.

This calls [show\(line\)](#) if *val* is true, and [hide\(line\)](#) otherwise. If *val* is not specified, the default is 1 (makes the line visible).

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

12.13.3.12 displayed()

```
int Fl_Browser::displayed (
    int line ) const [inline]
```

Returns non-zero if *line* has been scrolled to a position where it is being displayed.

Checks to see if the item's vertical position is within the top and bottom edges of the display window. This does NOT take into account the [hide\(\)/show\(\)](#) status of the widget or item.

Parameters

in	<i>line</i>	The line to be checked
----	-------------	------------------------

Returns

1 if visible, 0 if not visible.

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

12.13.3.13 find_line()

```
FL_BLINE * Fl_Browser::find_line (
    int line ) const [protected]
```

Returns the item for specified line.

Note: This call is slow. It's fine for e.g. responding to user clicks, but slow if called often, such as in a tight sorting loop. Finding an item 'by line' involves a linear lookup on the internal linked list. The performance hit can be significant if the browser's contents is large, and the method is called often (e.g. during a sort). If you're writing a subclass, use the protected methods [item_first\(\)](#), [item_next\(\)](#), etc. to access the internal linked list more efficiently.

Parameters

in	<i>line</i>	The line number of the item to return. (1 based)
----	-------------	--

Return values

<i>item</i>	that was found.
<i>NULL</i>	if line is out of range.

See also

[item_at\(\)](#), [find_line\(\)](#), [lineno\(\)](#)

12.13.3.14 format_char() [1/2]

```
char Fl_Browser::format_char ( ) const [inline]
```

Gets the current format code prefix character, which by default is '@'.

A string of formatting codes at the start of each column are stripped off and used to modify how the rest of the line is printed:

- '@.' Print rest of line, don't look for more '@' signs
- '@@' Doubling the format character prints the format character once, followed by the rest of line
- '@l' Use a LARGE (24 point) font
- '@m' Use a medium large (18 point) font
- '@s' Use a small (11 point) font
- '@b' Use a **bold** font (adds FL_BOLD to font)
- '@i' Use an *italic* font (adds FL_ITALIC to font)
- '@f' or '@t' Use a fixed-pitch font (sets font to FL_COURIER)
- '@c' Center the line horizontally
- '@r' Right-justify the text
- '@N' Use `fl_inactive_color()` to draw the text
- '@B0', '@B1', ... '@B255' Fill the background with `fl_color(n)`
- '@C0', '@C1', ... '@C255' Use `fl_color(n)` to draw the text
- '@F0', '@F1', ... Use `fl_font(n)` to draw the text

- '@S1', '@S2', ... Use point size *n* to draw the text
- '@u' or '@_' Underline the text.
- '@-' draw an engraved line through the middle.

Notice that the '@.' command can be used to reliably terminate the parsing. To print a random string in a random color, use `sprintf("@C%d@.%s", color, string)` and it will work even if the string starts with a digit or has the format character in it.

12.13.3.15 format_char() [2/2]

```
void Fl_Browser::format_char (
    char c ) [inline]
```

Sets the current format code prefix character to *c*.

The default prefix is '@'. Set the prefix to 0 to disable formatting.

See also

[format_char\(\)](#) for list of '@' codes

12.13.3.16 full_height()

```
int Fl_Browser::full_height ( ) const [protected], [virtual]
```

The height of the entire list of all [visible\(\)](#) items in pixels.

This returns the accumulated height of *all* the items in the browser that are not hidden with [hide\(\)](#), including items scrolled off screen.

Returns

The accumulated size of all the visible items in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Reimplemented from [Fl_Browser_.](#)

12.13.3.17 hide() [1/2]

```
void Fl_Browser::hide ( ) [inline], [virtual]
```

Hides the entire [Fl_Browser](#) widget – opposite of [show\(\)](#).

Reimplemented from [Fl_Widget](#).

12.13.3.18 hide() [2/2]

```
void Fl_Browser::hide (
    int line )
```

Makes *line* invisible, preventing selection by the user.

The line can still be selected under program control. This changes the [full_height\(\)](#) if the state was changed. When a line is made invisible, lines below it are moved up in the display. [redraw\(\)](#) is called automatically if a change occurred.

Parameters

in	<i>line</i>	The line to be hidden. (1 based)
----	-------------	----------------------------------

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

12.13.3.19 icon() [1/2]

```
Fl_Image * Fl_Browser::icon (
    int line ) const
```

Returns the icon currently defined for `line`.
If no icon is defined, NULL is returned.

Parameters

in	<i>line</i>	The line whose icon is returned.
----	-------------	----------------------------------

Returns

The icon defined, or NULL if none.

12.13.3.20 icon() [2/2]

```
void Fl_Browser::icon (
    int line,
    Fl_Image * icon )
```

Set the image icon for `line` to the value `icon`.
Caller is responsible for keeping the icon allocated. The `line` is automatically redrawn.

Parameters

in	<i>line</i>	The line to be modified. If out of range, nothing is done.
in	<i>icon</i>	The image icon to be assigned to the <code>line</code> . If NULL, any previous icon is removed.

12.13.3.21 incr_height()

```
int Fl_Browser::incr_height ( ) const [protected], [virtual]
```

The default 'average' item height (including inter-item spacing) in pixels.
This currently returns [textsize\(\)](#) + 2.

Returns

The value in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Reimplemented from [Fl_Browser_.](#)

12.13.3.22 insert() [1/2]

```
void Fl_Browser::insert (
    int line,
    const char * newtext,
    void * d = 0 )
```

Insert a new entry whose label is `newtext` *above* given `line`, optional data `d`.
Text may contain format characters; see [format_char\(\)](#) for details. `newtext` is copied using the `strdup()` function, and can be NULL to make a blank line.
The optional void * argument `d` will be the [data\(\)](#) of the new item.

Parameters

in	<i>line</i>	Line position for insert. (1 based) If <code>line > size()</code> , the entry will be added at the end.
in	<i>newtext</i>	The label text for the new line.
in	<i>d</i>	Optional pointer to user data to be associated with the new line.

12.13.3.23 insert() [2/2]

```
void Fl_Browser::insert (
    int line,
    FL_BLINE * item ) [protected]
```

Insert specified `item` above `line`.

If `line > size()` then the line is added to the end.

Caveat: See efficiency note in [find_line\(\)](#).

Parameters

in	<i>line</i>	The new line will be inserted above this line (1 based).
in	<i>item</i>	The item to be added.

12.13.3.24 item_at()

```
void * Fl_Browser::item_at (
    int line ) const [inline], [protected], [virtual]
```

Return the item at specified `line`.

Parameters

in	<i>line</i>	The line of the item to return. (1 based)
----	-------------	---

Returns

The item, or NULL if `line` out of range.

See also

[item_at\(\)](#), [find_line\(\)](#), [lineno\(\)](#)

Reimplemented from [Fl_Browser_](#).

12.13.3.25 item_draw()

```
void Fl_Browser::item_draw (
    void * item,
    int X,
    int Y,
    int W,
    int H ) const [protected], [virtual]
```

Draws `item` at the position specified by `X Y W H`.

The `W` and `H` values are used for clipping. Should only be called within the context of an FLTK [draw\(\)](#).

Parameters

in	<i>item</i>	The item to be drawn
in	<i>X,Y,W,H</i>	position and size.

Implements [Fl_Browser_](#).

12.13.3.26 item_first()

```
void * Fl_Browser::item_first ( ) const [protected], [virtual]
```

Returns the very first item in the list.

Example of use:

```
// Walk the browser from beginning to end
for ( void *i=item_first(); i; i=item_next(i) ) {
    printf("item label='%s'\n", item_text(i));
}
```

Returns

The first item, or NULL if list is empty.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_](#).

12.13.3.27 item_height()

```
int Fl_Browser::item_height (
    void * item ) const [protected], [virtual]
```

Returns height of *item* in pixels.

This takes into account embedded @ codes within the [text\(\)](#) label.

Parameters

in	<i>item</i>	The item whose height is returned.
----	-------------	------------------------------------

Returns

The height of the item in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Implements [Fl_Browser_](#).

12.13.3.28 item_last()

```
void * Fl_Browser::item_last ( ) const [protected], [virtual]
```

Returns the very last item in the list.

Example of use:

```
// Walk the browser in reverse, from end to start
for ( void *i=item_last(); i; i=item_prev(i) ) {
    printf("item label='%s'\n", item_text(i));
}
```

Returns

The last item, or NULL if list is empty.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Reimplemented from [Fl_Browser_](#).

12.13.3.29 item_next()

```
void * Fl_Browser::item_next (
    void * item ) const [protected], [virtual]
```

Returns the next item after *item*.

Parameters

in	<i>item</i>	The 'current' item
----	-------------	--------------------

Returns

The next item after *item*, or NULL if there are none after this one.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_.](#)

12.13.3.30 item_prev()

```
void * Fl_Browser::item_prev (
    void * item ) const [protected], [virtual]
```

Returns the previous item before *item*.

Parameters

in	<i>item</i>	The 'current' item
----	-------------	--------------------

Returns

The previous item before *item*, or NULL if there are none before this one.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_.](#)

12.13.3.31 item_select()

```
void Fl_Browser::item_select (
    void * item,
    int val ) [protected], [virtual]
```

Change the selection state of *item* to the value *val*.

Parameters

in	<i>item</i>	The item to be changed.
in	<i>val</i>	The new selection state: 1 selects, 0 de-selects.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

Reimplemented from [Fl_Browser_](#).

12.13.3.32 item_selected()

```
int Fl_Browser::item_selected (
    void * item ) const [protected], [virtual]
```

See if *item* is selected.

Parameters

in	<i>item</i>	The item whose selection state is to be checked.
----	-------------	--

Returns

1 if selected, 0 if not.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

Reimplemented from [Fl_Browser_](#).

12.13.3.33 item_swap()

```
void Fl_Browser::item_swap (
    void * a,
    void * b ) [inline], [protected], [virtual]
```

Swap the items *a* and *b*.

You must call [redraw\(\)](#) to make any changes visible.

Parameters

in	<i>a,b</i>	the items to be swapped.
----	------------	--------------------------

See also

[swap\(int,int\)](#), [item_swap\(\)](#)

Reimplemented from [Fl_Browser_](#).

12.13.3.34 item_text()

```
const char * Fl_Browser::item_text (
    void * item ) const [protected], [virtual]
```

Returns the label text for *item*.

Parameters

in	<i>item</i>	The item whose label text is returned.
----	-------------	--

Returns

The item's text string. (Can be NULL)

Reimplemented from [Fl_Browser_](#).

12.13.3.35 item_width()

```
int Fl_Browser::item_width (
    void * item ) const [protected], [virtual]
```

Returns width of *item* in pixels.

This takes into account embedded @ codes within the [text\(\)](#) label.

Parameters

in	<i>item</i>	The item whose width is returned.
----	-------------	-----------------------------------

Returns

The width of the item in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Implements [Fl_Browser_](#).

12.13.3.36 lineno()

```
int Fl_Browser::lineno (
    void * item ) const [protected]
```

Returns line number corresponding to *item*, or zero if not found.

Caveat: See efficiency note in [find_line\(\)](#).

Parameters

in	<i>item</i>	The item to be found
----	-------------	----------------------

Returns

The line number of the item, or 0 if not found.

See also

[item_at\(\)](#), [find_line\(\)](#), [lineno\(\)](#)

12.13.3.37 lineposition()

```
void Fl_Browser::lineposition (
    int line,
    Fl_Line_Position pos )
```

Updates the browser so that *line* is shown at position *pos*.

Parameters

in	<i>line</i>	line number. (1 based)
in	<i>pos</i>	position.

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#)

12.13.3.38 load()

```
int Fl_Browser::load (
    const char * filename )
```

Clears the browser and reads the file, adding each line from the file to the browser.

If the filename is NULL or a zero-length string then this just clears the browser. This returns zero if there was any error in opening or reading the file, in which case `errno` is set to the system error. The `data()` of each line is set to NULL.

Parameters

in	<i>filename</i>	The filename to load
----	-----------------	----------------------

Returns

1 if OK, 0 on error (`errno` has reason)

See also

[add\(\)](#)

12.13.3.39 make_visible()

```
void Fl_Browser::make_visible (
    int line ) [inline]
```

Make the item at the specified `line` [visible\(\)](#).

Functionally similar to [show\(int line\)](#). If `line` is out of range, redisplay top or bottom of list as appropriate.

Parameters

in	<i>line</i>	The line to be made visible.
----	-------------	------------------------------

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

12.13.3.40 middleline()

```
void Fl_Browser::middleline (
    int line ) [inline]
```

Scrolls the browser so the middle item in the browser is showing the specified `line`.

Parameters

in	<i>line</i>	The line to be displayed in the middle.
----	-------------	---

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

12.13.3.41 move()

```
void Fl_Browser::move (
    int to,
    int from )
```

Line `from` is removed and reinserted at `to`.

Note: `to` is calculated *after* line `from` gets removed.

Parameters

in	<i>to</i>	Destination line number (calculated <i>after</i> line <i>from</i> is removed)
in	<i>from</i>	Line number of item to be moved

12.13.3.42 remove()

```
void Fl_Browser::remove (
    int line )
```

Remove entry for given *line* number, making the browser one line shorter. You must call [redraw\(\)](#) to make any changes visible.

Parameters

in	<i>line</i>	Line to be removed. (1 based) If <i>line</i> is out of range, no action is taken.
----	-------------	--

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

12.13.3.43 remove_icon()

```
void Fl_Browser::remove_icon (
    int line )
```

Removes the icon for *line*. It's ok to remove an icon if none has been defined.

Parameters

in	<i>line</i>	The line whose icon is to be removed.
----	-------------	---------------------------------------

12.13.3.44 select()

```
int Fl_Browser::select (
    int line,
    int val = 1 )
```

Sets the selection state of the item at *line* to the value *val*. If *val* is not specified, the default is 1 (selects the item).

Parameters

in	<i>line</i>	The line number of the item to be changed. (1 based)
in	<i>val</i>	The new selection state (1=select, 0=de-select).

Returns

1 if the state changed, 0 if not.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

12.13.3.45 selected()

```
int Fl_Browser::selected (
    int line ) const
```

Returns 1 if specified `line` is selected, 0 if not.

Parameters

in	<i>line</i>	The line being checked (1 based)
----	-------------	----------------------------------

Returns

1 if item selected, 0 if not.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

12.13.3.46 show() [1/2]

```
void Fl_Browser::show ( ) [inline], [virtual]
```

Shows the entire [Fl_Browser](#) widget – opposite of [hide\(\)](#).

Reimplemented from [Fl_Widget](#).

12.13.3.47 show() [2/2]

```
void Fl_Browser::show (
    int line )
```

Makes `line` visible, and available for selection by user.

Opposite of [hide\(int\)](#). This changes the [full_height\(\)](#) if the state was changed. [redraw\(\)](#) is called automatically if a change occurred.

Parameters

in	<i>line</i>	The line to be shown. (1 based)
----	-------------	---------------------------------

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

12.13.3.48 size()

```
int Fl_Browser::size ( ) const [inline]
```

Returns how many lines are in the browser.

The last line number is equal to this. Returns 0 if browser is empty.

12.13.3.49 swap() [1/2]

```
void Fl_Browser::swap (
    FL_BLINE * a,
    FL_BLINE * b ) [protected]
```

Swap the two items `a` and `b`.

Uses [swapping\(\)](#) to ensure list updates correctly.

Parameters

in	<i>a,b</i>	The two items to be swapped.
----	------------	------------------------------

See also

[swap\(int,int\), item_swap\(\)](#)

12.13.3.50 swap() [2/2]

```
void Fl_Browser::swap (
    int a,
    int b )
```

Swaps two browser lines a and b.

You must call [redraw\(\)](#) to make any changes visible.

Parameters

in	<i>a,b</i>	The two lines to be swapped. (both 1 based)
----	------------	---

See also

[swap\(int,int\), item_swap\(\)](#)

12.13.3.51 text() [1/2]

```
const char * Fl_Browser::text (
    int line ) const
```

Returns the label text for the specified line.

Return value can be NULL if line is out of range or unset. The parameter line is 1 based.

Parameters

in	<i>line</i>	The line number of the item whose text is returned. (1 based)
----	-------------	---

Returns

The text string (can be NULL)

12.13.3.52 text() [2/2]

```
void Fl_Browser::text (
    int line,
    const char * newtext )
```

Sets the text for the specified line to newtext.

Text may contain format characters; see [format_char\(\)](#) for details. newtext is copied using the strdup() function, and can be NULL to make a blank line.

Does nothing if line is out of range.

Parameters

in	<i>line</i>	The line of the item whose text will be changed. (1 based)
in	<i>newtext</i>	The new string to be assigned to the item.

12.13.3.53 textsize()

```
void Fl_Browser::textsize (
    Fl_Fontsize newSize )
```

Sets the default text size (in pixels) for the lines in the browser to newSize.

This method recalculates all item heights and caches the total height internally for optimization of later item changes. This can be slow if there are many items in the browser. It returns immediately (w/o recalculation) if `newSize` equals the current `textsize()`. You *may* need to call `redraw()` to see the effect and to have the scrollbar positions recalculated. You should set the text size *before* populating the browser with items unless you really need to *change* the size later.

12.13.3.54 topline() [1/2]

```
int Fl_Browser::topline ( ) const
```

Returns the line that is currently visible at the top of the browser. If there is no vertical scrollbar then this will always return 1.

Returns

The `lineno()` of the `top()` of the browser.

12.13.3.55 topline() [2/2]

```
void Fl_Browser::topline (
    int line ) [inline]
```

Scrolls the browser so the top item in the browser is showing the specified `line`.

Parameters

<code>in</code>	<code>line</code>	The line to be displayed at the top.
-----------------	-------------------	--------------------------------------

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

12.13.3.56 value() [1/2]

```
int Fl_Browser::value ( ) const
```

Returns the line number of the currently selected line, or 0 if none selected.

Returns

The line number of current selection, or 0 if none selected.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

12.13.3.57 value() [2/2]

```
void Fl_Browser::value (
    int line ) [inline]
```

Sets the browser's `value()`, which selects the specified `line`. This is the same as calling `select(line)`.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

12.13.3.58 visible()

```
int Fl_Browser::visible (
    int line ) const
```

Returns non-zero if the specified `line` is visible, 0 if hidden. Use [show\(int\)](#), [hide\(int\)](#), or [make_visible\(int\)](#) to change an item's visible state.

Parameters

<code>in</code>	<code>line</code>	The line in the browser to be tested. (1 based)
-----------------	-------------------	---

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

The documentation for this class was generated from the following files:

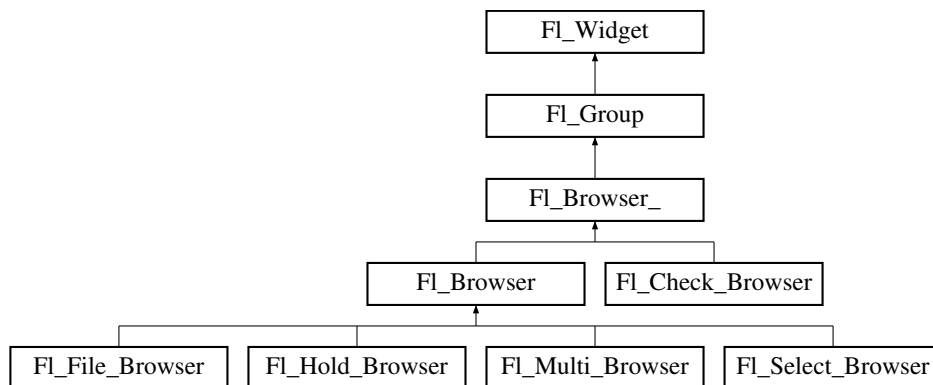
- `Fl_Browser.H`
- `Fl_Browser.cxx`
- `Fl_Browser_load.cxx`

12.14 Fl_Browser_ Class Reference

This is the base class for browsers.

```
#include <Fl_Browser_.H>
```

Inheritance diagram for `Fl_Browser_`:



Public Types

- enum {
[HORIZONTAL](#) = 1 , [VERTICAL](#) = 2 , [BOTH](#) = 3 , [ALWAYS_ON](#) = 4 ,
[HORIZONTAL_ALWAYS](#) = 5 , [VERTICAL_ALWAYS](#) = 6 , [BOTH_ALWAYS](#) = 7 }
Values for [has_scrollbar\(\)](#).

Public Member Functions

- int [deselect](#) (int docallbacks=0)
Deselects all items in the list and returns 1 if the state changed or 0 if it did not.
- void [display](#) (void *item)
*Displays the *item*, scrolling the list as necessary.*
- int [handle](#) (int event) [FL_OVERRIDE](#)
*Handles the *event* within the normal widget bounding box.*
- uchar [has_scrollbar](#) () const
Returns the current scrollbar mode, see [Fl_Browser_::has_scrollbar\(uchar\)](#)
- void [has_scrollbar](#) (uchar mode)
Sets whether the widget should have scrollbars or not (default [Fl_Browser_::BOTH](#)).
- int [hposition](#) () const
*Gets the horizontal scroll position of the list as a pixel position *pos*.*
- void [hposition](#) (int)

- Sets the horizontal scroll position of the list to pixel position `pos`.*

 - int `linespacing` () const

Return the height of additional spacing between browser lines.
- void `linespacing` (int pixels)

Add some space between browser lines.
- int `position` () const
- void `position` (int pos)
- void `position` (int x, int y)
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`

Repositions and/or resizes the browser.
- void `scrollbar_left` ()

Moves the vertical scrollbar to the lefthand side of the list.
- void `scrollbar_right` ()

Moves the vertical scrollbar to the righthand side of the list.
- int `scrollbar_size` () const

Gets the current size of the scrollbars' troughs, in pixels.
- void `scrollbar_size` (int newSize)

Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.
- int `scrollbar_width` () const

Returns the global value `Fl::scrollbar_size()`.
- void `scrollbar_width` (int width)

Sets the global `Fl::scrollbar_size()`, and forces this instance of the widget to use it.
- int `select` (void *item, int val=1, int docallbacks=0)

Sets the selection state of `item` to `val`, and returns 1 if the state changed or 0 if it did not.
- int `select_only` (void *item, int docallbacks=0)

Selects `item` and returns 1 if the state changed or 0 if it did not.
- void `sort` (int flags=0)

Sort the items in the browser based on `flags`.
- `Fl_Color` `textcolor` () const

Gets the default text color for the lines in the browser.
- void `textcolor` (`Fl_Color` col)

Sets the default text color for the lines in the browser to color `col`.
- `Fl_Font` `textfont` () const

Gets the default text font for the lines in the browser.
- void `textfont` (`Fl_Font` font)

Sets the default text font for the lines in the browser to `font`.
- `Fl_Fontsize` `textsize` () const

Gets the default text size (in pixels) for the lines in the browser.
- void `textsize` (`Fl_Fontsize` newSize)

Sets the default text size (in pixels) for the lines in the browser to `size`.
- int `vposition` () const

Gets the vertical scroll position of the list as a pixel position `pos`.
- void `vposition` (int pos)

Sets the vertical scroll position of the list to pixel position `pos`.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *[_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
Removes the widget at `index` from the group and deletes it.
- void [end](#) ()
Exactly the same as `current(this->parent())`.
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\) const](#).*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does `insert(w, find(before))`.
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)

- Removes the widget `o` from the group.*
- void `remove` (int index)
 - Removes the widget at `index` from the group but does not delete it.*
- `FL_Widget * resizable` () const
 - Returns the group's resizable widget.*
- void `resizable` (`FL_Widget &o`)
 - Sets the group's resizable widget.*
- void `resizable` (`FL_Widget *o`)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- void `resize` (int, int, int) `FL_OVERRIDE`
 - Resizes the `FL_Group` widget and all of its children.*
- virtual `~FL_Group` ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from `FL_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FL_Align align` () const
 - Gets the label alignment.*
- void `align` (`FL_Align alignment`)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FL_Gl_Window * as_gl_window` ()
 - Returns an `FL_Gl_Window` pointer if this widget is an `FL_Gl_Window`.*
- virtual class `FL_Gl_Window` const * `as_gl_window` () const
- virtual `FL_Window * as_window` ()
 - Returns an `FL_Window` pointer if this widget is an `FL_Window`.*
- virtual `FL_Window` const * `as_window` () const
- void `bind_deimage` (`FL_Image *img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FL_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FL_Boxtype box` () const
 - Gets the box type of the widget.*
- void `box` (`FL_Boxtype new_box`)
 - Sets the box type for the widget.*
- `FL_Callback_p callback` () const

- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, `bool auto_free`)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback *cb`, `void *p`)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0 *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1 *cb`, `long p=0`)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FI_Color bg`, `FI_Color sel`)
- Sets the background and selection color of the widget.*

 - `FI_Color color2` () const
- For back compatibility only.*

 - void `color2` (`unsigned a`)
- For back compatibility only.*

 - int `contains` (`const FI_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (`const char *new_label`)
- Sets the current label.*

 - void `copy_tooltip` (`const char *text`)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (`int`, `int`, `int`, `int`)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h () const`
Gets the widget height.
- `virtual void hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`

- Gets the font size in pixels.*
- void [labelsize](#) ([FI_Fontsize](#) pix)
 - Sets the font size in pixels.*
- [FI_Labeltype](#) [labeltype](#) () const
 - Gets the label type.*
- void [labeltype](#) ([FI_Labeltype](#) a)
 - Sets the label type.*
- void [measure_label](#) (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
- bool [needs_keyboard](#) () const
 - Returns whether this widget needs a keyboard.*
- void [needs_keyboard](#) (bool needs)
 - Sets whether this widget needs a keyboard.*
- unsigned int [output](#) () const
 - Returns if a widget is used for output only.*
- [FI_Group](#) * [parent](#) () const
 - Returns a pointer to the parent widget.*
- void [parent](#) ([FI_Group](#) *p)
 - Internal use only - "for hacks only".*
- void [position](#) (int X, int Y)
 - Repositions the window or widget.*
- void [redraw](#) ()
 - Schedules the drawing of the widget.*
- void [redraw_label](#) ()
 - Schedules the drawing of the label.*
- [FI_Color](#) [selection_color](#) () const
 - Gets the selection color.*
- void [selection_color](#) ([FI_Color](#) a)
 - Sets the selection color.*
- void [set_active](#) ()
 - Marks the widget as active without sending events or changing focus.*
- void [set_changed](#) ()
 - Marks the value of the widget as changed.*
- void [set_output](#) ()
 - Sets a widget to output only.*
- void [set_visible](#) ()
 - Makes the widget visible.*
- void [set_visible_focus](#) ()
 - Enables keyboard focus navigation with this widget.*
- int [shortcut_label](#) () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void [shortcut_label](#) (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void [show](#) ()
 - Makes a widget visible.*
- void [size](#) (int W, int H)
 - Changes the size of the widget.*
- int [take_focus](#) ()
 - Gives the widget the keyboard focus.*
- unsigned int [takeevents](#) () const
 - Returns if the widget is able to take events.*

- int [test_shortcut](#) ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const
Gets the current tooltip text.
- void [tooltip](#) (const char *text)
Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
Gets the widget type.
- void [type](#) ([uchar](#) t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [FI_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [FI_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~FI_Widget](#) ()
Destroys the widget.

Public Attributes

- [FI_Scrollbar](#) [hscrollbar](#)
Horizontal scrollbar.
- [FI_Scrollbar](#) [scrollbar](#)
Vertical scrollbar.

Protected Member Functions

- void `bbox` (int &X, int &Y, int &W, int &H) const
Returns the bounding box for the interior of the list's display window, inside the scrollbars.
- void `deleting` (void *item)
This method should be used when `item` is being deleted from the list.
- int `displayed` (void *item) const
Returns non-zero if `item` has been scrolled to a position where it is being displayed.
- void `draw` () `FL_OVERRIDE`
Draws the list within the normal widget bounding box.
- void * `find_item` (int ypos)
This method returns the item under mouse `y` position `ypos`.
- `Fl_Browser_` (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- virtual int `full_height` () const
This method may be provided by the subclass to indicate the full height of the item list, in pixels.
- virtual int `full_width` () const
This method may be provided by the subclass to indicate the full width of the item list, in pixels.
- virtual int `incr_height` () const
This method may be provided to return the average height of all items to be used for scrolling.
- void `inserting` (void *a, void *b)
This method should be used when an item is in the process of being inserted into the list.
- virtual void * `item_at` (int index) const
This method must be provided by the subclass to return the item for the specified `index`.
- virtual void `item_draw` (void *item, int X, int Y, int W, int H) const =0
This method must be provided by the subclass to draw the `item` in the area indicated by `X`, `Y`, `W`, `H`.
- virtual void * `item_first` () const =0
This method must be provided by the subclass to return the first item in the list.
- virtual int `item_height` (void *item) const =0
This method must be provided by the subclass to return the height of `item` in pixels.
- virtual void * `item_last` () const
This method must be provided by the subclass to return the last item in the list.
- virtual void * `item_next` (void *item) const =0
This method must be provided by the subclass to return the item in the list after `item`.
- virtual void * `item_prev` (void *item) const =0
This method must be provided by the subclass to return the item in the list before `item`.
- virtual int `item_quick_height` (void *item) const
This method may be provided by the subclass to return the height of the `item`, in pixels.
- virtual void `item_select` (void *item, int val=1)
This method must be implemented by the subclass if it supports multiple selections; sets the selection state to `val` for the `item`.
- virtual int `item_selected` (void *item) const
This method must be implemented by the subclass if it supports multiple selections; returns the selection state for `item`.
- virtual void `item_swap` (void *a, void *b)
This optional method should be provided by the subclass to efficiently swap browser items `a` and `b`, such as for sorting.
- virtual const char * `item_text` (void *item) const
This optional method returns a string (label) that may be used for sorting.
- virtual int `item_width` (void *item) const =0
This method must be provided by the subclass to return the width of the `item` in pixels.
- int `leftedge` () const

- This method returns the X position of the left edge of the list area after adjusting for the scrollbar and border, if any.*

 - void `new_list` ()

This method should be called when the list data is completely replaced or cleared.
- void `redraw_line` (void *item)
- This method should be called when the contents of `item` has changed, but not its height.*

 - void `redraw_lines` ()

This method will cause the entire list to be redrawn.
- void `replacing` (void *a, void *b)
- This method should be used when item `a` is being replaced by item `b`.*

 - void * `selection` () const

Returns the item currently selected, or NULL if there is no selection.
- void `swapping` (void *a, void *b)
- This method should be used when two items `a` and `b` are being swapped.*

 - void * `top` () const

Returns the item that appears at the top of the list.

Protected Member Functions inherited from FI_Group

- `FI_Rect` * `bounds` ()
- Returns the internal array of widget sizes and positions.*

 - void `draw` () `FL_OVERRIDE`

Draws the widget.
- void `draw_child` (`FI_Widget` &widget) const
- Forces a child to redraw.*

 - void `draw_children` ()

Draws all children of the group.
- void `draw_outside_label` (const `FI_Widget` &widget) const
- Parents normally call this to draw outside labels of child widgets.*

 - virtual int `on_insert` (`FI_Widget` *, int)

Allow derived groups to act when a widget is added as a child.
- virtual int `on_move` (int, int)
- Allow derived groups to act when a widget is moved within the group.*

 - virtual void `on_remove` (int)

Allow derived groups to act when a child widget is removed from the group.
- int * `sizes` ()
- Returns the internal array of widget sizes and positions.*

 - void `update_child` (`FI_Widget` &widget) const

Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
- Clears a flag in the flags mask.*

 - void `draw_backdrop` () const

If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
- Draws the widget box according its box style.*

 - void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const

Draws a box of type `t`, of color `c` at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
- Draws a box of type `t`, of color `c` at the position `X,Y` and size `W,H`.*

 - void `draw_focus` () const

- Draws a focus rectangle around the widget.*

 - void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
- Draws a focus rectangle around the widget.*

 - void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
- Draws a focus box for the widget at the given position and size.*

 - void `draw_label` () const
- Draws the widget's label at the defined label position.*

 - void `draw_label` (int, int, int, int) const
- Draws the label in an arbitrary bounding box.*

 - `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
- Creates a widget at the given position and size.*

 - unsigned int `flags` () const
- Gets the widget flags mask.*

 - void `h` (int v)
- Internal use only.*

 - void `set_flag` (unsigned int c)
- Sets a flag in the flags mask.*

 - void `w` (int v)
- Internal use only.*

 - void `x` (int v)
- Internal use only.*

 - void `y` (int v)
- Internal use only.*

Additional Inherited Members

Static Public Member Functions inherited from `FI_Group`

- static `FI_Group` * `current` ()
- Returns the currently active group.*
- static void `current` (`FI_Group` *g)
- Sets the current group.*

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
- The default callback for all widgets that don't set a callback.*
- static unsigned int `label_shortcut` (const char *t)
- Returns the Unicode value of the '&x' shortcut in a given text.*
- static int `test_shortcut` (const char *, const bool require_alt=false)
- Returns true if the given text t contains the entered '&x' shortcut.*

Protected Types inherited from `FI_Widget`

- enum {
- `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
- `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
- ,
- `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
- ,
- `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
- ,
- `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
- = 1<<19 ,

```
NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
USERFLAG1 = 1<<31 }
```

flags possible values enumeration.

12.14.1 Detailed Description

This is the base class for browsers.

To be useful it must be subclassed and several virtual functions defined. The Forms-compatible browser and the file chooser's browser are subclassed off of this.

This has been designed so that the subclass has complete control over the storage of the data, although because next() and prev() functions are used to index, it works best as a linked list or as a large block of characters in which the line breaks must be searched for.

A great deal of work has been done so that the "height" of a data object does not need to be determined until it is drawn. This is useful if actually figuring out the size of an object requires accessing image data or doing stat() on a file or doing some other slow operation.

Callbacks are called when the value changes with FL_REASON_CHANGED. If FL_WHEN_RELEASE is set, callbacks are called when the mouse button is released with FL_REASON_CHANGED or FL_REASON_↔ RESELECTED if the selection did not change. If FL_WHEN_ENTER_KEY is set, callbacks are also called when key presses or double clicks change the selection.

Keyboard navigation of browser items

The keyboard navigation of browser items is only possible if [visible_focus\(\)](#) is enabled. If disabled, the widget rejects keyboard focus; Tab and Shift-Tab focus navigation will skip the widget.

In 'Select' and 'Normal' mode, the widget rejects keyboard focus; no navigation keys are supported (other than scrollbar positioning).

In 'Hold' mode, the widget accepts keyboard focus, and Up/Down arrow keys can navigate the selected item.

In 'Multi' mode, the widget accepts keyboard focus, and Up/Down arrow keys navigate the focus box; Space toggles the current item's selection, Enter selects only the current item (deselects all others). If Shift (or Ctrl) is combined with Up/Down arrow keys, the current item's selection state is extended to the next item. In this way one can extend a selection or de-selection.

12.14.2 Member Enumeration Documentation

12.14.2.1 anonymous enum

anonymous enum

Values for [has_scrollbar\(\)](#).

Anonymous enum bit flags for [has_scrollbar\(\)](#).

- bit 0: horizontal
- bit 1: vertical
- bit 2: 'always' (to be combined with bits 0 and 1)
- bit 3-31: reserved for future use

Enumerator

HORIZONTAL	Only show horizontal scrollbar.
VERTICAL	Only show vertical scrollbar.
BOTH	Show both scrollbars. (default)
ALWAYS_ON	Specified scrollbar(s) should 'always' be shown (to be used with HORIZONTAL/VERTICAL)
HORIZONTAL_ALWAYS	Horizontal scrollbar always on.
VERTICAL_ALWAYS	Vertical scrollbar always on.
BOTH_ALWAYS	Both scrollbars always on.

12.14.3 Constructor & Destructor Documentation

12.14.3.1 Fl_Browser_()

```
Fl_Browser_::Fl_Browser_ (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 ) [protected]
```

The constructor makes an empty browser.

Parameters

in	<i>X,Y,W,H</i>	position and size.
in	<i>L</i>	The label string, may be NULL.

12.14.4 Member Function Documentation

12.14.4.1 bbox()

```
void Fl_Browser_::bbox (
    int & X,
    int & Y,
    int & W,
    int & H ) const [protected]
```

Returns the bounding box for the interior of the list's display window, inside the scrollbars.

Parameters

out	<i>X,Y,W,H</i>	The returned bounding box. (The original contents of these parameters are overwritten)
-----	----------------	---

12.14.4.2 deleting()

```
void Fl_Browser_::deleting (
    void * item ) [protected]
```

This method should be used when *item* is being deleted from the list.

It allows the `Fl_Browser_` to discard any cached data it has on the item. This method does not actually delete the item, but handles the follow up bookkeeping after the item has just been deleted.

Parameters

in	<i>item</i>	The item being deleted.
----	-------------	-------------------------

12.14.4.3 deselect()

```
int Fl_Browser_::deselect (
    int docallbacks = 0 )
```

Deselects all items in the list and returns 1 if the state changed or 0 if it did not.

If the optional `docallbacks` parameter is non-zero, `deselect` tries to call the callback function for the widget.

Parameters

in	<i>docallbacks</i>	If non-zero, invokes widget callback if item changed. If 0, doesn't do callback (default).
----	--------------------	---

12.14.4.4 display()

```
void Fl_Browser_::display (
    void * item )
```

Displays the `item`, scrolling the list as necessary.

Parameters

in	<i>item</i>	The item to be displayed.
----	-------------	---------------------------

See also

[display\(\)](#), [displayed\(\)](#)

12.14.4.5 displayed()

```
int Fl_Browser_::displayed (
    void * item ) const [protected]
```

Returns non-zero if `item` has been scrolled to a position where it is being displayed.

Checks to see if the item's vertical position is within the top and bottom edges of the display window. This does NOT take into account the [hide\(\)/show\(\)](#) status of the widget or item.

Parameters

in	<i>item</i>	The item to check
----	-------------	-------------------

Returns

1 if visible, 0 if not visible.

See also

[display\(\)](#), [displayed\(\)](#)

12.14.4.6 draw()

```
void Fl_Browser_::draw (
    void ) [protected], [virtual]
```

Draws the list within the normal widget bounding box.

Implements [Fl_Widget](#).

12.14.4.7 find_item()

```
void * Fl_Browser_::find_item (
    int ypos ) [protected]
```

This method returns the item under mouse y position `ypos`.

NULL is returned if no item is displayed at that position.

Parameters

in	<i>ypos</i>	The y position (eg. Fl::event_y()) to find an item under.
----	-------------	--

Returns

The item, or NULL if not found

12.14.4.8 full_height()

```
int Fl_Browser_::full_height ( ) const [protected], [virtual]
```

This method may be provided by the subclass to indicate the full height of the item list, in pixels.

The default implementation computes the full height from the item heights. Includes the items that are scrolled off screen.

Returns

The height of the entire list, in pixels.

Reimplemented in [Fl_Browser](#).

12.14.4.9 full_width()

```
int Fl_Browser_::full_width ( ) const [protected], [virtual]
```

This method may be provided by the subclass to indicate the full width of the item list, in pixels.

The default implementation computes the full width from the item widths.

Returns

The maximum width of all the items, in pixels.

12.14.4.10 handle()

```
int Fl_Browser_::handle (
    int event ) [virtual]
```

Handles the `event` within the normal widget bounding box.

Parameters

in	<i>event</i>	The event to process.
----	--------------	-----------------------

Returns

1 if event was processed, 0 if not.

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Check_Browser](#).

12.14.4.11 has_scrollbar()

```
void Fl_Browser_::has_scrollbar (
    uchar mode ) [inline]
```

Sets whether the widget should have scrollbars or not (default [Fl_Browser_::BOTH](#)).

By default you can scroll in both directions, and the scrollbars disappear if the data will fit in the widget.

[has_scrollbar\(\)](#) changes this based on the value of `mode`:

- 0 - No scrollbars.
- [Fl_Browser_::HORIZONTAL](#) - Only a horizontal scrollbar.
- [Fl_Browser_::VERTICAL](#) - Only a vertical scrollbar.
- [Fl_Browser_::BOTH](#) - The default is both scrollbars.
- [Fl_Browser_::HORIZONTAL_ALWAYS](#) - Horizontal scrollbar always on, vertical always off.
- [Fl_Browser_::VERTICAL_ALWAYS](#) - Vertical scrollbar always on, horizontal always off.
- [Fl_Browser_::BOTH_ALWAYS](#) - Both always on.

12.14.4.12 hposition() [1/2]

```
int Fl_Browser_::hposition ( ) const [inline]
```

Gets the horizontal scroll position of the list as a pixel position `pos`.

The position returned is how many pixels of the list are scrolled off the left edge of the screen. Example: A position of '18' indicates the left 18 pixels of the list are scrolled off the left edge of the screen.

See also

[position\(\)](#), [hposition\(\)](#)

12.14.4.13 hposition() [2/2]

```
void Fl_Browser_::hposition (
    int pos )
```

Sets the horizontal scroll position of the list to pixel position `pos`.

The position is how many pixels of the list are scrolled off the left edge of the screen. Example: A position of '18' scrolls the left 18 pixels of the list off the left edge of the screen.

Parameters

in	<i>pos</i>	The horizontal position (in pixels) to scroll the browser to.
----	------------	---

See also

[vposition\(\)](#), [hposition\(\)](#)

12.14.4.14 incr_height()

```
int Fl_Browser_::incr_height ( ) const [protected], [virtual]
```

This method may be provided to return the average height of all items to be used for scrolling.

The default implementation uses the height of the first item.

Returns

The average height of items, in pixels.

Reimplemented in [Fl_Browser](#).

12.14.4.15 inserting()

```
void Fl_Browser_::inserting (
    void * a,
    void * b ) [protected]
```

This method should be used when an item is in the process of being inserted into the list.

It allows the [Fl_Browser_](#) to update its cache data as needed, scheduling a redraw for the affected lines. This method does not actually insert items, but handles the follow up bookkeeping after items have been inserted.

Parameters

in	<i>a</i>	The starting item position
in	<i>b</i>	The new item being inserted

12.14.4.16 item_at()

```
virtual void * Fl_Browser_::item_at (
    int index ) const [inline], [protected], [virtual]
```

This method must be provided by the subclass to return the item for the specified `index`.

Parameters

in	<i>index</i>	The <i>index</i> of the item to be returned
----	--------------	---

Returns

The item at the specified *index*.

Reimplemented in [FI_Check_Browser](#), and [FI_Browser](#).

12.14.4.17 item_draw()

```
virtual void Fl_Browser::item_draw (
    void * item,
    int X,
    int Y,
    int W,
    int H ) const [protected], [pure virtual]
```

This method must be provided by the subclass to draw the *item* in the area indicated by *X*, *Y*, *W*, *H*.

Implemented in [FI_Check_Browser](#), and [FI_Browser](#).

12.14.4.18 item_first()

```
virtual void * Fl_Browser::item_first ( ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the first item in the list.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implemented in [FI_Browser](#), and [FI_Check_Browser](#).

12.14.4.19 item_height()

```
virtual int Fl_Browser::item_height (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the height of *item* in pixels.

Allow for two additional pixels for the list selection box.

Parameters

in	<i>item</i>	The item whose height is returned.
----	-------------	------------------------------------

Returns

The height of the specified *item* in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#), [item_quick_height\(\)](#)

Implemented in [FI_Check_Browser](#), and [FI_Browser](#).

12.14.4.20 item_last()

```
virtual void * Fl_Browser::item_last ( ) const [inline], [protected], [virtual]
```

This method must be provided by the subclass to return the last item in the list.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Reimplemented in [FI_Browser](#).

12.14.4.21 item_next()

```
virtual void * Fl_Browser_::item_next (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the item in the list after *item*.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implemented in [Fl_Check_Browser](#), and [Fl_Browser](#).

12.14.4.22 item_prev()

```
virtual void * Fl_Browser_::item_prev (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the item in the list before *item*.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implemented in [Fl_Check_Browser](#), and [Fl_Browser](#).

12.14.4.23 item_quick_height()

```
int Fl_Browser_::item_quick_height (
    void * item ) const [protected], [virtual]
```

This method may be provided by the subclass to return the height of the *item*, in pixels.

Allow for two additional pixels for the list selection box. This method differs from *item_height* in that it is only called for selection and scrolling operations. The default implementation calls *item_height*.

Parameters

in	<i>item</i>	The item whose height to return.
----	-------------	----------------------------------

Returns

The height, in pixels.

12.14.4.24 item_select()

```
void Fl_Browser_::item_select (
    void * item,
    int val = 1 ) [protected], [virtual]
```

This method must be implemented by the subclass if it supports multiple selections; sets the selection state to *val* for the *item*.

Sets the selection state for *item*, where optional *val* is 1 (select, the default) or 0 (de-select).

Parameters

in	<i>item</i>	The item to be selected
in	<i>val</i>	The optional selection state; 1=select, 0=de-select. The default is to select the item (1).

Reimplemented in [Fl_Check_Browser](#), and [Fl_Browser](#).

12.14.4.25 item_selected()

```
int Fl_Browser_::item_selected (
```

```
void * item ) const [protected], [virtual]
```

This method must be implemented by the subclass if it supports multiple selections; returns the selection state for *item*.

The method should return 1 if *item* is selected, or 0 otherwise.

Parameters

in	<i>item</i>	The item to test.
----	-------------	-------------------

Reimplemented in [Fl_Check_Browser](#), and [Fl_Browser](#).

12.14.4.26 item_swap()

```
virtual void Fl_Browser_::item_swap (
    void * a,
    void * b ) [inline], [protected], [virtual]
```

This optional method should be provided by the subclass to efficiently swap browser items *a* and *b*, such as for sorting.

Parameters

in	<i>a,b</i>	The two items to be swapped.
----	------------	------------------------------

Reimplemented in [Fl_Browser](#), and [Fl_Check_Browser](#).

12.14.4.27 item_text()

```
virtual const char * Fl_Browser_::item_text (
    void * item ) const [inline], [protected], [virtual]
```

This optional method returns a string (label) that may be used for sorting.

Parameters

in	<i>item</i>	The item whose label text is returned.
----	-------------	--

Returns

The item's text label. (Can be NULL if blank)

Reimplemented in [Fl_Browser](#), and [Fl_Check_Browser](#).

12.14.4.28 item_width()

```
virtual int Fl_Browser_::item_width (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the width of the *item* in pixels. Allow for two additional pixels for the list selection box.

Parameters

in	<i>item</i>	The item whose width is returned.
----	-------------	-----------------------------------

Returns

The width of the item in pixels.

Implemented in [Fl_Check_Browser](#), and [Fl_Browser](#).

12.14.4.29 leftedge()

```
int Fl_Browser_::leftedge ( ) const [protected]
```

This method returns the X position of the left edge of the list area after adjusting for the scrollbar and border, if any.

Returns

The X position of the left edge of the list, in pixels.

See also

[Fl_Browser_::bbox\(\)](#)

12.14.4.30 linespacing() [1/2]

```
int Fl_Browser_::linespacing ( ) const [inline]
```

Return the height of additional spacing between browser lines.

Returns

spacing height in pixel units.

12.14.4.31 linespacing() [2/2]

```
void Fl_Browser_::linespacing (
    int pixels ) [inline]
```

Add some space between browser lines.

Parameters

<i>in</i>	<i>pixels</i>	number of additional pixels between lines.
-----------	---------------	--

12.14.4.32 new_list()

```
void Fl_Browser_::new_list ( ) [protected]
```

This method should be called when the list data is completely replaced or cleared.

It informs the [Fl_Browser_](#) widget that any cached information it has concerning the items is invalid. This method does not clear the list, it just handles the follow up bookkeeping after the list has been cleared.

12.14.4.33 position() [1/2]

```
int Fl_Browser_::position ( ) const [inline]
```

Deprecated "in 1.4.0 - use vposition() instead"

12.14.4.34 position() [2/2]

```
void Fl_Browser_::position (
    int pos ) [inline]
```

Deprecated "in 1.4.0 - use vposition(pos) instead"

12.14.4.35 redraw_line()

```
void Fl_Browser_::redraw_line (
    void * item ) [protected]
```

This method should be called when the contents of `item` has changed, but not its height.

Parameters

in	<i>item</i>	The item that needs to be redrawn.
----	-------------	------------------------------------

See also

[redraw_lines\(\)](#), [redraw_line\(\)](#)

12.14.4.36 redraw_lines()

```
void Fl_Browser_::redraw_lines ( ) [inline], [protected]
```

This method will cause the entire list to be redrawn.

See also

[redraw_lines\(\)](#), [redraw_line\(\)](#)

12.14.4.37 replacing()

```
void Fl_Browser_::replacing (
    void * a,
    void * b ) [protected]
```

This method should be used when item `a` is being replaced by item `b`.

It allows the `Fl_Browser_` to update its cache data as needed, schedules a redraw for the item being changed, and tries to maintain the selection. This method does not actually replace the item, but handles the follow up bookkeeping after the item has just been replaced.

Parameters

in	<i>a</i>	Item being replaced
in	<i>b</i>	Item to replace 'a'

12.14.4.38 resize()

```
void Fl_Browser_::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Repositions and/or resizes the browser.

Parameters

in	<i>X,Y,W,H</i>	The new position and size for the browser, in pixels.
----	----------------	---

Reimplemented from [Fl_Widget](#).

12.14.4.39 scrollbar_left()

```
void Fl_Browser_::scrollbar_left ( ) [inline]
```

Moves the vertical scrollbar to the lefthand side of the list.

For back compatibility.

12.14.4.40 scrollbar_right()

```
void Fl_Browser_::scrollbar_right ( ) [inline]
```

Moves the vertical scrollbar to the righthand side of the list.
For back compatibility.

12.14.4.41 scrollbar_size() [1/2]

```
int Fl_Browser_::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.
If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

12.14.4.42 scrollbar_size() [2/2]

```
void Fl_Browser_::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.
Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.
Setting `newSize` to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

<code>in</code>	<code>newSize</code>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
-----------------	----------------------	---

See also

[Fl::scrollbar_size\(\)](#)

12.14.4.43 scrollbar_width() [1/2]

```
int Fl_Browser_::scrollbar_width ( ) const [inline]
```

Returns the global value [Fl::scrollbar_size\(\)](#).

Deprecated Use [scrollbar_size\(\)](#) instead.

Todo This method should eventually be removed in 1.4+

12.14.4.44 scrollbar_width() [2/2]

```
void Fl_Browser_::scrollbar_width (
    int width ) [inline]
```

Sets the global [Fl::scrollbar_size\(\)](#), and forces this instance of the widget to use it.

Deprecated Use [scrollbar_size\(\)](#) instead.

Todo This method should eventually be removed in 1.4+

12.14.4.45 select()

```
int Fl_Browser_::select (
    void * item,
    int val = 1,
    int docallbacks = 0 )
```

Sets the selection state of *item* to *val*, and returns 1 if the state changed or 0 if it did not. If *docallbacks* is non-zero, *select* tries to call the callback function for the widget.

Parameters

in	<i>item</i>	The item whose selection state is to be changed
in	<i>val</i>	The new selection state (1=select, 0=de-select)
in	<i>docallbacks</i>	If non-zero, invokes widget callback if item changed. If 0, doesn't do callback (default).

Returns

1 if state was changed, 0 if not.

12.14.4.46 select_only()

```
int Fl_Browser_::select_only (
    void * item,
    int docallbacks = 0 )
```

Selects *item* and returns 1 if the state changed or 0 if it did not. Any other items in the list are deselected.

Parameters

in	<i>item</i>	The item to select.
in	<i>docallbacks</i>	If non-zero, invokes widget callback if item changed. If 0, doesn't do callback (default).

12.14.4.47 selection()

```
void * Fl_Browser_::selection ( ) const [inline], [protected]
```

Returns the item currently selected, or NULL if there is no selection.

For multiple selection browsers this call returns the currently focused item, even if it is not selected. To find all selected items, call [Fl_Multi_Browser::selected\(\)](#) for every item in question.

12.14.4.48 sort()

```
void Fl_Browser_::sort (
    int flags = 0 )
```

Sort the items in the browser based on *flags*.

[item_swap\(void*, void*\)](#) and [item_text\(void*\)](#) must be implemented for this call.

Parameters

in	<i>flags</i>	FL_SORT_ASCENDING – sort in ascending order FL_SORT_DESCENDING – sort in descending order FL_SORT_CASEINSENSITIVE – add this to sort case-insensitively Values other than the above will cause undefined behavior Other flags may appear in the future.
----	--------------	---

12.14.4.49 swapping()

```
void Fl_Browser_::swapping (
    void * a,
    void * b ) [protected]
```

This method should be used when two items *a* and *b* are being swapped.

It allows the `Fl_Browser_` to update its cache data as needed, schedules a redraw for the two items, and tries to maintain the current selection. This method does not actually swap items, but handles the follow up bookkeeping after items have been swapped.

Parameters

in	<i>a,b</i>	Items being swapped.
----	------------	----------------------

12.14.4.50 textfont()

```
Fl_Font Fl_Browser_::textfont ( ) const [inline]
```

Gets the default text font for the lines in the browser.

See also

[textfont\(\)](#), [textsize\(\)](#), [textcolor\(\)](#)

12.14.4.51 vposition() [1/2]

```
int Fl_Browser_::vposition ( ) const [inline]
```

Gets the vertical scroll position of the list as a pixel position *pos*.

The position returned is how many pixels of the list are scrolled off the top edge of the screen. Example: A position of '3' indicates the top 3 pixels of the list are scrolled off the top edge of the screen.

See also

[position\(\)](#), [hposition\(\)](#)

12.14.4.52 vposition() [2/2]

```
void Fl_Browser_::vposition (
    int pos )
```

Sets the vertical scroll position of the list to pixel position *pos*.

The position is how many pixels of the list are scrolled off the top edge of the screen. Example: A position of '3' scrolls the top three pixels of the list off the top edge of the screen.

Parameters

in	<i>pos</i>	The vertical position (in pixels) to scroll the browser to.
----	------------	---

See also

[vposition\(\)](#), [hposition\(\)](#)

12.14.5 Member Data Documentation**12.14.5.1 hscrollbar**

```
Fl_Scrollbar Fl_Browser_::hscrollbar
```

Horizontal scrollbar.

Public, so that it can be accessed directly.

12.14.5.2 scrollbar

`Fl_Scrollbar` `Fl_Browser_::scrollbar`

Vertical scrollbar.

Public, so that it can be accessed directly.

Use `scrollbar_left()` or `scrollbar_right()` to change what side the vertical scrollbar is drawn on.

Use `scrollbar.align(int)` (see `Fl_Widget::align(Fl_Align)`) to change what side either of the scrollbars is drawn on.

If the `FL_ALIGN_LEFT` bit is on, the vertical scrollbar is on the left. If the `FL_ALIGN_TOP` bit is on, the horizontal scrollbar is on the top. Note that only the alignment flags in `scrollbar` are considered. The flags in `hscrollbar` however are ignored.

The documentation for this class was generated from the following files:

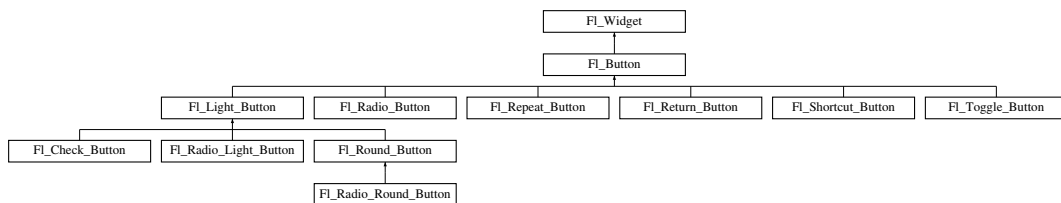
- `Fl_Browser.H`
- `Fl_Browser.cxx`

12.15 FI_Button Class Reference

Buttons generate callbacks when they are clicked by the user.

```
#include <Fl_Button.H>
```

Inheritance diagram for `Fl_Button`:



Public Member Functions

- `int clear()`
Same as `value(0)`.
- `uchar compact()`
Return true if buttons are rendered as compact buttons.
- `void compact(uchar v)`
Decide if buttons should be rendered in compact mode.
- `Fl_Boxtype down_box() const`
Returns the current down box type, which is drawn when `value()` is non-zero.
- `void down_box(Fl_Boxtype b)`
Sets the down box type.
- `Fl_Color down_color() const`
(for backwards compatibility)
- `void down_color(unsigned c)`
(for backwards compatibility)
- `Fl_Button(int X, int Y, int W, int H, const char *L=0)`
The constructor creates the button using the given position, size, and label.
- `int handle(int FL_OVERRIDE)`
Handles the specified event.
- `int set()`
Same as `value(1)`.
- `void setonly()`
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- `int shortcut() const`

- Returns the current shortcut key for the button.*
- void **shortcut** (const char *s)
 - (for backwards compatibility)*
- void **shortcut** (int s)
 - Sets the shortcut key to s.*
- char **value** () const
 - Returns the current value of the button (0 or 1).*
- int **value** (int v)
 - Sets the current value of the button.*

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- **FI_Align** **align** () const
 - Gets the label alignment.*
- void **align** (**FI_Align** alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class **FI_GI_Window** * **as_gi_window** ()
 - Returns an FI_GI_Window pointer if this widget is an FI_GI_Window.*
- virtual class **FI_GI_Window** const * **as_gi_window** () const
- virtual **FI_Group** * **as_group** ()
 - Returns an FI_Group pointer if this widget is an FI_Group.*
- virtual **FI_Group** const * **as_group** () const
- virtual **FI_Window** * **as_window** ()
 - Returns an FI_Window pointer if this widget is an FI_Window.*
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (**FI_Image** *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** (**FI_Image** *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void **bind_image** (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- **FI_Boxtype** **box** () const
 - Gets the box type of the widget.*
- void **box** (**FI_Boxtype** new_box)
 - Sets the box type for the widget.*
- **FI_Callback_p** **callback** () const
 - Gets the current callback function for the widget.*

- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar` c)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar` c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (int, int, int, int)
 - Internal use only.*
- void `deactivate` ()
 - Deactivates the widget.*
- `FI_Image` * `deimage` ()

- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image * deimage ()` const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage (FI_Image &img)`
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage (FI_Image *img)`
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound ()` const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
- Calls the widget callback function with default arguments.*

 - void `do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
- Calls the widget callback function with arbitrary arguments.*

 - void `do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
- Calls the widget callback function with arbitrary arguments.*

 - void `draw_label (int, int, int, int, FI_Align) const`
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int `h ()` const
- Gets the widget height.*

 - virtual void `hide ()`
- Makes a widget invisible.*

 - `FI_Image * image ()`
- Gets the image that is used as part of the widget label when in the active state.*

 - const `FI_Image * image ()` const
- Gets the image that is used as part of the widget label when in the active state.*

 - void `image (FI_Image &img)`
- Sets the image to use as part of the widget label when in the active state.*

 - void `image (FI_Image *img)`
- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound ()` const
- Returns whether the image is managed by the widget.*

 - int `inside (const FI_Widget *wgt)` const
- Checks if this widget is a child of wgt.*

 - int `is_label_copied ()` const
- Returns whether the current label was assigned with `copy_label()`.*

 - const char * `label ()` const
- Gets the current label text.*

 - void `label (const char *text)`
- Sets the current label pointer.*

 - void `label (FI_Labeltype a, const char *b)`
- Shortcut to set the label text and type in one call.*

 - `FI_Color labelcolor ()` const
- Gets the label color.*

 - void `labelcolor (FI_Color c)`
- Sets the label color.*

 - `FI_Font labelfont ()` const
- Gets the font to use.*

 - void `labelfont (FI_Font f)`
- Sets the font to use.*

 - `FI_Fontsize labelsize ()` const
- Gets the font size in pixels.*

- void `labelsize` (`Fl_Fontsize` pix)
Sets the font size in pixels.
- `Fl_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`Fl_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `Fl_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`Fl_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `Fl_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`Fl_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

- Returns if the widget is able to take events.*

 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const

Gets the widget type.
- void `type` (`uchar` t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When` `when` () const

Returns the conditions under which the callback is called.
- void `when` (`uchar` i)

Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.
- int `y` () const

Gets the widget position in its window.
- virtual `~FI_Widget` ()

Destroys the widget.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`

Draws the widget.
- void `simulate_key_action` ()

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Static Protected Member Functions

- static void **key_release_timeout** (void *)

Static Protected Attributes

- static [FI_Widget_Tracker](#) * **key_release_tracker** = 0

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from Fl_Widget

- enum {
 - INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,
 - FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7
 - ,
 - OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11
 - ,
 - MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15
 - ,
 - GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU = 1<<19 ,
 - NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
 - AUTO_DELETE_USER_DATA = 1<<23 ,
 - MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
 - USERFLAG1 = 1<<31 }

flags possible values enumeration.

12.15.1 Detailed Description

Buttons generate callbacks when they are clicked by the user.

You control exactly when and how by changing the values for [type\(uchar\)](#) and [when\(uchar\)](#). Buttons can also generate callbacks in response to `FL_SHORTCUT` events. The button can either have an explicit [shortcut\(int s\)](#) value or a letter shortcut can be indicated in the [label\(\)](#) with an '&' character before it. For the label shortcut it does not matter if *Alt* is held down, but if you have an input field in the same window, the user will have to hold down the *Alt* key so that the input field does not eat the event first as an `FL_KEYBOARD` event.

See also

[Fl_Widget::shortcut_label\(int\)](#)

For an [Fl_Button](#) object, the [type\(\)](#) call returns one of:

- `FL_NORMAL_BUTTON` (0): [value\(\)](#) remains unchanged after button press.
- `FL_TOGGLE_BUTTON`: [value\(\)](#) is inverted after button press.
- `FL_RADIO_BUTTON`: [value\(\)](#) is set to 1 after button press, and all other buttons in the current group with [type\(\)](#) == `FL_RADIO_BUTTON` are set to zero.

For an [Fl_Button](#) object, the following [when\(\)](#) values are useful, the default being `FL_WHEN_RELEASE`:

- 0: The callback is not done, instead [changed\(\)](#) is turned on.
- `FL_WHEN_RELEASE`: The callback is done after the user successfully clicks the button, or when a shortcut is typed. The reason is `FL_REASON_RELEASED`.
- `FL_WHEN_CHANGED`: The callback is done each time the [value\(\)](#) changes (when the user pushes and releases the button, and as the mouse is dragged around in and out of the button). The reason is set to `FL_REASON_CHANGED`
- `FL_WHEN_NOT_CHANGED`: The callback is done when the mouse button is released, but the value did not change. The reason is set to `FL_REASON_SELECTED`

12.15.2 Constructor & Destructor Documentation

12.15.2.1 Fl_Button()

```
Fl_Button::Fl_Button (
    int X,
    int Y,
    int W,
```

```
int H,
const char * L = 0 )
```

The constructor creates the button using the given position, size, and label.

The default box type is `box(FL_UP_BOX)`.

You can control how the button is drawn when ON by setting `down_box()`. The default is `FL_NO_BOX (0)` which will select an appropriate box type using the normal (OFF) box type by using `fl_down(box())`.

Derived classes may handle this differently.

A button may reequest callbacks with `whne()` `FL_WHEN_CHANGED`, `FL_WHEN_NOT_CHANGED`, and `FL↔_WHEN_RELEASE`, triggering the callback reasons `FL_REASON_CHANGED`, `FL_REASON_SELECTED`, and `FL_REASON_DESELECTED`.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

12.15.3 Member Function Documentation

12.15.3.1 `clear()`

```
int Fl_Button::clear ( ) [inline]
```

Same as `value(0)`.

See also

[value\(int v\)](#)

12.15.3.2 `compact()` [1/2]

```
uchar Fl_Button::compact ( ) [inline]
```

Return true if buttons are rendered as compact buttons.

Returns

0 if compact mode is off, 1 if it is on

See also

`compact(bool)`

12.15.3.3 `compact()` [2/2]

```
void Fl_Button::compact (
    uchar v )
```

Decide if buttons should be rendered in compact mode.



Figure 12.4 compact button keypad using GTK+ Scheme

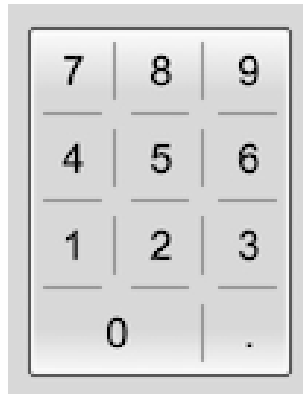


Figure 12.5 compact buttons in Glem

In compact mode, the button's surrounding border is altered to visually signal that multiple buttons are functionally linked together. To ensure the correct rendering of buttons in compact mode, all buttons must be part of the same group, positioned close to each other, and aligned with the edges of the group. Any button outlines not in contact with the parent group's outline will be displayed as separators.

Parameters

in	v	switch compact mode on (1) or off (0)
----	---	---------------------------------------

12.15.3.4 down_box() [1/2]

```
Fl_Boxtype Fl_Button::down_box ( ) const [inline]
```

Returns the current down box type, which is drawn when [value\(\)](#) is non-zero.

Return values

<i>Fl_Boxtype</i>	
-------------------	--

12.15.3.5 down_box() [2/2]

```
void Fl_Button::down_box (
    Fl_Boxtype b ) [inline]
```

Sets the down box type.

The default value of 0 causes FLTK to figure out the correct matching down version of [box\(\)](#).

Some derived classes (e.g. [Fl_Round_Button](#) and [Fl_Light_Button](#) use [down_box\(\)](#) for special purposes. See docs of these classes.

Parameters

in	<i>b</i>	down box type
----	----------	---------------

12.15.3.6 draw()

```
void Fl_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

Reimplemented in [Fl_Light_Button](#), [Fl_Return_Button](#), and [Fl_Shortcut_Button](#).

12.15.3.7 handle()

```
int Fl_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Light_Button](#), [Fl_Repeat_Button](#), [Fl_Return_Button](#), and [Fl_Shortcut_Button](#).

12.15.3.8 set()

```
int Fl_Button::set ( ) [inline]
```

Same as `value(1)`.

See also

[value\(int v\)](#)

12.15.3.9 shortcut() [1/2]

```
int Fl_Button::shortcut ( ) const [inline]
```

Returns the current shortcut key for the button.

Return values

<i>int</i>	
------------	--

12.15.3.10 shortcut() [2/2]

```
void Fl_Button::shortcut (
    int s ) [inline]
```

Sets the shortcut key to `s`.

Setting this overrides the use of '&' in the [label\(\)](#). The value is a bitwise OR of a key and a set of shift flags, for example: `FL_ALT | 'a'`, or `FL_ALT | (FL_F + 10)`, or just `'a'`. A value of 0 disables the shortcut.

The key can be any value returned by [Fl::event_key\(\)](#), but will usually be an ASCII letter. Use a lower-case letter unless you require the shift key to be held down.

The shift flags can be any set of values accepted by [Fl::event_state\(\)](#). If the bit is on, that shift key must be pushed. Meta, Alt, Ctrl, and Shift must be off if they are not in the shift flags (zero for the other bits indicates a "don't care" setting).

Parameters

in	s	bitwise OR of key and shift flags
----	---	-----------------------------------

12.15.3.11 value()

```
int Fl_Button::value (
    int v )
```

Sets the current value of the button.

A non-zero value sets the button to 1 (ON), and zero sets it to 0 (OFF).

Parameters

in	v	button value.
----	---	---------------

See also

[set\(\)](#), [clear\(\)](#)

The documentation for this class was generated from the following files:

- `Fl_Button.H`
- `Fl_Button.cxx`

12.16 Fl_Cairo_State Class Reference

Contains all the necessary info on the current cairo context.

```
#include <Fl_Cairo.H>
```

Public Member Functions

- bool **autolink** () const
Gets the autolink option. See [Fl::cairo_autolink_context\(bool\)](#)
- void **autolink** (bool b)
Sets the autolink option, only available with `--enable-cairoext`.
- `cairo_t * cc ()` const
Gets the current cairo context.
- void **cc** (`cairo_t *c`, bool own=true)
Sets the current cairo context.
- void * **gc** () const
Gets the last gc attached to a cc.
- void **gc** (void *c)
Sets the gc c to keep track on.

- void * **window** () const
Gets the last window attached to a cc.
- void **window** (void *w)
Sets the window w to keep track on.

12.16.1 Detailed Description

Contains all the necessary info on the current cairo context.

A private internal & unique corresponding object is created to permit cairo context state handling while keeping it opaque. For internal use only.

Note

Only available when configure has the `--enable-cairo` or `--enable-cairoext` option or one or both of the CMake options `FLTK_OPTION_CAIRO_WINDOW` or `FLTK_OPTION_CAIRO_EXT` is set (ON)

12.16.2 Member Function Documentation

12.16.2.1 cc()

```
void Fl_Cairo_State::cc (
    cairo_t * c,
    bool own = true ) [inline]
```

Sets the current cairo context.

`own == true` (the default) indicates that the cairo context `c` will be deleted by FLTK internally when another `cc` is set later.

`own == false` indicates `cc` deletion is handled externally by the user program.

The documentation for this class was generated from the following files:

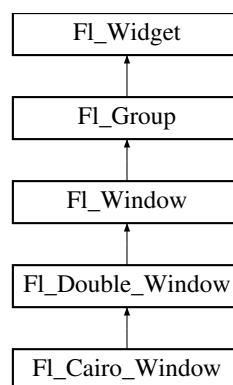
- [Fl_Cairo.H](#)
- [Fl_Cairo.cxx](#)

12.17 Fl_Cairo_Window Class Reference

This defines an FLTK window with Cairo support.

```
#include <Fl_Cairo_Window.H>
```

Inheritance diagram for `Fl_Cairo_Window`:



Public Types

- typedef void(* **cairo_draw_cb**) ([Fl_Cairo_Window](#) *self, cairo_t *def)
The Cairo draw callback prototype you need to implement.

Public Types inherited from [Fl_Window](#)

- typedef struct HICON__ * **HICON**

Public Member Functions

- **FI_Cairo_Window** (int W, int H, const char *L=0)
- **FI_Cairo_Window** (int X, int Y, int W, int H, const char *L=0)
- void **set_draw_cb** (cairo_draw_cb cb)

You must provide a draw callback that implements your Cairo rendering.

Public Member Functions inherited from FI_Double_Window

- **FI_Double_Window * as_double_window** () **FL_OVERRIDE**
Return non-null if this is an FI_Overlay_Window object.
- **FI_Double_Window** (int W, int H, const char *l=0)
Creates a new FI_Double_Window widget using the given position, size, and label (title) string.
- **FI_Double_Window** (int X, int Y, int W, int H, const char *l=0)
*See FI_Double_Window::FI_Double_Window(int w, int h, const char *label = 0)*
- void **flush** () **FL_OVERRIDE**
Forces the window to be drawn, this window is also made current and calls draw().
- void **hide** () **FL_OVERRIDE**
Makes a widget invisible.
- void **resize** (int, int, int, int) **FL_OVERRIDE**
Changes the size or position of the widget.
- void **show** () **FL_OVERRIDE**
Makes a widget visible.
- void **show** (int a, char **b)
*Same as FI_Window::show(int a, char **b)*
- **~FI_Double_Window** ()
The destructor also deletes all the children.

Public Member Functions inherited from FI_Window

- virtual class **FI_Overlay_Window * as_overlay_window** ()
Return non-null if this is an FI_Overlay_Window object.
- **FI_Window** const * **as_window** () const **FL_OVERRIDE**
- **FI_Window * as_window** () **FL_OVERRIDE**
Returns an FI_Window pointer if this widget is an FI_Window.
- unsigned int **border** () const
Returns whether the window possesses a border.
- void **border** (int b)
Sets whether or not the window manager border is around the window.
- void **clear_border** ()
Fast inline function to turn the window manager border off.
- void **clear_modal_states** ()
Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.
- void **copy_label** (const char *a)
Sets the window titlebar label to a copy of a character string.
- void **cursor** (const FI_RGB_Image *, int, int)
Changes the cursor for this window using the provided image as cursor's shape.
- void **cursor** (FI_Cursor c, FI_Color, FI_Color=FL_WHITE)
For back compatibility only.
- void **cursor** (FI_Cursor)
Changes the cursor for this window.
- int **decorated_h** () const

- Returns the window height including any window title bar and any frame added by the window manager.*

 - int **decorated_w** () const

Returns the window width including any frame added by the window manager.
 - void **default_cursor** (FL_Cursor c, FL_Color, FL_Color=FL_WHITE)

For back compatibility only.
 - void **default_cursor** (FL_Cursor)

Sets the default window cursor.
 - void **draw_backdrop** ()

Draw the background image if one is set and is aligned inside.
 - **FL_Window** (int w, int h, const char *title=0)

Creates a window from the given width w, height h, and title.
 - **FL_Window** (int x, int y, int w, int h, const char *title=0)

Creates a window from the given position (x, y), size (w, h) and title.
 - void **free_position** ()

*Undoes the effect of a previous **resize()** or **show()** so that the next time **show()** is called the window manager is free to position the window.*
 - void **fullscreen** ()

Makes the window completely fill one or more screens, without any window manager border visible.
 - unsigned int **fullscreen_active** () const

Returns non zero if FULLSCREEN flag is set, 0 otherwise.
 - void **fullscreen_off** ()

*Turns off any side effects of **fullscreen()***
 - void **fullscreen_off** (int X, int Y, int W, int H)

*Turns off any side effects of **fullscreen()** and does **resize(x,y,w,h)**.*
 - void **fullscreen_screens** (int top, int bottom, int left, int right)

Sets which screens should be used when this window is in fullscreen mode.
 - int **handle** (int) FL_OVERRIDE

Handles the specified event.
 - void **hide** () FL_OVERRIDE

Removes the window from the screen.
 - void **hotspot** (const FL_Widget &p, int offscreen=0)

*See void **FL_Window::hotspot**(int x, int y, int offscreen = 0)*
 - void **hotspot** (const FL_Widget *, int offscreen=0)

*See void **FL_Window::hotspot**(int x, int y, int offscreen = 0)*
 - void **hotspot** (int x, int y, int offscreen=0)

Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.
 - const void * **icon** () const

Gets the current icon window target dependent data.
 - void **icon** (const FL_RGB_Image *)

Sets or resets a single window icon.
 - void **icon** (const void *ic)

Platform-specific method to set the window icon usable on Windows and X11 only.
 - void **iconize** ()

Iconifies the window.
 - const char * **iconlabel** () const

*See void **FL_Window::iconlabel**(const char*)*
 - void **iconlabel** (const char *)

Sets the icon label.
 - void **icons** (const FL_RGB_Image *[], int)

- Sets the window icons.*

 - void **icons** (HICON big_icon, HICON small_icon)

Sets the window icons using HICON handles (Windows platform only).
- const char * **label** () const

See void [Fl_Window::label\(const char\)](#)*
- void **label** (const char *)

Sets the window title bar label.
- void **label** (const char *label, const char *iconlabel)

Sets the icon label.
- void **make_current** ()

Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.
- void **maximize** ()

Maximizes a top-level window to its current screen.
- unsigned int **maximize_active** () const

Returns whether the window is currently maximized.
- unsigned int **menu_window** () const

Returns true if this window is a menu window.
- unsigned int **modal** () const

Returns true if this window is modal.
- unsigned int **non_modal** () const

Returns true if this window is modal or non-modal.
- **fl_uintptr_t os_id** ()

Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int **override** () const

Returns non zero if OVERRIDE flag is set, 0 otherwise.
- void **resize** (int X, int Y, int W, int H) **FL_OVERRIDE**

Changes the size and position of the window.
- int **screen_num** ()

The number of the screen containing the mapped window.
- void **screen_num** (int screen_num)

Set the number of the screen where to map the window.
- void **set_menu_window** ()

Marks the window as a menu window.
- void **set_modal** ()

A "modal" window, when [shown\(\)](#), will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void **set_non_modal** ()

A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.
- void **set_override** ()

Activates the flags NOBORDER|OVERRIDE.
- void **set_tooltip_window** ()

Marks the window as a tooltip window.
- const **Fl_Image * shape** ()

Returns the image controlling the window shape or NULL.
- void **shape** (const **Fl_Image** &b)

Set the window's shape with an [Fl_Image](#).
- void **shape** (const **Fl_Image** *img)

Assigns a non-rectangular shape to the window.
- void **show** () **FL_OVERRIDE**

- Puts the window on the screen.*
- void [show](#) (int argc, char **argv)
 - Puts the window on the screen with [show\(\)](#) and parses command-line arguments.*
- int [shown](#) ()
 - Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).*
- void [size_range](#) (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)
 - Sets the allowable range the user can resize this window to.*
- unsigned int [tooltip_window](#) () const
 - Returns true if this window is a tooltip window.*
- void [un_maximize](#) ()
 - Returns a previously maximized top-level window to its previous size.*
- void [wait_for_expose](#) ()
 - Waits for the window to be displayed after calling [show\(\)](#).*
- int [x_root](#) () const
 - Gets the x position of the window on the screen.*
- const char * [xclass](#) () const
 - Returns the xclass for this window, or a default.*
- void [xclass](#) (const char *c)
 - Sets the xclass for this window.*
- int [y_root](#) () const
 - Gets the y position of the window on the screen.*
- virtual [~FI_Window](#) ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *& [_ddfdesign_kludge](#) ()
 - This is for forms compatibility only.*
- void [add](#) ([FI_Widget](#) &)
 - The widget is removed from its current group (if any) and then added to the end of this group.*
- void [add](#) ([FI_Widget](#) *o)
 - See void [FI_Group::add\(FI_Widget &w\)](#)*
- void [add_resizable](#) ([FI_Widget](#) &o)
 - Adds a widget to the group and makes it the resizable widget.*
- [FI_Widget](#) *const * [array](#) () const
 - Returns a pointer to the array of children.*
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- void [begin](#) ()
 - Sets the current group so you can build the widget tree by just constructing the widgets.*
- [FI_Widget](#) * [child](#) (int n) const
 - Returns [array\(\)\[n\]](#).*
- int [children](#) () const
 - Returns how many child widgets the group has.*
- void [clear](#) ()
 - Deletes all child widgets from memory recursively.*
- unsigned int [clip_children](#) ()
 - Returns the current clipping mode.*
- void [clip_children](#) (int c)
 - Controls whether the group widget clips the drawing of child widgets to its bounding box.*

- virtual int `delete_child` (int n)
Removes the widget at `index` from the group and deletes it.
- void `end` ()
Exactly the same as `current(this->parent())`.
- int `find` (const `FL_Widget` &o) const
*See int `FL_Group::find(const FL_Widget *w)` const.*
- int `find` (const `FL_Widget` *) const
Searches the child array for the widget and returns the index.
- `FL_Group` (int, int, int, int, const char *s=0)
Creates a new `FL_Group` widget using the given position, size, and label string.
- void `focus` (`FL_Widget` *W)
- void `forms_end` ()
This is for forms compatibility only.
- void `init_sizes` ()
Resets the internal array of widget sizes and positions.
- void `insert` (`FL_Widget` &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void `insert` (`FL_Widget` &o, `FL_Widget` *before)
This does `insert(w, find(before))`.
- void `remove` (`FL_Widget` &)
Removes a widget from the group but does not delete it.
- void `remove` (`FL_Widget` *o)
Removes the widget `o` from the group.
- void `remove` (int index)
Removes the widget at `index` from the group but does not delete it.
- `FL_Widget` * `resizable` () const
Returns the group's resizable widget.
- void `resizable` (`FL_Widget` &o)
Sets the group's resizable widget.
- void `resizable` (`FL_Widget` *o)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- virtual `~FL_Group` ()
The destructor also deletes all the children.

Public Member Functions inherited from `FL_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- `FL_Align` `align` () const
Gets the label alignment.
- void `align` (`FL_Align` alignment)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument` (long v)

- Sets the current user data (long) argument that is passed to the callback function.*

 - virtual class `FI_GI_Window * as_gl_window ()`

Returns an FI_GI_Window pointer if this widget is an FI_GI_Window.
- virtual class `FI_GI_Window const * as_gl_window () const`
- void `bind_deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage (int f)`

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.
- void `bind_image (int f)`

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`

Gets the box type of the widget.
- void `box (FI_Boxtype new_box)`

Sets the box type for the widget.
- `FI_Callback_p callback () const`

Gets the current callback function for the widget.
- void `callback (FI_Callback *cb)`

Sets the current callback function for the widget.
- void `callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

Sets the current callback function and managed user data for the widget.
- void `callback (FI_Callback *cb, void *p)`

Sets the current callback function and data for the widget.
- void `callback (FI_Callback0 *cb)`

Sets the current callback function for the widget.
- void `callback (FI_Callback1 *cb, long p=0)`

Sets the current callback function for the widget.
- unsigned int `changed () const`

Checks if the widget value changed since the last callback.
- void `clear_active ()`

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed ()`

Marks the value of the widget as unchanged.
- void `clear_damage (uchar c=0)`

Clears or sets the damage flags.
- void `clear_output ()`

Sets a widget to accept input.
- void `clear_visible ()`

Hides the widget.
- void `clear_visible_focus ()`

Disables keyboard focus navigation with this widget.
- `FI_Color color () const`

Gets the background color of the widget.
- void `color (FI_Color bg)`

Sets the background color of the widget.
- void `color (FI_Color bg, FI_Color sel)`

Sets the background and selection color of the widget.
- `FI_Color color2 () const`

For back compatibility only.
- void `color2 (unsigned a)`

- For back compatibility only.*

 - int `contains` (const `FI_Widget *w`) const
Checks if w is a child of this widget.
 - void `copy_label` (const char *new_label)
Sets the current label.
 - void `copy_tooltip` (const char *text)
Sets the current tooltip text.
 - `uchar damage` () const
Returns non-zero if `draw()` needs to be called.
 - void `damage` (uchar c)
Sets the damage bits for the widget.
 - void `damage` (uchar c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
 - int `damage_resize` (int, int, int, int)
Internal use only.
 - void `deactivate` ()
Deactivates the widget.
 - `FI_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
 - const `FI_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
 - void `deimage` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
 - void `deimage` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
 - int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
 - void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
 - void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
 - void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
 - int `h` () const
Gets the widget height.
 - `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
 - const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
 - void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
 - void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
 - int `image_bound` () const
Returns whether the image is managed by the widget.
 - int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of wgt.
 - int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.

- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelszize () const`
Gets the font size in pixels.
- `void labelszize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- `void labeltype (FI_Labeltype a)`
Sets the label type.
- `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
- `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- `unsigned int output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`
Schedules the drawing of the widget.
- `void redraw_label ()`
Schedules the drawing of the label.
- `FI_Color selection_color () const`
Gets the selection color.
- `void selection_color (FI_Color a)`
Sets the selection color.
- `void set_active ()`
Marks the widget as active without sending events or changing focus.
- `void set_changed ()`
Marks the value of the widget as changed.
- `void set_output ()`
Sets a widget to output only.
- `void set_visible ()`

- Makes the widget visible.*

 - void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const

Gets the widget type.
- void `type` (`uchar` t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When` `when` () const

Returns the conditions under which the callback is called.
- void `when` (`uchar` i)

Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.

- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~FL_Widget ()`
Destroys the widget.

Protected Member Functions

- `void draw () FL_OVERRIDE`
Overloaded to provide Cairo callback support.

Protected Member Functions inherited from [FL_Window](#)

- `void default_size_range ()`
Protected method to calculate the default size range of a window.
- `void draw () FL_OVERRIDE`
Draws the widget.
- `int force_position () const`
Returns the internal state of the window's FORCE_POSITION flag.
- `void force_position (int force)`
Sets an internal flag that tells FLTK and the window manager to honor position requests.
- `void free_icons ()`
Deletes all icons previously attached to the window.
- `int is_resizable ()`
Protected method to determine whether a window is resizable.

Protected Member Functions inherited from [FL_Group](#)

- `FL_Rect * bounds ()`
Returns the internal array of widget sizes and positions.
- `void draw_child (FL_Widget &widget) const`
Forces a child to redraw.
- `void draw_children ()`
Draws all children of the group.
- `void draw_outside_label (const FL_Widget &widget) const`
Parents normally call this to draw outside labels of child widgets.
- `virtual int on_insert (FL_Widget *, int)`
Allow derived groups to act when a widget is added as a child.
- `virtual int on_move (int, int)`
Allow derived groups to act when a widget is moved within the group.
- `virtual void on_remove (int)`
Allow derived groups to act when a child widget is removed from the group.
- `int * sizes ()`
Returns the internal array of widget sizes and positions.
- `void update_child (FL_Widget &widget) const`
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Window

- static **FI_Window** * **current** ()
Returns the last window that was made current.
- static void **default_callback** (FI_Window *, void *v)
Back compatibility: Sets the default callback v for win to call on close event.
- static void **default_icon** (const FI_RGB_Image *)
Sets a single default window icon.
- static void **default_icons** (const FI_RGB_Image *[], int)
Sets the default window icons.
- static void **default_icons** (HICON big_icon, HICON small_icon)
Sets the default window icons (Windows platform only).
- static const char * **default_xclass** ()

- Returns the default xclass.*
- static void `default_xclass` (const char *)
Sets the default window xclass.
- static bool `is_a_rescale` ()
Returns true when a window is being rescaled.
- static char `show_next_window_iconic` ()
Returns the static flag whether the next window should be opened iconified.
- static void `show_next_window_iconic` (char stat)
Sets a static flag whether the next window should be opened iconified.

Static Public Member Functions inherited from `Fl_Group`

- static `Fl_Group` * `current` ()
Returns the currently active group.
- static void `current` (`Fl_Group` *g)
Sets the current group.

Static Public Member Functions inherited from `Fl_Widget`

- static void `default_callback` (`Fl_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from `Fl_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Static Protected Attributes inherited from `Fl_Window`

- static `Fl_Window` * `current_`
Stores the last window that was made current.

12.17.1 Detailed Description

This defines an FLTK window with Cairo support.

This class overloads the virtual `draw()` method for you, so that the only thing you have to do is to provide your Cairo code. All Cairo context handling is achieved transparently.

The default coordinate system for Cairo drawing commands within [Fl_Cairo_Window](#) is FLTK's coordinate system, where the x, y, w, h values are relative to the top/left corner of the [Fl_Cairo_Window](#), as one would expect with regular FLTK drawing commands, e.g.: $(0 \ x \ w-1), (0 \ y \ h-1)$. **Example:**

```
static void my_cairo_draw_cb(Fl_Cairo_Window *window, cairo_t *cr) {
    // Draw an "X"
    const double xmax = (window->w() - 1);
    const double ymax = (window->h() - 1);
    cairo_set_line_width(cr, 1.00); // line width for drawing
    cairo_set_source_rgb(cr, 1.0, 0.5, 0.0); // orange
    cairo_move_to(cr, 0.0, 0.0); cairo_line_to(cr, xmax, ymax); // draw diagonal "\"
    cairo_move_to(cr, 0.0, ymax); cairo_line_to(cr, xmax, 0.0); // draw diagonal "/"
    cairo_stroke(cr); // stroke the lines
}
```

The FLTK coordinate system differs from the default native Cairo coordinate system which uses normalized $(0.0 \dots 1.0)$ values for x and y , e.g.: $(0 \ x \ 1.0), (0 \ y \ 1.0)$. So beware of this when copy/pasting Cairo example programs that assume normalized values. If need be, you can revert to the Cairo coordinate system by simply calling `cairo_scale()` with the widget's `w()` and `h()` values. **Example:**

```
static void my_cairo_draw_cb(Fl_Cairo_Window *window, cairo_t *cr) {
    cairo_scale(cr, window->w(), window->h()); // use Cairo's default coordinate system
    /*use 0.0 to 1.0 values from here on..*/
}
```

See also

`examples/cairo-draw-x.cxx`
`test/cairo_test.cxx`

Note

Class [Fl_Cairo_Window](#) requires the FLTK library to have been built with CMake option `FLTK_OPTION_CAIRO_WINDOW` or configure `--enable-cairo`.

You can alternatively define your custom Cairo FLTK window, and thus at least override the `draw()` method to provide custom Cairo support. In this case you will probably use `Fl::cairo_make_current(Fl_Window*)` to attach a context to your window. You should do this only when your window is the current window.

See also

[Fl_Window::current\(\)](#)

12.17.2 Member Function Documentation

12.17.2.1 draw()

```
void Fl_Cairo_Window::draw (
    void ) [inline], [protected], [virtual]
```

Overloaded to provide Cairo callback support.

Implements [Fl_Widget](#).

12.17.2.2 set_draw_cb()

```
void Fl_Cairo_Window::set_draw_cb (
    cairo_draw_cb cb ) [inline]
```

You must provide a draw callback that implements your Cairo rendering.

This method permits you to set your Cairo callback to `cb`.

The documentation for this class was generated from the following file:

- [Fl_Cairo_Window.H](#)

12.18 Fl_Callback_User_Data Class Reference

A class prototype that allows for additional data in callbacks.

```
#include <Fl_Widget.H>
```

12.18.1 Detailed Description

A class prototype that allows for additional data in callbacks.

Users can extend this class and pass it to widget callbacks. Widgets can take ownership of the callback data, deleting the data when the widget itself is deleted.

The destructor of this class is virtual, allowing for additional code to deallocate resources when the user data is deleted.

See also

[FL_FUNCTION_CALLBACK_3](#), [FL_METHOD_CALLBACK_1](#), [FL_INLINE_CALLBACK_2](#)

[Fl_Widget::callback\(Fl_Callback*, Fl_Callback_User_Data*, bool\)](#)

[Fl_Widget::user_data\(Fl_Callback_User_Data*, bool\)](#)

The documentation for this class was generated from the following file:

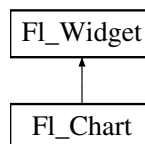
- [Fl_Widget.H](#)

12.19 Fl_Chart Class Reference

[Fl_Chart](#) displays simple charts.

```
#include <Fl_Chart.H>
```

Inheritance diagram for [Fl_Chart](#):



Public Member Functions

- void [add](#) (double val, const char *str=0, unsigned col=0)
Adds the data value val with optional label str and color col to the chart.
- [uchar autosize](#) () const
Gets whether the chart will automatically adjust the bounds of the chart.
- void [autosize](#) (uchar n)
Sets whether the chart will automatically adjust the bounds of the chart.
- void [bounds](#) (double *a, double *b) const
Gets the lower and upper bounds of the chart values.
- void [bounds](#) (double a, double b)
Sets the lower and upper bounds of the chart values.
- void [clear](#) ()
Removes all values from the chart.
- [Fl_Chart](#) (int X, int Y, int W, int H, const char *L=0)
Create a new Fl_Chart widget using the given position, size and label string.
- void [insert](#) (int ind, double val, const char *str=0, unsigned col=0)
Inserts a data value val at the given position ind.
- int [maxsize](#) () const
Gets the maximum number of data values for a chart.
- void [maxsize](#) (int m)
Sets the maximum number of data values for a chart.
- void [replace](#) (int ind, double val, const char *str=0, unsigned col=0)
Replaces a data value val at the given position ind.
- int [size](#) () const

- Returns the number of data values in the chart.*
- void **size** (int W, int H)
 - Sets the widget size (width, height).*
- **FI_Color textcolor** () const
 - Gets the chart's text color.*
- void **textcolor** (FI_Color n)
 - Sets the chart's text color to n.*
- **FI_Font textfont** () const
 - Gets the chart's text font.*
- void **textfont** (FI_Font s)
 - Sets the chart's text font to s.*
- **FI_Fontsize textsize** () const
 - Gets the chart's text size.*
- void **textsize** (FI_Fontsize s)
 - Sets the chart's text size to s.*
- **~FI_Chart** ()
 - Destroys the FI_Chart widget and all of its data.*

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- **FI_Align align** () const
 - Gets the label alignment.*
- void **align** (FI_Align alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class **FI_Gl_Window * as_gl_window** ()
 - Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.*
- virtual class **FI_Gl_Window const * as_gl_window** () const
- virtual **FI_Group * as_group** ()
 - Returns an FI_Group pointer if this widget is an FI_Group.*
- virtual **FI_Group const * as_group** () const
- virtual **FI_Window * as_window** ()
 - Returns an FI_Window pointer if this widget is an FI_Window.*
- virtual **FI_Window const * as_window** () const
- void **bind_deimage** (FI_Image *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** (FI_Image *img)
 - Sets the image to use as part of the widget label when in the active state.*

- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype` `box` () const
Gets the box type of the widget.
- void `box` (`FI_Boxtype` new_box)
Sets the box type for the widget.
- `FI_Callback_p` `callback` () const
Gets the current callback function for the widget.
- void `callback` (`FI_Callback` *cb)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback` *cb, void *p)
Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0` *cb)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback1` *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar` c=0)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const
Gets the background color of the widget.
- void `color` (`FI_Color` bg)
Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)
Sets the background and selection color of the widget.
- `FI_Color` `color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const `FI_Widget` *w) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- `uchar` `damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar` c)

- Sets the damage bits for the widget.*

 - void [damage](#) ([uchar](#) c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int [damage_resize](#) (int, int, int, int)
- Internal use only.*

 - void [deactivate](#) ()
- Deactivates the widget.*

 - [FI_Image](#) * [deimage](#) ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const [FI_Image](#) * [deimage](#) () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void [deimage](#) ([FI_Image](#) &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void [deimage](#) ([FI_Image](#) *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int [deimage_bound](#) () const
- Returns whether the inactive image is managed by the widget.*

 - void [do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- Calls the widget callback function with default arguments.*

 - void [do_callback](#) ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- Calls the widget callback function with arbitrary arguments.*

 - void [do_callback](#) ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- Calls the widget callback function with arbitrary arguments.*

 - void [draw_label](#) (int, int, int, int, [FI_Align](#)) const
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int [h](#) () const
- Gets the widget height.*

 - virtual int [handle](#) (int event)
- Handles the specified event.*

 - virtual void [hide](#) ()
- Makes a widget invisible.*

 - [FI_Image](#) * [image](#) ()
- Gets the image that is used as part of the widget label when in the active state.*

 - const [FI_Image](#) * [image](#) () const
- Gets the image that is used as part of the widget label when in the active state.*

 - void [image](#) ([FI_Image](#) &img)
- Sets the image to use as part of the widget label when in the active state.*

 - void [image](#) ([FI_Image](#) *img)
- Sets the image to use as part of the widget label when in the active state.*

 - int [image_bound](#) () const
- Returns whether the image is managed by the widget.*

 - int [inside](#) (const [FI_Widget](#) *wgt) const
- Checks if this widget is a child of wgt.*

 - int [is_label_copied](#) () const
- Returns whether the current label was assigned with [copy_label\(\)](#).*

 - const char * [label](#) () const
- Gets the current label text.*

 - void [label](#) (const char *text)
- Sets the current label pointer.*

 - void [label](#) ([FI_Labeltype](#) a, const char *b)
- Shortcut to set the label text and type in one call.*

- [FI_Color labelcolor](#) () const
Gets the label color.
- void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
- [FI_Font labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group * parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const

- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()

Makes a widget visible.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const

Gets the widget type.
- void `type` (`uchar` t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When` `when` () const

Returns the conditions under which the callback is called.
- void `when` (`uchar` i)

Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.

- int **y** () const
Gets the widget position in its window.
- virtual **~FI_Widget** ()
Destroys the widget.

Protected Member Functions

- void **draw** () **FL_OVERRIDE**
*Draws the *FL_Chart* widget.*

Protected Member Functions inherited from **FI_Widget**

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
*If *FL_ALIGN_IMAGE_BACKDROP* is set, the image or deimage will be drawn.*
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (**FI_Boxtype** t, **FI_Color** c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (**FI_Boxtype** t, int x, int y, int w, int h, **FI_Color** c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FI_Boxtype** t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FI_Boxtype** t, int x, int y, int w, int h, **FI_Color** bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Static Protected Member Functions

- static void `draw_barchart` (int `x`, int `y`, int `w`, int `h`, int `numb`, `FL_CHART_ENTRY` `entries`[], double `min`, double `max`, int `autosize`, int `maxnumb`, `FI_Color` `textcolor`)
Draws a bar chart.
- static void `draw_horbarchart` (int `x`, int `y`, int `w`, int `h`, int `numb`, `FL_CHART_ENTRY` `entries`[], double `min`, double `max`, int `autosize`, int `maxnumb`, `FI_Color` `textcolor`)
Draws a horizontal bar chart.
- static void `draw_linechart` (int `type`, int `x`, int `y`, int `w`, int `h`, int `numb`, `FL_CHART_ENTRY` `entries`[], double `min`, double `max`, int `autosize`, int `maxnumb`, `FI_Color` `textcolor`)
Draws a line chart.
- static void `draw_piechart` (int `x`, int `y`, int `w`, int `h`, int `numb`, `FL_CHART_ENTRY` `entries`[], int `special`, `FI_Color` `textcolor`)
Draws a pie chart.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *`widget`, void *`data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *`t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

12.19.1 Detailed Description

`FI_Chart` displays simple charts.

It is provided for Forms compatibility.

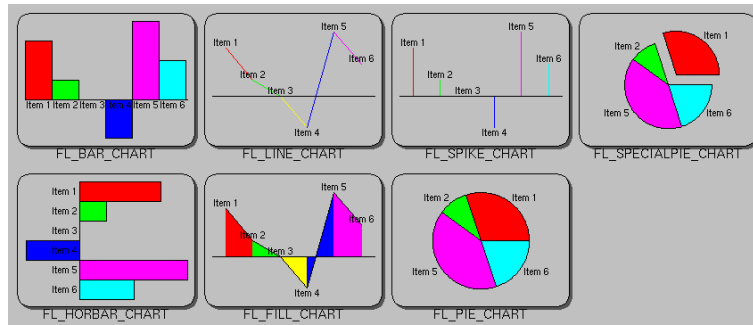


Figure 12.6 FL_Chart

Todo Refactor `FL_Chart::type()` information.

The type of an `FL_Chart` object can be set using `type(uchar t)` to:

Chart Type	Description
FL_BAR_CHART	Each sample value is drawn as a vertical bar.
FL_FILLED_CHART	The chart is filled from the bottom of the graph to the sample values.
FL_HORBAR_CHART	Each sample value is drawn as a horizontal bar.
FL_LINE_CHART	The chart is drawn as a polyline with vertices at each sample value.
FL_PIE_CHART	A pie chart is drawn with each sample value being drawn as a proportionate slice in the circle.
FL_SPECIALPIE_CHART	Like <code>FL_PIE_CHART</code> , but the first slice is separated from the pie.
FL_SPIKE_CHART	Each sample value is drawn as a vertical line.

12.19.2 Constructor & Destructor Documentation

12.19.2.1 FL_Chart()

```
FL_Chart::FL_Chart (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create a new `FL_Chart` widget using the given position, size and label string.

The default boxstyle is `FL_NO_BOX`.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

12.19.3 Member Function Documentation

12.19.3.1 add()

```
void FL_Chart::add (
    double val,
    const char * str = 0,
    unsigned col = 0 )
```

Adds the data value `val` with optional label `str` and color `col` to the chart.

Parameters

in	<i>val</i>	data value
in	<i>str</i>	optional data label
in	<i>col</i>	optional data color

12.19.3.2 autosize() [1/2]

```
uchar Fl_Chart::autosize ( ) const [inline]
```

Gets whether the chart will automatically adjust the bounds of the chart.

Returns

non-zero if auto-sizing is enabled and zero if disabled.

12.19.3.3 autosize() [2/2]

```
void Fl_Chart::autosize (
    uchar n ) [inline]
```

Sets whether the chart will automatically adjust the bounds of the chart.

Parameters

in	<i>n</i>	non-zero to enable automatic resizing, zero to disable.
----	----------	---

12.19.3.4 bounds() [1/2]

```
void Fl_Chart::bounds (
    double * a,
    double * b ) const [inline]
```

Gets the lower and upper bounds of the chart values.

Parameters

out	<i>a,b</i>	are set to lower, upper
-----	------------	-------------------------

12.19.3.5 bounds() [2/2]

```
void Fl_Chart::bounds (
    double a,
    double b )
```

Sets the lower and upper bounds of the chart values.

Parameters

in	<i>a,b</i>	are used to set lower, upper
----	------------	------------------------------

12.19.3.6 draw()

```
void Fl_Chart::draw (
    void ) [protected], [virtual]
```

Draws the [Fl_Chart](#) widget.

Implements [Fl_Widget](#).

12.19.3.7 draw_barchart()

```
void Fl_Chart::draw_barchart (
    int x,
    int y,
    int w,
    int h,
    int numb,
    FL_CHART_ENTRY entries[],
    double min,
    double max,
    int autosize,
    int maxnumb,
    Fl_Color textcolor ) [static], [protected]
```

Draws a bar chart.

`x`, `y`, `w`, `h` is the bounding box, `entries` the array of `numb` entries, and `min` and `max` the boundaries.

Parameters

in	<code>x,y,w,h</code>	Widget position and size
in	<code>numb</code>	Number of values
in	<code>entries</code>	Array of values
in	<code>min</code>	Lower boundary
in	<code>max</code>	Upper boundary
in	<code>autosize</code>	Whether the chart autosizes
in	<code>maxnumb</code>	Maximal number of entries
in	<code>textcolor</code>	Text color

12.19.3.8 draw_horbarchart()

```
void Fl_Chart::draw_horbarchart (
    int x,
    int y,
    int w,
    int h,
    int numb,
    FL_CHART_ENTRY entries[],
    double min,
    double max,
    int autosize,
    int maxnumb,
    Fl_Color textcolor ) [static], [protected]
```

Draws a horizontal bar chart.

`x`, `y`, `w`, `h` is the bounding box, `entries` the array of `numb` entries, and `min` and `max` the boundaries.

Parameters

in	<code>x,y,w,h</code>	Widget position and size
in	<code>numb</code>	Number of values
in	<code>entries</code>	Array of values
in	<code>min</code>	Lower boundary
in	<code>max</code>	Upper boundary
in	<code>autosize</code>	Whether the chart autosizes
in	<code>maxnumb</code>	Maximal number of entries
in	<code>textcolor</code>	Text color

12.19.3.9 draw_linechart()

```
void Fl_Chart::draw_linechart (
    int type,
    int x,
    int y,
    int w,
    int h,
    int numb,
    FL_CHART_ENTRY entries[],
    double min,
    double max,
    int autosize,
    int maxnumb,
    Fl_Color textcolor ) [static], [protected]
```

Draws a line chart.

x, *y*, *w*, *h* is the bounding box, *entries* the array of *numb* entries, and *min* and *max* the boundaries.

Parameters

in	<i>type</i>	Chart type
in	<i>x,y,w,h</i>	Widget position and size
in	<i>numb</i>	Number of values
in	<i>entries</i>	Array of values
in	<i>min</i>	Lower boundary
in	<i>max</i>	Upper boundary
in	<i>autosize</i>	Whether the chart autosizes
in	<i>maxnumb</i>	Maximal number of entries
in	<i>textcolor</i>	Text color

12.19.3.10 draw_piechart()

```
void Fl_Chart::draw_piechart (
    int x,
    int y,
    int w,
    int h,
    int numb,
    FL_CHART_ENTRY entries[],
    int special,
    Fl_Color textcolor ) [static], [protected]
```

Draws a pie chart.

Parameters

in	<i>x,y,w,h</i>	bounding box
in	<i>numb</i>	number of chart entries
in	<i>entries</i>	array of chart entries
in	<i>special</i>	special (?)
in	<i>textcolor</i>	text color

12.19.3.11 insert()

```
void Fl_Chart::insert (
    int ind,
```

```
double val,
const char * str = 0,
unsigned col = 0 )
```

Inserts a data value `val` at the given position `ind`.
Position 1 is the first data value.

Parameters

in	<i>ind</i>	insertion position
in	<i>val</i>	data value
in	<i>str</i>	optional data label
in	<i>col</i>	optional data color

12.19.3.12 maxsize()

```
void Fl_Chart::maxsize (
    int m )
```

Sets the maximum number of data values for a chart.

If you do not call this method then the chart will be allowed to grow to any size depending on available memory.

Parameters

in	<i>m</i>	maximum number of data values allowed.
----	----------	--

12.19.3.13 replace()

```
void Fl_Chart::replace (
    int ind,
    double val,
    const char * str = 0,
    unsigned col = 0 )
```

Replaces a data value `val` at the given position `ind`.
Position 1 is the first data value.

Parameters

in	<i>ind</i>	insertion position
in	<i>val</i>	data value
in	<i>str</i>	optional data label
in	<i>col</i>	optional data color

12.19.3.14 size()

```
void Fl_Chart::size (
    int W,
    int H ) [inline]
```

Sets the widget size (width, height).

This is the same as calling [Fl_Widget::size\(int W, int H\)](#);

Parameters

in	<i>W,H</i>	new width and height of the widget
----	------------	------------------------------------

The documentation for this class was generated from the following files:

- [Fl_Chart.H](#)
- [Fl_Chart.cxx](#)

12.20 FL_CHART_ENTRY Struct Reference

For internal use only.

```
#include <Fl_Chart.H>
```

Public Attributes

- unsigned **col**
For internal use only.
- char **str** [[FL_CHART_LABEL_MAX](#)+1]
For internal use only.
- float **val**
For internal use only.

12.20.1 Detailed Description

For internal use only.

The documentation for this struct was generated from the following file:

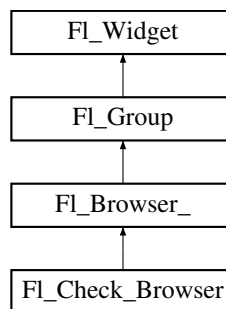
- [Fl_Chart.H](#)

12.21 Fl_Check_Browser Class Reference

The [Fl_Check_Browser](#) widget displays a scrolling list of text lines that may be selected and/or checked by the user.

```
#include <Fl_Check_Browser.H>
```

Inheritance diagram for [Fl_Check_Browser](#):



Public Member Functions

- int **add** (char *s)
Add a new unchecked line to the end of the browser.
- int **add** (char *s, int b)
Add a new line to the end of the browser.
- int **add** (const char *s)
*See int [Fl_Check_Browser::add\(char *s\)](#)*
- int **add** (const char *s, int b)
*See int [Fl_Check_Browser::add\(char *s\)](#)*
- void **check_all** ()
Sets all the items checked.
- void **check_none** ()

- Sets all the items unchecked.*
- int **checked** (int item) const
 - Gets the current status of item item.*
- void **checked** (int item, int b)
 - Sets the check status of item item to b.*
- void **clear** ()
 - Remove every item from the browser.*
- **FI_Check_Browser** (int x, int y, int w, int h, const char *l=0)
 - The constructor makes an empty browser.*
- void * **item_at** (int index) const **FL_OVERRIDE**
 - This method must be provided by the subclass to return the item for the specified index.*
- void **item_swap** (int ia, int ib)
- void **item_swap** (void *a, void *b) **FL_OVERRIDE**
 - This optional method should be provided by the subclass to efficiently swap browser items a and b, such as for sorting.*
- int **nchecked** () const
 - Returns how many items are currently checked.*
- int **nitems** () const
 - Returns how many lines are in the browser.*
- int **remove** (int item)
 - Remove line n and make the browser one line shorter.*
- void **set_checked** (int item)
 - Equivalent to FI_Check_Browser::checked(item, 1).*
- char * **text** (int item) const
 - Return a pointer to an internal buffer holding item item's text.*
- int **value** () const
 - Returns the index of the currently selected item.*
- **~FI_Check_Browser** ()
 - The destructor deletes all list items and destroys the browser.*

Public Member Functions inherited from **FI_Browser_**

- int **deselect** (int docallbacks=0)
 - Deselects all items in the list and returns 1 if the state changed or 0 if it did not.*
- void **display** (void *item)
 - Displays the item, scrolling the list as necessary.*
- **uchar has_scrollbar** () const
 - Returns the current scrollbar mode, see FI_Browser_::has_scrollbar(uchar)*
- void **has_scrollbar** (uchar mode)
 - Sets whether the widget should have scrollbars or not (default FI_Browser_::BOTH).*
- int **hposition** () const
 - Gets the horizontal scroll position of the list as a pixel position pos.*
- void **hposition** (int)
 - Sets the horizontal scroll position of the list to pixel position pos.*
- int **linespacing** () const
 - Return the height of additional spacing between browser lines.*
- void **linespacing** (int pixels)
 - Add some space between browser lines.*
- int **position** () const
- void **position** (int pos)
- void **position** (int x, int y)
- void **resize** (int X, int Y, int W, int H) **FL_OVERRIDE**

- Repositions and/or resizes the browser.*

 - void `scrollbar_left` ()
 - Moves the vertical scrollbar to the lefthand side of the list.*
 - void `scrollbar_right` ()
 - Moves the vertical scrollbar to the righthand side of the list.*
 - int `scrollbar_size` () const
 - Gets the current size of the scrollbars' troughs, in pixels.*
 - void `scrollbar_size` (int newSize)
 - Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.*
 - int `scrollbar_width` () const
 - Returns the global value `FI::scrollbar_size()`.*
 - void `scrollbar_width` (int width)
 - Sets the global `FI::scrollbar_size()`, and forces this instance of the widget to use it.*
 - int `select` (void *item, int val=1, int docallbacks=0)
 - Sets the selection state of `item` to `val`, and returns 1 if the state changed or 0 if it did not.*
 - int `select_only` (void *item, int docallbacks=0)
 - Selects `item` and returns 1 if the state changed or 0 if it did not.*
 - void `sort` (int flags=0)
 - Sort the items in the browser based on `flags`.*
 - `FI_Color` `textcolor` () const
 - Gets the default text color for the lines in the browser.*
 - void `textcolor` (`FI_Color` col)
 - Sets the default text color for the lines in the browser to color `col`.*
 - `FI_Font` `textfont` () const
 - Gets the default text font for the lines in the browser.*
 - void `textfont` (`FI_Font` font)
 - Sets the default text font for the lines in the browser to `font`.*
 - `FI_Fontsize` `textsize` () const
 - Gets the default text size (in pixels) for the lines in the browser.*
 - void `textsize` (`FI_Fontsize` newSize)
 - Sets the default text size (in pixels) for the lines in the browser to `size`.*
 - int `vposition` () const
 - Gets the vertical scroll position of the list as a pixel position `pos`.*
 - void `vposition` (int pos)
 - Sets the vertical scroll position of the list to pixel position `pos`.*

Public Member Functions inherited from `FI_Group`

- `FI_Widget` *& `_ddfdesign_kludge` ()
- This is for forms compatibility only.*
- void `add` (`FI_Widget` &)
- The widget is removed from its current group (if any) and then added to the end of this group.*
- void `add` (`FI_Widget` *o)
- See void `FI_Group::add(FI_Widget &w)`*
- void `add_resizable` (`FI_Widget` &o)
- Adds a widget to the group and makes it the resizable widget.*
- `FI_Widget` *const * `array` () const
- Returns a pointer to the array of children.*
- `FI_Group` const * `as_group` () const `FL_OVERRIDE`
- `FI_Group` * `as_group` () `FL_OVERRIDE`
- Returns an `FI_Group` pointer if this widget is an `FI_Group`.*

- void **begin** ()
 - Sets the current group so you can build the widget tree by just constructing the widgets.*
- **FL_Widget * child** (int n) const
 - Returns `array()[n]`.*
- int **children** () const
 - Returns how many child widgets the group has.*
- void **clear** ()
 - Deletes all child widgets from memory recursively.*
- unsigned int **clip_children** ()
 - Returns the current clipping mode.*
- void **clip_children** (int c)
 - Controls whether the group widget clips the drawing of child widgets to its bounding box.*
- virtual int **delete_child** (int n)
 - Removes the widget at `index` from the group and deletes it.*
- void **end** ()
 - Exactly the same as `current(this->parent())`.*
- int **find** (const **FL_Widget** &o) const
 - See `int FL_Group::find(const FL_Widget *w) const`.*
- int **find** (const **FL_Widget** *) const
 - Searches the child array for the widget and returns the index.*
- **FL_Group** (int, int, int, int, const char *s=0)
 - Creates a new `FL_Group` widget using the given position, size, and label string.*
- void **focus** (**FL_Widget** *W)
- void **forms_end** ()
 - This is for forms compatibility only.*
- int **handle** (int) **FL_OVERRIDE**
 - Handles the specified event.*
- void **init_sizes** ()
 - Resets the internal array of widget sizes and positions.*
- void **insert** (**FL_Widget** &, int i)
 - The widget is removed from its current group (if any) and then inserted into this group.*
- void **insert** (**FL_Widget** &o, **FL_Widget** *before)
 - This does `insert(w, find(before))`.*
- void **remove** (**FL_Widget** &)
 - Removes a widget from the group but does not delete it.*
- void **remove** (**FL_Widget** *o)
 - Removes the widget `o` from the group.*
- void **remove** (int index)
 - Removes the widget at `index` from the group but does not delete it.*
- **FL_Widget * resizable** () const
 - Returns the group's resizable widget.*
- void **resizable** (**FL_Widget** &o)
 - Sets the group's resizable widget.*
- void **resizable** (**FL_Widget** *o)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- void **resize** (int, int, int, int) **FL_OVERRIDE**
 - Resizes the `FL_Group` widget and all of its children.*
- virtual **~FL_Group** ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (**FI_Align** alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window** * **as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window** const * **as_gl_window** () const
- virtual **FI_Window** * **as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (**FI_Boxtype** new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (**FI_Callback** *cb)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback** *cb, **FI_Callback_User_Data** *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (**FI_Callback** *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** (**FI_Callback0** *cb)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback1** *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const
Checks if the widget value changed since the last callback.
- void **clear_active** ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (uchar c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FL_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FL_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FL_Color` bg, `FL_Color` sel)
- Sets the background and selection color of the widget.*

 - `FL_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FL_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (uchar c)
- Sets the damage bits for the widget.*

 - void `damage` (uchar c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FL_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FL_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FL_Widget` *widget, long arg, `FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h` () `const`
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- `int image_bound` () `const`
Returns whether the image is managed by the widget.
- `int inside` (`const FI_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- `int is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- `bool needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- `unsigned int output` () `const`

- Returns if a widget is used for output only.*

 - `FI_Group * parent () const`

Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`

Internal use only - "for hacks only".
- `void position (int X, int Y)`

Repositions the window or widget.
- `void redraw ()`

Schedules the drawing of the widget.
- `void redraw_label ()`

Schedules the drawing of the label.
- `FI_Color selection_color () const`

Gets the selection color.
- `void selection_color (FI_Color a)`

Sets the selection color.
- `void set_active ()`

Marks the widget as active without sending events or changing focus.
- `void set_changed ()`

Marks the value of the widget as changed.
- `void set_output ()`

Sets a widget to output only.
- `void set_visible ()`

Makes the widget visible.
- `void set_visible_focus ()`

Enables keyboard focus navigation with this widget.
- `int shortcut_label () const`

Returns whether the widget's label uses '&' to indicate shortcuts.
- `void shortcut_label (int value)`

Sets whether the widget's label uses '&' to indicate shortcuts.
- `virtual void show ()`

Makes a widget visible.
- `void size (int W, int H)`

Changes the size of the widget.
- `int take_focus ()`

Gives the widget the keyboard focus.
- `unsigned int takeevents () const`

Returns if the widget is able to take events.
- `int test_shortcut ()`

Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip () const`

Gets the current tooltip text.
- `void tooltip (const char *text)`

Sets the current tooltip text.
- `FI_Window * top_window () const`

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset (int &xoff, int &yoff) const`

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type () const`

Gets the widget type.
- `void type (uchar t)`

Sets the widget type.

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (Fl_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- Fl_When **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- Fl_Window * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual ~Fl_Widget ()
Destroys the widget.

Protected Member Functions

- int **handle** (int) FL_OVERRIDE
Handles the event within the normal widget bounding box.
- void **item_draw** (void *, int, int, int, int) const FL_OVERRIDE
This method must be provided by the subclass to draw the item in the area indicated by X, Y, W, H.
- void * **item_first** () const FL_OVERRIDE
This method must be provided by the subclass to return the first item in the list.
- int **item_height** (void *) const FL_OVERRIDE
This method must be provided by the subclass to return the height of item in pixels.
- void * **item_next** (void *) const FL_OVERRIDE
This method must be provided by the subclass to return the item in the list after item.
- void * **item_prev** (void *) const FL_OVERRIDE
This method must be provided by the subclass to return the item in the list before item.
- void **item_select** (void *, int) FL_OVERRIDE
This method must be implemented by the subclass if it supports multiple selections; sets the selection state to val for the item.
- int **item_selected** (void *) const FL_OVERRIDE
This method must be implemented by the subclass if it supports multiple selections; returns the selection state for item.
- const char * **item_text** (void *item) const FL_OVERRIDE

This optional method returns a string (label) that may be used for sorting.

- int `item_width` (void *) const `FL_OVERRIDE`

This method must be provided by the subclass to return the width of the `item` in pixels.

Protected Member Functions inherited from `Fl_Browser_`

- void `bbox` (int &X, int &Y, int &W, int &H) const

Returns the bounding box for the interior of the list's display window, inside the scrollbars.

- void `deleting` (void *item)

This method should be used when `item` is being deleted from the list.

- int `displayed` (void *item) const

Returns non-zero if `item` has been scrolled to a position where it is being displayed.

- void `draw` () `FL_OVERRIDE`

Draws the list within the normal widget bounding box.

- void * `find_item` (int ypos)

This method returns the item under mouse y position `ypos`.

- `Fl_Browser_` (int X, int Y, int W, int H, const char *L=0)

The constructor makes an empty browser.

- virtual int `full_height` () const

This method may be provided by the subclass to indicate the full height of the item list, in pixels.

- virtual int `full_width` () const

This method may be provided by the subclass to indicate the full width of the item list, in pixels.

- virtual int `incr_height` () const

This method may be provided to return the average height of all items to be used for scrolling.

- void `inserting` (void *a, void *b)

This method should be used when an item is in the process of being inserted into the list.

- virtual void * `item_last` () const

This method must be provided by the subclass to return the last item in the list.

- virtual int `item_quick_height` (void *item) const

This method may be provided by the subclass to return the height of the `item`, in pixels.

- int `leftedge` () const

This method returns the X position of the left edge of the list area after adjusting for the scrollbar and border, if any.

- void `new_list` ()

This method should be called when the list data is completely replaced or cleared.

- void `redraw_line` (void *item)

This method should be called when the contents of `item` has changed, but not its height.

- void `redraw_lines` ()

This method will cause the entire list to be redrawn.

- void `replacing` (void *a, void *b)

This method should be used when item `a` is being replaced by item `b`.

- void * `selection` () const

Returns the item currently selected, or NULL if there is no selection.

- void `swapping` (void *a, void *b)

This method should be used when two items `a` and `b` are being swapped.

- void * `top` () const

Returns the item that appears at the top of the list.

Protected Member Functions inherited from FI_Group

- `FI_Rect * bounds ()`
Returns the internal array of widget sizes and positions.
- `void draw () FL_OVERRIDE`
Draws the widget.
- `void draw_child (FI_Widget &widget) const`
Forces a child to redraw.
- `void draw_children ()`
Draws all children of the group.
- `void draw_outside_label (const FI_Widget &widget) const`
Parents normally call this to draw outside labels of child widgets.
- `virtual int on_insert (FI_Widget *, int)`
Allow derived groups to act when a widget is added as a child.
- `virtual int on_move (int, int)`
Allow derived groups to act when a widget is moved within the group.
- `virtual void on_remove (int)`
Allow derived groups to act when a child widget is removed from the group.
- `int * sizes ()`
Returns the internal array of widget sizes and positions.
- `void update_child (FI_Widget &widget) const`
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- `void clear_flag (unsigned int c)`
Clears a flag in the flags mask.
- `void draw_backdrop () const`
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- `void draw_box () const`
Draws the widget box according its box style.
- `void draw_box (FI_Boxtype t, FI_Color c) const`
Draws a box of type t, of color c at the widget's position and size.
- `void draw_box (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const`
Draws a box of type t, of color c at the position X,Y and size W,H.
- `void draw_focus () const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int X, int Y, int W, int H) const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const`
Draws a focus box for the widget at the given position and size.
- `void draw_label () const`
Draws the widget's label at the defined label position.
- `void draw_label (int, int, int, int) const`
Draws the label in an arbitrary bounding box.
- `FI_Widget (int x, int y, int w, int h, const char *label=0L)`
Creates a widget at the given position and size.
- `unsigned int flags () const`
Gets the widget flags mask.
- `void h (int v)`
Internal use only.
- `void set_flag (unsigned int c)`

- *Sets a flag in the flags mask.*
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Public Types inherited from `FI_Browser_`

- enum {
`HORIZONTAL` = 1 , `VERTICAL` = 2 , `BOTH` = 3 , `ALWAYS_ON` = 4 ,
`HORIZONTAL_ALWAYS` = 5 , `VERTICAL_ALWAYS` = 6 , `BOTH_ALWAYS` = 7 }
Values for `has_scrollbar()`.

Static Public Member Functions inherited from `FI_Group`

- static `FI_Group * current` ()
Returns the currently active group.
- static void `current` (`FI_Group *g`)
Sets the current group.

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget *widget`, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Public Attributes inherited from `FI_Browser_`

- `FI_Scrollbar hscrollbar`
Horizontal scrollbar.
- `FI_Scrollbar scrollbar`
Vertical scrollbar.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

12.21.1 Detailed Description

The [Fl_Check_Browser](#) widget displays a scrolling list of text lines that may be selected and/or checked by the user.

12.21.2 Member Function Documentation

12.21.2.1 add() [1/2]

```
int Fl_Check_Browser::add (
    char * s )
```

Add a new unchecked line to the end of the browser.

See also

[add\(char *s, int b\)](#)

12.21.2.2 add() [2/2]

```
int Fl_Check_Browser::add (
    char * s,
    int b )
```

Add a new line to the end of the browser.

The text is copied using the `strdup()` function. It may also be NULL to make a blank line. It can set the item checked if `b` is not 0.

12.21.2.3 handle()

```
int Fl_Check_Browser::handle (
    int event ) [protected], [virtual]
```

Handles the `event` within the normal widget bounding box.

Parameters

in	<i>event</i>	The event to process.
----	--------------	-----------------------

Returns

1 if event was processed, 0 if not.

Reimplemented from [Fl_Browser_](#).

12.21.2.4 item_at()

```
void * Fl_Check_Browser::item_at (
    int index ) const [virtual]
```

This method must be provided by the subclass to return the item for the specified `index`.

Parameters

in	<i>index</i>	The <code>index</code> of the item to be returned
----	--------------	---

Returns

The item at the specified `index`.

Reimplemented from [Fl_Browser_](#).

12.21.2.5 item_draw()

```
void Fl_Check_Browser::item_draw (
    void * item,
```

```

    int X,
    int Y,
    int W,
    int H ) const [protected], [virtual]

```

This method must be provided by the subclass to draw the `item` in the area indicated by `X`, `Y`, `W`, `H`.
Implements [Fl_Browser_](#).

12.21.2.6 `item_first()`

```

void * Fl_Check_Browser::item_first ( ) const [protected], [virtual]

```

This method must be provided by the subclass to return the first item in the list.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_](#).

12.21.2.7 `item_height()`

```

int Fl_Check_Browser::item_height (
    void * item ) const [protected], [virtual]

```

This method must be provided by the subclass to return the height of `item` in pixels.
Allow for two additional pixels for the list selection box.

Parameters

<code>in</code>	<i>item</i>	The item whose height is returned.
-----------------	-------------	------------------------------------

Returns

The height of the specified `item` in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#), [item_quick_height\(\)](#)

Implements [Fl_Browser_](#).

12.21.2.8 `item_next()`

```

void * Fl_Check_Browser::item_next (
    void * item ) const [protected], [virtual]

```

This method must be provided by the subclass to return the item in the list after `item`.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_](#).

12.21.2.9 `item_prev()`

```

void * Fl_Check_Browser::item_prev (
    void * item ) const [protected], [virtual]

```

This method must be provided by the subclass to return the item in the list before `item`.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_](#).

12.21.2.10 item_select()

```
void Fl_Check_Browser::item_select (
    void * item,
    int val ) [protected], [virtual]
```

This method must be implemented by the subclass if it supports multiple selections; sets the selection state to `val` for the `item`.

Sets the selection state for `item`, where optional `val` is 1 (select, the default) or 0 (de-select).

Parameters

in	<i>item</i>	The item to be selected
in	<i>val</i>	The optional selection state; 1=select, 0=de-select. The default is to select the item (1).

Reimplemented from [Fl_Browser_.](#)

12.21.2.11 item_selected()

```
int Fl_Check_Browser::item_selected (
    void * item ) const [protected], [virtual]
```

This method must be implemented by the subclass if it supports multiple selections; returns the selection state for `item`.

The method should return 1 if `item` is selected, or 0 otherwise.

Parameters

in	<i>item</i>	The item to test.
----	-------------	-------------------

Reimplemented from [Fl_Browser_.](#)

12.21.2.12 item_swap()

```
void Fl_Check_Browser::item_swap (
    void * a,
    void * b ) [virtual]
```

This optional method should be provided by the subclass to efficiently swap browser items `a` and `b`, such as for sorting.

Parameters

in	<i>a,b</i>	The two items to be swapped.
----	------------	------------------------------

Reimplemented from [Fl_Browser_.](#)

12.21.2.13 item_text()

```
const char * Fl_Check_Browser::item_text (
    void * item ) const [protected], [virtual]
```

This optional method returns a string (label) that may be used for sorting.

Parameters

in	<i>item</i>	The item whose label text is returned.
----	-------------	--

Returns

The item's text label. (Can be NULL if blank)

Reimplemented from [Fl_Browser_](#).

12.21.2.14 item_width()

```
int Fl_Check_Browser::item_width (
    void * item ) const [protected], [virtual]
```

This method must be provided by the subclass to return the width of the `item` in pixels. Allow for two additional pixels for the list selection box.

Parameters

<code>in</code>	<code>item</code>	The item whose width is returned.
-----------------	-------------------	-----------------------------------

Returns

The width of the item in pixels.

Implements [Fl_Browser_](#).

12.21.2.15 nitems()

```
int Fl_Check_Browser::nitems ( ) const [inline]
```

Returns how many lines are in the browser.

The last line number is equal to this.

12.21.2.16 remove()

```
int Fl_Check_Browser::remove (
    int item )
```

Remove line `n` and make the browser one line shorter.

Returns the number of lines left in the browser.

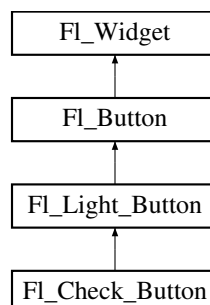
The documentation for this class was generated from the following files:

- [Fl_Check_Browser.H](#)
- [Fl_Check_Browser.cxx](#)

12.22 Fl_Check_Button Class Reference

A button with a "checkmark" to show its status.

Inheritance diagram for `Fl_Check_Button`:

**Public Member Functions**

- [Fl_Check_Button](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Check_Button](#) widget using the given position, size, and label string.

Public Member Functions inherited from FI_Light_Button

- [FI_Light_Button](#) (int x, int y, int w, int h, const char *l=0)
Creates a new [FI_Light_Button](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from FI_Button

- int [clear](#) ()
Same as `value(0)`.
- [uchar compact](#) ()
Return true if buttons are rendered as compact buttons.
- void [compact](#) ([uchar v](#))
Decide if buttons should be rendered in compact mode.
- [FI_Boxtype down_box](#) () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void [down_box](#) ([FI_Boxtype b](#))
Sets the down box type.
- [FI_Color down_color](#) () const
(for backwards compatibility)
- void [down_color](#) (unsigned c)
(for backwards compatibility)
- [FI_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int [set](#) ()
Same as `value(1)`.
- void [setonly](#) ()
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- int [shortcut](#) () const
Returns the current shortcut key for the button.
- void [shortcut](#) (const char *s)
(for backwards compatibility)
- void [shortcut](#) (int s)
Sets the shortcut key to `s`.
- char [value](#) () const
Returns the current value of the button (0 or 1).
- int [value](#) (int v)
Sets the current value of the button.

Public Member Functions inherited from FI_Widget

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.

- void `align` (`FI_Align` alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
 - Returns an `FI_Group` pointer if this widget is an `FI_Group`.*
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*

- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const
Gets the background color of the widget.
- void `color` (`FI_Color` bg)
Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)
Sets the background and selection color of the widget.
- `FI_Color` `color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const `FI_Widget` *w) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- `uchar` `damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar` c)
Sets the damage bits for the widget.
- void `damage` (`uchar` c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image` * `deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image` * `deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` &img)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` *img)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image` * `image` ()

- Gets the image that is used as part of the widget label when in the active state.*

 - const `FI_Image * image` () const
- Gets the image that is used as part of the widget label when in the active state.*

 - void `image (FI_Image &img)`
- Sets the image to use as part of the widget label when in the active state.*

 - void `image (FI_Image *img)`
- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound` () const
- Returns whether the image is managed by the widget.*

 - int `inside (const FI_Widget *wgt)` const
- Checks if this widget is a child of wgt.*

 - int `is_label_copied` () const
- Returns whether the current label was assigned with `copy_label()`.*

 - const char * `label` () const
- Gets the current label text.*

 - void `label (const char *text)`
- Sets the current label pointer.*

 - void `label (FI_Labeltype a, const char *b)`
- Shortcut to set the label text and type in one call.*

 - `FI_Color labelcolor` () const
- Gets the label color.*

 - void `labelcolor (FI_Color c)`
- Sets the label color.*

 - `FI_Font labelfont` () const
- Gets the font to use.*

 - void `labelfont (FI_Font f)`
- Sets the font to use.*

 - `FI_Fontsize labelsize` () const
- Gets the font size in pixels.*

 - void `labelsize (FI_Fontsize pix)`
- Sets the font size in pixels.*

 - `FI_Labeltype labeltype` () const
- Gets the label type.*

 - void `labeltype (FI_Labeltype a)`
- Sets the label type.*

 - void `measure_label (int &ww, int &hh)` const
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard (bool needs)`
- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group * parent` () const
- Returns a pointer to the parent widget.*

 - void `parent (FI_Group *p)`
- Internal use only - "for hacks only".*

 - void `position (int X, int Y)`
- Repositions the window or widget.*

 - void `redraw` ()
- Schedules the drawing of the widget.*

- void `redraw_label ()`
Schedules the drawing of the label.
- virtual void `resize (int x, int y, int w, int h)`
Changes the size or position of the widget.
- `Fl_Color selection_color () const`
Gets the selection color.
- void `selection_color (Fl_Color a)`
Sets the selection color.
- void `set_active ()`
Marks the widget as active without sending events or changing focus.
- void `set_changed ()`
Marks the value of the widget as changed.
- void `set_output ()`
Sets a widget to output only.
- void `set_visible ()`
Makes the widget visible.
- void `set_visible_focus ()`
Enables keyboard focus navigation with this widget.
- int `shortcut_label () const`
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label (int value)`
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show ()`
Makes a widget visible.
- void `size (int W, int H)`
Changes the size of the widget.
- int `take_focus ()`
Gives the widget the keyboard focus.
- unsigned int `takesevents () const`
Returns if the widget is able to take events.
- int `test_shortcut ()`
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip () const`
Gets the current tooltip text.
- void `tooltip (const char *text)`
Sets the current tooltip text.
- `Fl_Window * top_window () const`
Returns a pointer to the top-level window for the widget.
- `Fl_Window * top_window_offset (int &xoff, int &yoff) const`
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type () const`
Gets the widget type.
- void `type (uchar t)`
Sets the widget type.
- int `use_accents_menu ()`
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data () const`
Gets the user data for this widget.
- void `user_data (Fl_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- void `user_data (void *v)`

- Sets the user data for this widget.*

 - unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When when` () const

Returns the conditions under which the callback is called.
- void `when` (uchar i)

Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.
- int `y` () const

Gets the widget position in its window.
- virtual `~FI_Widget` ()

Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget *widget`, void *data)

The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)

Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)

Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
 - `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
 - `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 - ,
 - `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 - ,
 - `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 - ,
 - `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU` = 1<<19 ,
 - `NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
 - `AUTO_DELETE_USER_DATA` = 1<<23 ,
 - `MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
 - `USERFLAG1` = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from FI_Light_Button

- void `draw ()` [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from FI_Button

- void `simulate_key_action ()`

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop ()` const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void `draw_box ()` const
Draws the widget box according its box style.
- void `draw_box` ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus ()` const
Draws a focus rectangle around the widget.
- void `draw_focus` ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label ()` const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags ()` const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Static Protected Member Functions inherited from FI_Button

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from FI_Button

- static [FI_Widget_Tracker](#) * `key_release_tracker` = 0

12.22.1 Detailed Description

A button with a "checkmark" to show its status.



Figure 12.7 FI_Check_Button

Buttons generate callbacks when they are clicked by the user. You control exactly when and how by changing the values for `type()` and `when()`.

The `FI_Check_Button` subclass displays its "ON" state by showing a "checkmark" rather than drawing itself pushed in.

12.22.2 Constructor & Destructor Documentation

12.22.2.1 FI_Check_Button()

```
FI_Check_Button::FI_Check_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `FI_Check_Button` widget using the given position, size, and label string.

The default box type is `FL_NO_BOX`, which draws the label w/o a box right of the checkmark.

The `selection_color()` sets the color of the checkmark. Default is `FL_FOREGROUND_COLOR` (usually black).

You can use `down_box()` to change the box type of the checkmark. Default is `FL_DOWN_BOX`.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

The documentation for this class was generated from the following files:

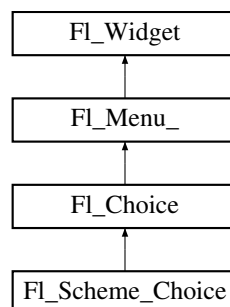
- `FI_Check_Button.H`
- `FI_Check_Button.cxx`

12.23 FI_Choice Class Reference

A button that is used to pop up a menu.

```
#include <Fl_Choice.H>
```

Inheritance diagram for `FI_Choice`:



Public Member Functions

- `FI_Choice` (int X, int Y, int W, int H, const char *L=0)

- Create a new *FI_Choice* widget using the given position, size and label string.
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.
- int **value** () const
Gets the index of the last item chosen by the user.
- int **value** (const **FI_Menu_Item** *v)
Sets the currently selected value using a pointer to menu item.
- int **value** (int v)
Sets the currently selected value using the index into the menu item array.

Public Member Functions inherited from **FI_Menu_**

- int **add** (const char *)
This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.
- int **add** (const char *, int **shortcut**, **FI_Callback** *, void *=0, int=0)
Adds a new menu item.
- int **add** (const char *a, const char *b, **FI_Callback** *c, void *d=0, int e=0)
See int *FI_Menu_::add(const char* label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)*
- void **clear** ()
Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.
- int **clear_submenu** (int index)
Clears the specified submenu pointed to by *index* of all menu items.
- void **copy** (const **FI_Menu_Item** *m, void *user_data=0)
Sets the menu array pointer with a copy of m that will be automatically deleted.
- **FI_Boxtype** **down_box** () const
This box type is used to surround the currently-selected items in the menus.
- void **down_box** (**FI_Boxtype** b)
Sets the box type used to surround the currently-selected items in the menus.
- **FI_Color** **down_color** () const
For back compatibility, same as *selection_color()*
- void **down_color** (unsigned c)
For back compatibility, same as *selection_color()*
- int **find_index** (const char *name) const
Find the menu item index for a given menu *pathname*, such as "Edit/Copy".
- int **find_index** (const **FI_Menu_Item** *item) const
Find the index into the menu array for a given *item*.
- int **find_index** (**FI_Callback** *cb) const
Find the index into the menu array for a given callback *cb*.
- const **FI_Menu_Item** * **find_item** (const char *name)
Find the menu item for a given menu *pathname*, such as "Edit/Copy".
- const **FI_Menu_Item** * **find_item** (**FI_Callback** *)
Find the menu item for the given callback *cb*.
- const **FI_Menu_Item** * **find_item_with_argument** (long)
Find the menu item for the given user argument *v*.
- const **FI_Menu_Item** * **find_item_with_user_data** (void *)
Find the menu item for the given user data *v*.
- **FI_Menu_** (int, int, int, int, const char *=0)
Creates a new *FI_Menu_* widget using the given position, size, and label string.
- void **global** ()
Make the shortcuts for this menu work no matter what window has the focus when you type it.

- int **insert** (int index, const char *, int shortcut, FI_Callback *, void *=0, int=0)
Inserts a new menu item at the specified index position.
- int **insert** (int index, const char *a, const char *b, FI_Callback *c, void *d=0, int e=0)
See int FI_Menu_::insert(const char label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)*
- int **item_pathname** (char *name, int namelen, const FI_Menu_Item *finditem=0) const
Get the menu 'pathname' for the specified menuitem.
- const FI_Menu_Item * **menu** () const
Returns a pointer to the array of FI_Menu_Items.
- void **menu** (const FI_Menu_Item *m)
Sets the menu array pointer directly.
- FI_Boxtype **menu_box** () const
Get the box type for the menu popup windows.
- void **menu_box** (FI_Boxtype b)
Set the box type for the menu popup windows.
- const FI_Menu_Item * **menu_end** ()
Finishes menu modifications and returns menu().
- int **mode** (int i) const
Gets the flags of item i.
- void **mode** (int i, int fl)
Sets the flags of item i.
- const FI_Menu_Item * **mvalue** () const
Returns a pointer to the last menu item that was picked.
- const FI_Menu_Item * **picked** (const FI_Menu_Item *)
When user picks a menu item, call this.
- const FI_Menu_Item * **prev_mvalue** () const
Returns a pointer to the menu item that was picked before the current one was picked.
- void **remove** (int)
Deletes item i from the menu.
- void **replace** (int, const char *)
Changes the text of item i.
- void **setonly** (FI_Menu_Item *item)
Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.
- void **shortcut** (int i, int s)
Changes the shortcut of item i to s.
- int **size** () const
This returns the number of FI_Menu_Item structures that make up the menu, correctly counting submenus.
- void **size** (int W, int H)
- const FI_Menu_Item * **test_shortcut** ()
Returns the menu item with the entered shortcut (key value).
- const char * **text** () const
Returns the title of the last item chosen.
- const char * **text** (int i) const
Returns the title of item i.
- FI_Color **textcolor** () const
Get the current color of menu item labels.
- void **textcolor** (FI_Color c)
Sets the current color of menu item labels.
- FI_Font **textfont** () const
Gets the current font of menu item labels.
- void **textfont** (FI_Font c)
Sets the current font of menu item labels.

- [FI_Fontsize](#) `textsize ()` const
Gets the font size of menu item labels.
- void `textsize (FI_Fontsize c)`
Sets the font size of menu item labels.
- int `value ()` const
Returns the index into menu() of the last item chosen by the user.
- int `value (const FI_Menu_Item *)`
The value is the index into menu() of the last item chosen by the user.
- int `value (int i)`
The value is the index into menu() of the last item chosen by the user.

Public Member Functions inherited from [FI_Widget](#)

- void `_clear_fullscreen ()`
- void `_set_fullscreen ()`
- void `activate ()`
Activates the widget.
- unsigned int `active ()` const
Returns whether the widget is active.
- int `active_r ()` const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) `align ()` const
Gets the label alignment.
- void `align (FI_Align alignment)`
Sets the label alignment.
- long `argument ()` const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument (long v)`
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * `as_gl_window ()`
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class [FI_Gl_Window](#) const * `as_gl_window ()` const
- virtual [FI_Group](#) * `as_group ()`
Returns an FI_Group pointer if this widget is an FI_Group.
- virtual [FI_Group](#) const * `as_group ()` const
- virtual [FI_Window](#) * `as_window ()`
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual [FI_Window](#) const * `as_window ()` const
- void `bind_deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage (int f)`
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- void `bind_image (int f)`
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) `box ()` const
Gets the box type of the widget.
- void `box (FI_Boxtype new_box)`
Sets the box type for the widget.
- [FI_Callback_p](#) `callback ()` const

- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback` *cb, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1` *cb, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar` c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h () const`
Gets the widget height.
- `virtual void hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`

- Gets the font size in pixels.*
- void `labelsize` (`FI_Fontsize` pix)
 - Sets the font size in pixels.*
- `FI_Labeltype` `labeltype` () const
 - Gets the label type.*
- void `labeltype` (`FI_Labeltype` a)
 - Sets the label type.*
- void `measure_label` (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
- bool `needs_keyboard` () const
 - Returns whether this widget needs a keyboard.*
- void `needs_keyboard` (bool needs)
 - Sets whether this widget needs a keyboard.*
- unsigned int `output` () const
 - Returns if a widget is used for output only.*
- `FI_Group` * `parent` () const
 - Returns a pointer to the parent widget.*
- void `parent` (`FI_Group` *p)
 - Internal use only - "for hacks only".*
- void `position` (int X, int Y)
 - Repositions the window or widget.*
- void `redraw` ()
 - Schedules the drawing of the widget.*
- void `redraw_label` ()
 - Schedules the drawing of the label.*
- virtual void `resize` (int x, int y, int w, int h)
 - Changes the size or position of the widget.*
- `FI_Color` `selection_color` () const
 - Gets the selection color.*
- void `selection_color` (`FI_Color` a)
 - Sets the selection color.*
- void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
- void `set_changed` ()
 - Marks the value of the widget as changed.*
- void `set_output` ()
 - Sets a widget to output only.*
- void `set_visible` ()
 - Makes the widget visible.*
- void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
- int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void `show` ()
 - Makes a widget visible.*
- void `size` (int W, int H)
 - Changes the size of the widget.*
- int `take_focus` ()
 - Gives the widget the keyboard focus.*

- unsigned int [takeevents](#) () const
Returns if the widget is able to take events.
- int [test_shortcut](#) ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const
Gets the current tooltip text.
- void [tooltip](#) (const char *text)
Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
Gets the widget type.
- void [type](#) ([uchar](#) t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [FI_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [FI_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~FI_Widget](#) ()
Destroys the widget.

Protected Member Functions

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from [FI_Menu_](#)

- int **item_pathname_** (char *name, int namelen, const [FI_Menu_Item](#) *finditem, const [FI_Menu_Item](#) *menu=0) const

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [Fl_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

Protected Attributes inherited from [Fl_Menu_](#)

- [uchar](#) `alloc`
- [uchar](#) `down_box_`
- [Fl_Boxtype](#) `menu_box_`
- [Fl_Color](#) `textcolor_`
- [Fl_Font](#) `textfont_`
- [Fl_Fonsize](#) `textsize_`

12.23.1 Detailed Description

A button that is used to pop up a menu.

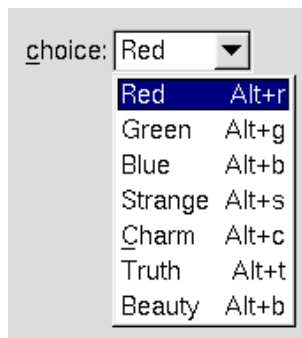


Figure 12.8 [Fl_Choice](#)

This is a button that, when pushed, pops up a menu (or hierarchy of menus) defined by an array of [Fl_Menu_Item](#) objects. Motif calls this an `OptionButton`.

The only difference between this and a [Fl_Menu_Button](#) is that the name of the most recent chosen menu item is displayed inside the box, while the label is displayed outside the box. However, since the use of this is most often to control a single variable rather than do individual callbacks, some of the [Fl_Menu_Button](#) methods are redescribed here in those terms.

When the user clicks a menu item, `value()` is set to that item and then:

- The item's callback is done if one has been set; the `Fl_Choice` is passed as the `Fl_Widget*` argument, along with any userdata configured for the callback.
- If the item does not have a callback, the `Fl_Choice` widget's callback is done instead, along with any userdata configured for it. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

All three mouse buttons pop up the menu. The Forms behavior of the first two buttons to increment/decrement the choice is not implemented. This could be added with a subclass, however.

The menu will also pop up in response to shortcuts indicated by putting a '&' character in the `label()`. See `Fl_Button::shortcut(int s)` for a description of this.

Typing the `shortcut()` of any of the items will do exactly the same as when you pick the item with the mouse. The '&' character in item names are only looked at when the menu is popped up, however.

The inherited `Fl_Widget::changed()` and related methods can be used as follows:

- `int Fl_Widget::changed() const` This value is true when the user picks a different value. *It is turned off by `value()` and just before doing a callback (the callback can turn it back on if desired).*
- `void Fl_Widget::set_changed()` This method sets the `changed()` flag.
- `void Fl_Widget::clear_changed()` This method clears the `changed()` flag.

The inherited `Fl_Menu_::down_box()` methods can be used as follows:

- `Fl_Boxtype Fl_Menu_::down_box() const` Gets the current down box, which is used when the menu is popped up. The default down box type is `FL_DOWN_BOX`.
- `void Fl_Menu_::down_box(Fl_Boxtype b)` Sets the current down box type to `b`.

Simple example:

```
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Choice.H>
int main() {
    Fl_Window *win = new Fl_Window(300,200);
    Fl_Choice *choice = new Fl_Choice(100,10,100,25,"Choice:");
    choice->add("Zero");
    choice->add("One");
    choice->add("Two");
    choice->add("Three");
    choice->value(2); // make "Two" selected by default (zero based!)
    win->end();
    win->show();
    return Fl::run();
}
```

12.23.2 Constructor & Destructor Documentation

12.23.2.1 Fl_Choice()

```
Fl_Choice::Fl_Choice (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create a new `Fl_Choice` widget using the given position, size and label string.

The default boxtype is `FL_UP_BOX`.

The constructor sets `menu()` to NULL. See `Fl_Menu_` for the methods to set or change the menu.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

12.23.3 Member Function Documentation

12.23.3.1 draw()

```
void Fl_Choice::draw ( ) [protected], [virtual]
```


Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.23.3.2 [handle\(\)](#)

```
int Fl_Choice::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Scheme_Choice](#).

12.23.3.3 [value\(\)](#) [1/3]

```
int Fl_Choice::value ( ) const [inline]
```

Gets the index of the last item chosen by the user.

The index is -1 initially.

12.23.3.4 [value\(\)](#) [2/3]

```
int Fl_Choice::value (
    const Fl_Menu_Item * v )
```

Sets the currently selected value using a pointer to menu item.

Changing the selected value causes a [redraw\(\)](#).

Parameters

in	<i>v</i>	pointer to menu item in the menu item array.
----	----------	--

Returns

non-zero if the new value is different to the old one.

12.23.3.5 value() [3/3]

```
int Fl_Choice::value (
    int v )
```

Sets the currently selected value using the index into the menu item array. Changing the selected value causes a [redraw\(\)](#).

Parameters

in	v	index of value in the menu item array.
----	---	--

Returns

non-zero if the new value is different to the old one.

The documentation for this class was generated from the following files:

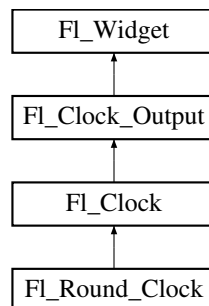
- Fl_Choice.H
- Fl_Choice.cxx

12.24 FI_Clock Class Reference

This widget provides a round analog clock display.

```
#include <Fl_Clock.H>
```

Inheritance diagram for Fl_Clock:

**Public Member Functions**

- [Fl_Clock](#) (int X, int Y, int W, int H, const char *L=0)
Create an [Fl_Clock](#) widget using the given position, size, and label string.
- [Fl_Clock](#) (uchar t, int X, int Y, int W, int H, const char *L)
Create an [Fl_Clock](#) widget using the given clock type t, position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- [~Fl_Clock](#) ()
The destructor removes the clock.

Public Member Functions inherited from [Fl_Clock_Output](#)

- [Fl_Clock_Output](#) (int X, int Y, int W, int H, const char *L=0)
Create a new [Fl_Clock_Output](#) widget with the given position, size and label.

- int `hour` () const
Returns the displayed hour (0 to 23).
- int `minute` () const
Returns the displayed minute (0 to 59).
- int `second` () const
Returns the displayed second (0 to 60, 60=leap second).
- int `shadow` () const
Returns the shadow drawing mode of the hands.
- void `shadow` (int mode)
Sets the shadow drawing mode of the hands.
- `ulong value` () const
Returns the displayed time.
- void `value` (int H, int m, int s)
Set the displayed time.
- void `value` (`ulong` v)
Set the displayed time.

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- `FI_Align align` () const
Gets the label alignment.
- void `align` (`FI_Align` alignment)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument` (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class `FI_Gl_Window` * `as_gl_window` ()
Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
Returns an `FI_Group` pointer if this widget is an `FI_Group`.
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` (`FI_Image` *img)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)

- Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype box](#) () const
 - Gets the box type of the widget.*
- void [box](#) ([FI_Boxtype](#) new_box)
 - Sets the box type for the widget.*
- [FI_Callback_p callback](#) () const
 - Gets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void [callback](#) ([FI_Callback0](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int [changed](#) () const
 - Checks if the widget value changed since the last callback.*
- void [clear_active](#) ()
 - Marks the widget as inactive without sending events or changing focus.*
- void [clear_changed](#) ()
 - Marks the value of the widget as unchanged.*
- void [clear_damage](#) ([uchar](#) c=0)
 - Clears or sets the damage flags.*
- void [clear_output](#) ()
 - Sets a widget to accept input.*
- void [clear_visible](#) ()
 - Hides the widget.*
- void [clear_visible_focus](#) ()
 - Disables keyboard focus navigation with this widget.*
- [FI_Color color](#) () const
 - Gets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg)
 - Sets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
 - Sets the background and selection color of the widget.*
- [FI_Color color2](#) () const
 - For back compatibility only.*
- void [color2](#) (unsigned a)
 - For back compatibility only.*
- int [contains](#) (const [FI_Widget](#) *w) const
 - Checks if w is a child of this widget.*
- void [copy_label](#) (const char *new_label)
 - Sets the current label.*
- void [copy_tooltip](#) (const char *text)
 - Sets the current tooltip text.*
- [uchar damage](#) () const
 - Returns non-zero if [draw\(\)](#) needs to be called.*
- void [damage](#) ([uchar](#) c)
 - Sets the damage bits for the widget.*

- void `damage` (`uchar` c, `int` x, `int` y, `int` w, `int` h)
 - Sets the damage bits for an area inside the widget.*
- `int` `damage_resize` (`int`, `int`, `int`, `int`)
 - Internal use only.*
- void `deactivate` ()
 - Deactivates the widget.*
- `FI_Image` * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
- `const FI_Image` * `deimage` () `const`
 - Gets the image that is used as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image` &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- `int` `deimage_bound` () `const`
 - Returns whether the inactive image is managed by the widget.*
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with default arguments.*
- void `do_callback` (`FI_Widget` *widget, `long` arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `do_callback` (`FI_Widget` *widget, `void` *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- `int` `h` () `const`
 - Gets the widget height.*
- virtual void `hide` ()
 - Makes a widget invisible.*
- `FI_Image` * `image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
- `const FI_Image` * `image` () `const`
 - Gets the image that is used as part of the widget label when in the active state.*
- void `image` (`FI_Image` &img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- `int` `image_bound` () `const`
 - Returns whether the image is managed by the widget.*
- `int` `inside` (`const FI_Widget` *wgt) `const`
 - Checks if this widget is a child of wgt.*
- `int` `is_label_copied` () `const`
 - Returns whether the current label was assigned with `copy_label()`.*
- `const char` * `label` () `const`
 - Gets the current label text.*
- void `label` (`const char` *text)
 - Sets the current label pointer.*
- void `label` (`FI_Labeltype` a, `const char` *b)
 - Shortcut to set the label text and type in one call.*
- `FI_Color` `labelcolor` () `const`
 - Gets the label color.*
- void `labelcolor` (`FI_Color` c)

- Sets the label color.*
- [FI_Font labelfont](#) () const
 - Gets the font to use.*
- void [labelfont](#) ([FI_Font](#) f)
 - Sets the font to use.*
- [FI_Fontsize labelsize](#) () const
 - Gets the font size in pixels.*
- void [labelsize](#) ([FI_Fontsize](#) pix)
 - Sets the font size in pixels.*
- [FI_Labeltype labeltype](#) () const
 - Gets the label type.*
- void [labeltype](#) ([FI_Labeltype](#) a)
 - Sets the label type.*
- void [measure_label](#) (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
- bool [needs_keyboard](#) () const
 - Returns whether this widget needs a keyboard.*
- void [needs_keyboard](#) (bool needs)
 - Sets whether this widget needs a keyboard.*
- unsigned int [output](#) () const
 - Returns if a widget is used for output only.*
- [FI_Group * parent](#) () const
 - Returns a pointer to the parent widget.*
- void [parent](#) ([FI_Group](#) *p)
 - Internal use only - "for hacks only".*
- void [position](#) (int X, int Y)
 - Repositions the window or widget.*
- void [redraw](#) ()
 - Schedules the drawing of the widget.*
- void [redraw_label](#) ()
 - Schedules the drawing of the label.*
- virtual void [resize](#) (int x, int y, int w, int h)
 - Changes the size or position of the widget.*
- [FI_Color selection_color](#) () const
 - Gets the selection color.*
- void [selection_color](#) ([FI_Color](#) a)
 - Sets the selection color.*
- void [set_active](#) ()
 - Marks the widget as active without sending events or changing focus.*
- void [set_changed](#) ()
 - Marks the value of the widget as changed.*
- void [set_output](#) ()
 - Sets a widget to output only.*
- void [set_visible](#) ()
 - Makes the widget visible.*
- void [set_visible_focus](#) ()
 - Enables keyboard focus navigation with this widget.*
- int [shortcut_label](#) () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void [shortcut_label](#) (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*

- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 ,
[OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 ,
[MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 ,
[GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
 = 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPOP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Clock_Output](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draw clock with current position and size.
- void [draw](#) (int X, int Y, int W, int H)
Draw clock with the given position and size.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const

- Draws the widget's label at the defined label position.*
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FL_Widget](#) (int *x*, int *y*, int *w*, int *h*, const char **label*=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int *v*)
Internal use only.
- void **set_flag** (unsigned int *c*)
Sets a flag in the flags mask.
- void **w** (int *v*)
Internal use only.
- void **x** (int *v*)
Internal use only.
- void **y** (int *v*)
Internal use only.

12.24.1 Detailed Description

This widget provides a round analog clock display.

[FL_Clock](#) is provided for Forms compatibility. It installs a 1-second timeout callback using [Fl::add_timeout\(\)](#). You can choose the rounded or square type of the clock with [type\(\)](#). Please see [FL_Clock_Output](#) widget for applicable values.

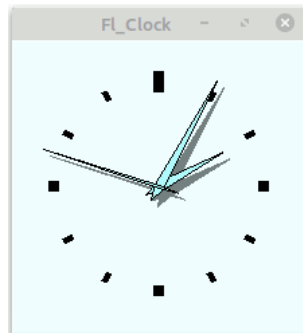


Figure 12.9 FL_SQUARE_CLOCK type

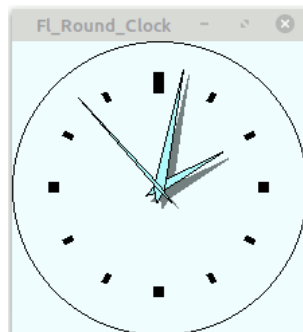


Figure 12.10 FL_ROUND_CLOCK type

See also

class [FL_Clock_Output](#)

12.24.2 Constructor & Destructor Documentation

12.24.2.1 Fl_Clock() [1/2]

```
Fl_Clock::Fl_Clock (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create an [Fl_Clock](#) widget using the given position, size, and label string. The default clock type is `FL_SQUARE_CLOCK` and the default boxtype is `FL_UP_BOX`.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

12.24.2.2 Fl_Clock() [2/2]

```
Fl_Clock::Fl_Clock (
    uchar t,
    int X,
    int Y,
    int W,
    int H,
    const char * L )
```

Create an [Fl_Clock](#) widget using the given clock type *t*, position, size, and label string. The default clock type *t* is `FL_SQUARE_CLOCK`. You can set the clock type to `FL_ROUND_CLOCK` or any other valid clock type. See [Fl_Clock_Output](#) widget for applicable values. The default boxtype is `FL_UP_BOX` for `FL_SQUARE_CLOCK` and `FL_NO_BOX` for `FL_ROUND_CLOCK`, if set by the constructor. If you change the clock type with [type\(\)](#) later you should also set the boxtype with [box\(\)](#).

Parameters

in	<i>t</i>	type of clock: <code>FL_ROUND_CLOCK</code> or <code>FL_SQUARE_CLOCK</code> (0)
in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

See also

class [Fl_Clock_Output](#)

12.24.3 Member Function Documentation

12.24.3.1 handle()

```
int Fl_Clock::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget. When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise. Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval. One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses)

in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

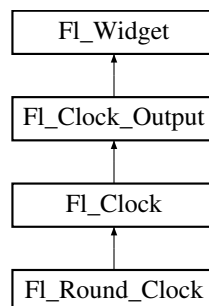
- `Fl_Clock.H`
- `Fl_Clock.cxx`

12.25 Fl_Clock_Output Class Reference

This widget can be used to display a program-supplied time.

```
#include <Fl_Clock.H>
```

Inheritance diagram for `Fl_Clock_Output`:



Public Member Functions

- `Fl_Clock_Output` (int X, int Y, int W, int H, const char *L=0)
Create a new `Fl_Clock_Output` widget with the given position, size and label.
- int `hour` () const
Returns the displayed hour (0 to 23).
- int `minute` () const
Returns the displayed minute (0 to 59).
- int `second` () const
Returns the displayed second (0 to 60, 60=leap second).
- int `shadow` () const
Returns the shadow drawing mode of the hands.
- void `shadow` (int mode)
Sets the shadow drawing mode of the hands.

- `ulong value () const`
Returns the displayed time.
- `void value (int H, int m, int s)`
Set the displayed time.
- `void value (ulong v)`
Set the displayed time.

Public Member Functions inherited from `FI_Widget`

- `void _clear_fullscreen ()`
- `void _set_fullscreen ()`
- `void activate ()`
Activates the widget.
- `unsigned int active () const`
Returns whether the widget is active.
- `int active_r () const`
Returns whether the widget and all of its parents are active.
- `FI_Align align () const`
Gets the label alignment.
- `void align (FI_Align alignment)`
Sets the label alignment.
- `long argument () const`
Gets the current user data (long) argument that is passed to the callback function.
- `void argument (long v)`
Sets the current user data (long) argument that is passed to the callback function.
- `virtual class FI_Gl_Window * as_gl_window ()`
Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- `virtual class FI_Gl_Window const * as_gl_window () const`
- `virtual FI_Group * as_group ()`
Returns an `FI_Group` pointer if this widget is an `FI_Group`.
- `virtual FI_Group const * as_group () const`
- `virtual FI_Window * as_window ()`
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- `virtual FI_Window const * as_window () const`
- `void bind_deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void bind_deimage (int f)`
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- `void bind_image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `void bind_image (int f)`
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`
Gets the box type of the widget.
- `void box (FI_Boxtype new_box)`
Sets the box type for the widget.
- `FI_Callback_p callback () const`
Gets the current callback function for the widget.
- `void callback (FI_Callback *cb)`
Sets the current callback function for the widget.
- `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback *cb`, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0 *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1 *cb`, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FI_Color bg`, `FI_Color sel`)
- Sets the background and selection color of the widget.*

 - `FI_Color color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image * deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image * deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

- void `deimage` (`FI_Image` &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with default arguments.*
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `draw_label` (int, int, int, int, `FI_Align`) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int `h` () const
 - Gets the widget height.*
- virtual int `handle` (int event)
 - Handles the specified event.*
- virtual void `hide` ()
 - Makes a widget invisible.*
- `FI_Image` * `image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
- const `FI_Image` * `image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
- void `image` (`FI_Image` &img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- int `image_bound` () const
 - Returns whether the image is managed by the widget.*
- int `inside` (const `FI_Widget` *wgt) const
 - Checks if this widget is a child of wgt.*
- int `is_label_copied` () const
 - Returns whether the current label was assigned with `copy_label()`.*
- const char * `label` () const
 - Gets the current label text.*
- void `label` (const char *text)
 - Sets the current label pointer.*
- void `label` (`FI_Labeltype` a, const char *b)
 - Shortcut to set the label text and type in one call.*
- `FI_Color` `labelcolor` () const
 - Gets the label color.*
- void `labelcolor` (`FI_Color` c)
 - Sets the label color.*
- `FI_Font` `labelfont` () const
 - Gets the font to use.*
- void `labelfont` (`FI_Font` f)
 - Sets the font to use.*
- `FI_Fontsize` `labelsize` () const
 - Gets the font size in pixels.*
- void `labelsize` (`FI_Fontsize` pix)

- Sets the font size in pixels.*
- `FI_Labeltype labeltype () const`
 - Gets the label type.*
- `void labeltype (FI_Labeltype a)`
 - Sets the label type.*
- `void measure_label (int &ww, int &hh) const`
 - Sets width ww and height hh accordingly with the label size.*
- `bool needs_keyboard () const`
 - Returns whether this widget needs a keyboard.*
- `void needs_keyboard (bool needs)`
 - Sets whether this widget needs a keyboard.*
- `unsigned int output () const`
 - Returns if a widget is used for output only.*
- `FI_Group * parent () const`
 - Returns a pointer to the parent widget.*
- `void parent (FI_Group *p)`
 - Internal use only - "for hacks only".*
- `void position (int X, int Y)`
 - Repositions the window or widget.*
- `void redraw ()`
 - Schedules the drawing of the widget.*
- `void redraw_label ()`
 - Schedules the drawing of the label.*
- `virtual void resize (int x, int y, int w, int h)`
 - Changes the size or position of the widget.*
- `FI_Color selection_color () const`
 - Gets the selection color.*
- `void selection_color (FI_Color a)`
 - Sets the selection color.*
- `void set_active ()`
 - Marks the widget as active without sending events or changing focus.*
- `void set_changed ()`
 - Marks the value of the widget as changed.*
- `void set_output ()`
 - Sets a widget to output only.*
- `void set_visible ()`
 - Makes the widget visible.*
- `void set_visible_focus ()`
 - Enables keyboard focus navigation with this widget.*
- `int shortcut_label () const`
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- `void shortcut_label (int value)`
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- `virtual void show ()`
 - Makes a widget visible.*
- `void size (int W, int H)`
 - Changes the size of the widget.*
- `int take_focus ()`
 - Gives the widget the keyboard focus.*
- `unsigned int takeevents () const`
 - Returns if the widget is able to take events.*

- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- uchar `type` () const
Gets the widget type.
- void `type` (uchar t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draw clock with current position and size.
- void `draw` (int X, int Y, int W, int H)
Draw clock with the given position and size.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [Fl_Widget](#)

```

• enum {
    INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,
    FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7
  ,
    OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11
  ,
    MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15
  ,
    GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU
    = 1<<19 ,
    NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
    AUTO_DELETE_USER_DATA = 1<<23 ,
    MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
    USERFLAG1 = 1<<31 }

```

flags possible values enumeration.

12.25.1 Detailed Description

This widget can be used to display a program-supplied time.

The time shown on the clock is not updated. To display the current time, use [Fl_Clock](#) instead.

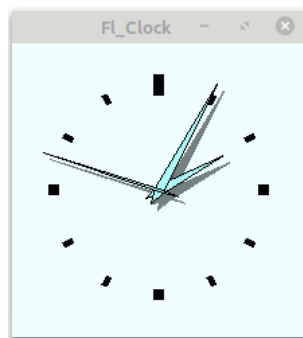


Figure 12.11 `FL_SQUARE_CLOCK` type

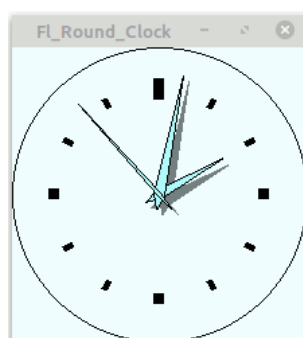


Figure 12.12 `FL_ROUND_CLOCK` type

Values for clock `type()` (`#include <FL/Clock.H>`):

```

#define FL_SQUARE_CLOCK      0      // Square Clock variant
#define FL_ROUND_CLOCK      1      // Round Clock variant
#define FL_ANALOG_CLOCK     FL_SQUARE_CLOCK // An analog clock is square
#define FL_DIGITAL_CLOCK    FL_SQUARE_CLOCK // Not yet implemented

```

12.25.2 Constructor & Destructor Documentation

12.25.2.1 Fl_Clock_Output()

```
Fl_Clock_Output::Fl_Clock_Output (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create a new [Fl_Clock_Output](#) widget with the given position, size and label.

The default clock type is `FL_SQUARE_CLOCK` and the default boxtype is `FL_UP_BOX`.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

12.25.3 Member Function Documentation

12.25.3.1 draw() [1/2]

```
void Fl_Clock_Output::draw (
    void ) [protected], [virtual]
```

Draw clock with current position and size.

Implements [Fl_Widget](#).

12.25.3.2 draw() [2/2]

```
void Fl_Clock_Output::draw (
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Draw clock with the given position and size.

Parameters

in	<i>X,Y,W,H</i>	position and size
----	----------------	-------------------

12.25.3.3 hour()

```
int Fl_Clock_Output::hour ( ) const [inline]
```

Returns the displayed hour (0 to 23).

See also

[value\(\)](#), [minute\(\)](#), [second\(\)](#)

12.25.3.4 minute()

```
int Fl_Clock_Output::minute ( ) const [inline]
```

Returns the displayed minute (0 to 59).

See also

[value\(\)](#), [hour\(\)](#), [second\(\)](#)

12.25.3.5 second()

```
int Fl_Clock_Output::second ( ) const [inline]
```

Returns the displayed second (0 to 60, 60=leap second).

See also

[value\(\)](#), [hour\(\)](#), [minute\(\)](#)

12.25.3.6 shadow() [1/2]

```
int Fl_Clock_Output::shadow ( ) const [inline]
```

Returns the shadow drawing mode of the hands.

Returns

shadow drawing mode of the hands

Return values

0	no shadows
1	draw shadows of hands (default)

12.25.3.7 shadow() [2/2]

```
void Fl_Clock_Output::shadow (
    int mode ) [inline]
```

Sets the shadow drawing mode of the hands.

Enables (1) or disables (0) drawing the hands with shadows.

Values except 0 and 1 are reserved for future extensions and yield undefined behavior.

The default is to draw the shadows (1).

Parameters

in	<i>mode</i>	1 = shadows (default), 0 = no shadows
----	-------------	---------------------------------------

12.25.3.8 value() [1/3]

```
ulong Fl_Clock_Output::value ( ) const [inline]
```

Returns the displayed time.

Returns the time in seconds since the UNIX epoch (January 1, 1970).

See also

[value\(ulong\)](#)

12.25.3.9 value() [2/3]

```
void Fl_Clock_Output::value (
    int H,
    int m,
    int s )
```

Set the displayed time.

Set the time in hours, minutes, and seconds.

Parameters

in	<i>H,m,s</i>	displayed time
----	--------------	----------------

See also

[hour\(\)](#), [minute\(\)](#), [second\(\)](#)

12.25.3.10 value() [3/3]

```
void Fl_Clock_Output::value (
    ulong v )
```

Set the displayed time.

Set the time in seconds since the UNIX epoch (January 1, 1970).

Parameters

in	<i>v</i>	seconds since epoch
----	----------	---------------------

See also

[value\(\)](#)

The documentation for this class was generated from the following files:

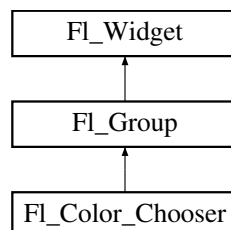
- Fl_Clock.H
- Fl_Clock.cxx

12.26 Fl_Color_Chooser Class Reference

The [Fl_Color_Chooser](#) widget provides a standard RGB color chooser.

```
#include <Fl_Color_Chooser.H>
```

Inheritance diagram for [Fl_Color_Chooser](#):

**Public Member Functions**

- `double b () const`
Returns the current blue value.
- `Fl_Color_Chooser (int X, int Y, int W, int H, const char *L=0)`
Creates a new [Fl_Color_Chooser](#) widget using the given position, size, and label string.
- `double g () const`
Returns the current green value.
- `int handle (int e) FL_OVERRIDE`
Handles all events received by this widget.
- `int hsv (double H, double S, double V)`
Set the hsv values.

- `double hue () const`
Returns the current hue.
- `int mode ()`
Returns which `FI_Color_Chooser` variant is currently active.
- `void mode (int newMode)`
Set which `FI_Color_Chooser` variant is currently active.
- `double r () const`
Returns the current red value.
- `int rgb (double R, double G, double B)`
Sets the current rgb color values.
- `double saturation () const`
Returns the saturation.
- `double value () const`
Returns the value/brightness.

Public Member Functions inherited from `FI_Group`

- `FI_Widget *& _ddfdesign_kludge ()`
This is for forms compatibility only.
- `void add (FI_Widget &)`
The widget is removed from its current group (if any) and then added to the end of this group.
- `void add (FI_Widget *o)`
See void `FI_Group::add(FI_Widget &w)`
- `void add_resizable (FI_Widget &o)`
Adds a widget to the group and makes it the resizable widget.
- `FI_Widget *const * array () const`
Returns a pointer to the array of children.
- `FI_Group const * as_group () const FL_OVERRIDE`
- `FI_Group * as_group () FL_OVERRIDE`
Returns an `FI_Group` pointer if this widget is an `FI_Group`.
- `void begin ()`
Sets the current group so you can build the widget tree by just constructing the widgets.
- `FI_Widget * child (int n) const`
Returns `array()[n]`.
- `int children () const`
Returns how many child widgets the group has.
- `void clear ()`
Deletes all child widgets from memory recursively.
- `unsigned int clip_children ()`
Returns the current clipping mode.
- `void clip_children (int c)`
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- `virtual int delete_child (int n)`
Removes the widget at `index` from the group and deletes it.
- `void end ()`
Exactly the same as `current(this->parent())`.
- `int find (const FI_Widget &o) const`
*See `int FI_Group::find(const FI_Widget *w) const`.*
- `int find (const FI_Widget *) const`
Searches the child array for the widget and returns the index.
- `FI_Group (int, int, int, int, const char * = 0)`

- Creates a new `FI_Group` widget using the given position, size, and label string.*
- void `focus` (`FI_Widget *W`)
- void `forms_end` ()
 - This is for forms compatibility only.*
- int `handle` (int) `FL_OVERRIDE`
 - Handles the specified event.*
- void `init_sizes` ()
 - Resets the internal array of widget sizes and positions.*
- void `insert` (`FI_Widget &`, int i)
 - The widget is removed from its current group (if any) and then inserted into this group.*
- void `insert` (`FI_Widget &o`, `FI_Widget *before`)
 - This does `insert(w, find(before))`.*
- void `remove` (`FI_Widget &`)
 - Removes a widget from the group but does not delete it.*
- void `remove` (`FI_Widget *o`)
 - Removes the widget `o` from the group.*
- void `remove` (int index)
 - Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget *resizable` () const
 - Returns the group's resizable widget.*
- void `resizable` (`FI_Widget &o`)
 - Sets the group's resizable widget.*
- void `resizable` (`FI_Widget *o`)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- void `resize` (int, int, int, int) `FL_OVERRIDE`
 - Resizes the `FI_Group` widget and all of its children.*
- virtual `~FI_Group` ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FI_Align` `align` () const
 - Gets the label alignment.*
- void `align` (`FI_Align` alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_GI_Window *as_gi_window` ()
 - Returns an `FI_GI_Window` pointer if this widget is an `FI_GI_Window`.*
- virtual class `FI_GI_Window` const * `as_gi_window` () const
- virtual `FI_Window *as_window` ()

- Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * **as_window** () const
- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const

- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `Fl_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `Fl_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (Fl_Image &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (Fl_Image *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (Fl_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.
- void `do_callback` (Fl_Widget *widget, long arg, Fl_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (Fl_Widget *widget, void *arg=0, Fl_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, Fl_Align) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- virtual void `hide` ()

Makes a widget invisible.
- `Fl_Image * image` ()

Gets the image that is used as part of the widget label when in the active state.
- const `Fl_Image * image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (Fl_Image &img)

Sets the image to use as part of the widget label when in the active state.
- void `image` (Fl_Image *img)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const Fl_Widget *wgt) const

Checks if this widget is a child of wgt.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.

- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`
Gets the font size in pixels.
- `void labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- `void labeltype (FI_Labeltype a)`
Sets the label type.
- `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
- `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- `unsigned int output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`
Schedules the drawing of the widget.
- `void redraw_label ()`
Schedules the drawing of the label.
- `FI_Color selection_color () const`
Gets the selection color.
- `void selection_color (FI_Color a)`
Sets the selection color.
- `void set_active ()`
Marks the widget as active without sending events or changing focus.
- `void set_changed ()`
Marks the value of the widget as changed.
- `void set_output ()`
Sets a widget to output only.
- `void set_visible ()`

- Makes the widget visible.*
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.

- `FI_Window * window () const`
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~FI_Widget ()`
Destroys the widget.

Static Public Member Functions

- `static void hsv2rgb (double H, double S, double V, double &R, double &G, double &B)`
This static method converts HSV colors to RGB colorspace.
- `static void rgb2hsv (double R, double G, double B, double &H, double &S, double &V)`
This static method converts RGB colors to HSV colorspace.

Static Public Member Functions inherited from `FI_Group`

- `static FI_Group * current ()`
Returns the currently active group.
- `static void current (FI_Group *g)`
Sets the current group.

Static Public Member Functions inherited from `FI_Widget`

- `static void default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- `static unsigned int label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- `static int test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Related Symbols

(Note that these are not member symbols.)

- `int fl_color_chooser (const char *name, double &r, double &g, double &b, int cmode)`
Pops up a window to let the user pick an arbitrary RGB color.
- `int fl_color_chooser (const char *name, uchar &r, uchar &g, uchar &b, int cmode)`
Pops up a window to let the user pick an arbitrary RGB color.

Additional Inherited Members

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
, `OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
, `MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
, `GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,

```
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
USERFLAG1 = 1<<31 }
```

flags possible values enumeration.

Protected Member Functions inherited from FI_Group

- `FI_Rect * bounds ()`
Returns the internal array of widget sizes and positions.
- `void draw () FL_OVERRIDE`
Draws the widget.
- `void draw_child (FI_Widget &widget) const`
Forces a child to redraw.
- `void draw_children ()`
Draws all children of the group.
- `void draw_outside_label (const FI_Widget &widget) const`
Parents normally call this to draw outside labels of child widgets.
- `virtual int on_insert (FI_Widget *, int)`
Allow derived groups to act when a widget is added as a child.
- `virtual int on_move (int, int)`
Allow derived groups to act when a widget is moved within the group.
- `virtual void on_remove (int)`
Allow derived groups to act when a child widget is removed from the group.
- `int * sizes ()`
Returns the internal array of widget sizes and positions.
- `void update_child (FI_Widget &widget) const`
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- `void clear_flag (unsigned int c)`
Clears a flag in the flags mask.
- `void draw_backdrop () const`
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- `void draw_box () const`
Draws the widget box according its box style.
- `void draw_box (FI_Boxtype t, FI_Color c) const`
Draws a box of type t, of color c at the widget's position and size.
- `void draw_box (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const`
Draws a box of type t, of color c at the position X,Y and size W,H.
- `void draw_focus () const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int X, int Y, int W, int H) const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const`
Draws a focus box for the widget at the given position and size.
- `void draw_label () const`
Draws the widget's label at the defined label position.
- `void draw_label (int, int, int, int) const`
Draws the label in an arbitrary bounding box.
- `FI_Widget (int x, int y, int w, int h, const char *label=0L)`
Creates a widget at the given position and size.

- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.26.1 Detailed Description

The `Fl_Color_Chooser` widget provides a standard RGB color chooser.

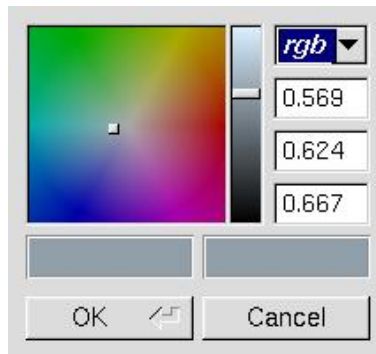


Figure 12.13 `fl_color_chooser()`

You can place any number of the widgets into a panel of your own design. The diagram shows the widget as part of a color chooser dialog created by the `fl_color_chooser()` function. The `Fl_Color_Chooser` widget contains the hue box, value slider, and rgb input fields from the above diagram (it does not have the color chips or the Cancel or OK buttons). The callback is done every time the user changes the rgb value. It is not done if they move the hue control in a way that produces the *same* rgb value, such as when saturation or value is zero.

The `fl_color_chooser()` function pops up a window to let the user pick an arbitrary RGB color. They can pick the hue and saturation in the "hue box" on the left (hold down CTRL to just change the saturation), and the brightness using the vertical slider. Or they can type the 8-bit numbers into the RGB `Fl_Value_Input` fields, or drag the mouse across them to adjust them. The pull-down menu lets the user set the input fields to show RGB, HSV, or 8-bit RGB (0 to 255).

The user can press CTRL-C to copy the currently selected color value as text in RGB hex format with leading zeroes to the clipboard, for instance `FL_GREEN` would be '00FF00' (since FLTK 1.4.0).

`fl_color_chooser()` returns non-zero if the user picks ok, and updates the RGB values. If the user picks cancel or closes the window this returns zero and leaves RGB unchanged.

If you use the color chooser on an 8-bit screen, it will allocate all the available colors, leaving you no space to exactly represent the color the user picks! You can however use `fl_rectf()` to fill a region with a simulated color using dithering.

Callback reasons can be `FL_REASON_DRAGGED`, `FL_REASON_CHANGED`, or `FL_REASON_RESELECTED`.

12.26.2 Constructor & Destructor Documentation

12.26.2.1 `Fl_Color_Chooser()`

```
Fl_Color_Chooser::Fl_Color_Chooser (
    int X,
    int Y,
```

```
int W,
int H,
const char * L = 0 )
```

Creates a new [Fl_Color_Chooser](#) widget using the given position, size, and label string. The recommended dimensions are 200x95. The color is initialized to black.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

12.26.3 Member Function Documentation

12.26.3.1 b()

```
double Fl_Color_Chooser::b ( ) const [inline]
```

Returns the current blue value.

$0 \leq b \leq 1$.

12.26.3.2 g()

```
double Fl_Color_Chooser::g ( ) const [inline]
```

Returns the current green value.

$0 \leq g \leq 1$.

12.26.3.3 handle()

```
int Fl_Color_Chooser::handle (
    int e ) [virtual]
```

Handles all events received by this widget.

This specific [handle\(\)](#) method processes the standard 'copy' function as seen in other input widgets. It copies the current color value to the clipboard as a string in RGB format ('RRGGBB').

This format is independent of the [Fl_Color_Chooser](#) display format setting. No other formats are supplied.

The keyboard events handled are:

- ctrl-c
- ctrl-x
- ctrl-Insert

All other events are processed by the parent class [Fl_Group](#).

This enables the **user** to choose a color value, press `ctrl-c` to copy the value to the clipboard and paste it into a color selection widget in another application window or any other text input (e.g. a preferences dialog or an editor).

Note

Keyboard event handling by the current focus widget has priority, hence moving the focus to one of the buttons or selecting text in one of the input widgets effectively disables this special method.

Parameters

in	<i>e</i>	current event
----	----------	---------------

Returns

1 if event has been handled, 0 otherwise

See also

[Fl_Group::handle\(int\)](#)

Reimplemented from [Fl_Widget](#).

12.26.3.4 hsv()

```
int Fl_Color_Chooser::hsv (
    double H,
    double S,
    double V )
```

Set the hsv values.

The passed values are clamped (or for hue, modulus 6 is used) to get legal values. Does not do the callback.

Parameters

in	<i>H,S,V</i>	color components.
----	--------------	-------------------

Returns

1 if a new hsv value was set, 0 if the hsv value was the previous one.

12.26.3.5 hsv2rgb()

```
void Fl_Color_Chooser::hsv2rgb (
    double H,
    double S,
    double V,
    double & R,
    double & G,
    double & B ) [static]
```

This *static* method converts HSV colors to RGB colorspace.

Parameters

in	<i>H,S,V</i>	color components
out	<i>R,G,B</i>	color components

12.26.3.6 hue()

```
double Fl_Color_Chooser::hue ( ) const [inline]
```

Returns the current hue.

$0 \leq \text{hue} < 6$. Zero is red, one is yellow, two is green, etc. *This value is convenient for the internal calculations - some other systems consider hue to run from zero to one, or from 0 to 360.*

12.26.3.7 mode() [1/2]

```
int Fl_Color_Chooser::mode ( ) [inline]
```

Returns which [Fl_Color_Chooser](#) variant is currently active.

Returns

color modes are rgb(0), byte(1), hex(2), or hsv(3)

12.26.3.8 mode() [2/2]

```
void Fl_Color_Chooser::mode (
    int newMode )
```


Set which `Fl_Color_Chooser` variant is currently active.

Parameters

in	<i>newMode</i>	color modes are rgb(0), byte(1), hex(2), or hsv(3)
----	----------------	--

12.26.3.9 r()

```
double Fl_Color_Chooser::r ( ) const [inline]
```

Returns the current red value.

$0 \leq r \leq 1$.

12.26.3.10 rgb()

```
int Fl_Color_Chooser::rgb (
    double R,
    double G,
    double B )
```

Sets the current rgb color values.

Does not do the callback. Does not clamp (but out of range values will produce psychedelic effects in the hue selector).

Parameters

in	<i>R,G,B</i>	color components.
----	--------------	-------------------

Returns

1 if a new rgb value was set, 0 if the rgb value was the previous one.

12.26.3.11 rgb2hsv()

```
void Fl_Color_Chooser::rgb2hsv (
    double R,
    double G,
    double B,
    double & H,
    double & S,
    double & V ) [static]
```

This *static* method converts RGB colors to HSV colorspace.

Parameters

in	<i>R,G,B</i>	color components
out	<i>H,S,V</i>	color components

12.26.3.12 saturation()

```
double Fl_Color_Chooser::saturation ( ) const [inline]
```

Returns the saturation.

$0 \leq \text{saturation} \leq 1$.

12.26.3.13 value()

```
double Fl_Color_Chooser::value ( ) const [inline]
```

Returns the value/brightness.

$0 \leq \text{value} \leq 1$.

The documentation for this class was generated from the following files:

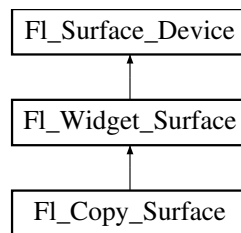
- [Fl_Color_Chooser.H](#)
- [Fl_Color_Chooser.cxx](#)

12.27 Fl_Copy_Surface Class Reference

Supports copying of graphical data to the clipboard.

```
#include <Fl_Copy_Surface.H>
```

Inheritance diagram for Fl_Copy_Surface:



Public Member Functions

- [Fl_Copy_Surface](#) (int **w**, int **h**)
the constructor
- int **h** ()
Returns the pixel height of the copy surface.
- bool [is_current](#) () [FL_OVERRIDE](#)
Is this surface the current drawing surface?
- void [origin](#) (int *x, int *y) [FL_OVERRIDE](#)
Computes the coordinates of the current origin of graphics functions.
- void [origin](#) (int x, int y) [FL_OVERRIDE](#)
Sets the position of the origin of graphics in the drawable part of the drawing surface.
- int [printable_rect](#) (int *w, int *h) [FL_OVERRIDE](#)
Computes the width and height of the drawable area of the drawing surface.
- void [set_current](#) () [FL_OVERRIDE](#)
Make this surface the current drawing surface.
- int **w** ()
Returns the pixel width of the copy surface.
- [~Fl_Copy_Surface](#) ()
the destructor

Public Member Functions inherited from [Fl_Widget_Surface](#)

- void [draw](#) ([Fl_Widget](#) *widget, int delta_x=0, int delta_y=0)
Draws the widget on the drawing surface.
- void [draw_decorated_window](#) ([Fl_Window](#) *win, int x_offset=0, int y_offset=0)
Draws a window with its title bar and frame if any.
- void [print_window_part](#) ([Fl_Window](#) *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Draws a rectangular part of an on-screen window.

Public Member Functions inherited from FI_Surface_Device

- FI_Graphics_Driver * **driver** ()
Returns the graphics driver of this drawing surface.
- virtual ~**FI_Surface_Device** ()
The destructor.

Protected Member Functions

- void **translate** (int x, int y) **FL_OVERRIDE**
Translates the current graphics origin accounting for the current rotation.
- void **untranslate** () **FL_OVERRIDE**
Undoes the effect of a previous [translate\(\)](#) call.

Protected Member Functions inherited from FI_Widget_Surface

- **FI_Widget_Surface** (FI_Graphics_Driver *d)
The constructor.

Protected Member Functions inherited from FI_Surface_Device

- void **driver** (FI_Graphics_Driver *graphics_driver)
Sets the graphics driver of this drawing surface.
- virtual void **end_current** ()
FLTK calls this each time a surface ceases to be the current drawing surface.
- **FI_Surface_Device** (FI_Graphics_Driver *graphics_driver)
Constructor that sets the graphics driver to use for the created surface.

Additional Inherited Members

Static Public Member Functions inherited from FI_Surface_Device

- static **FI_Surface_Device** * **pop_current** ()
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void **push_current** (FI_Surface_Device *new_current)
*Pushes *new_current* on top of the stack of current drawing surfaces, and makes it current.*
- static **FI_Surface_Device** * **surface** ()
The current drawing surface.

Protected Attributes inherited from FI_Widget_Surface

- int **x_offset**
horizontal offset to the origin of graphics coordinates
- int **y_offset**
vertical offset to the origin of graphics coordinates

12.27.1 Detailed Description

Supports copying of graphical data to the clipboard.

After creation of an [FI_Copy_Surface](#) object, make it the current drawing surface calling [FI_Surface_Device::push_current\(\)](#), and all subsequent graphics requests will be recorded in the clipboard. It's possible to draw widgets (using [FI_Copy_Surface::draw\(\)](#)) or to use any of the [Drawing functions](#) or the [Color & Font functions](#). Finally, delete the [FI_Copy_Surface](#) object to load the clipboard with the graphical data.

[FI_Gl_Window](#) 's can be copied to the clipboard as well.

Usage example:

```
Fl_Widget *g = ...; // a widget you want to copy to the clipboard
Fl_Copy_Surface *copy_surf = new Fl_Copy_Surface(g->w(), g->h()); // create an Fl_Copy_Surface object
Fl_Surface_Device::push_current(copy_surf); // direct graphics requests to the clipboard
fl_color(FL_WHITE); fl_rectf(0, 0, g->w(), g->h()); // draw a white background
copy_surf->draw(g); // draw the g widget in the clipboard
Fl_Surface_Device::pop_current(); // direct graphics requests back to their previous destination
delete copy_surf; // after this, the clipboard is loaded
```

Platform details:

- Windows: Transparent RGB images copy without transparency. The graphical data are copied to the clipboard in two formats: 1) as an 'enhanced metafile'; 2) as a color bitmap. Applications to which the clipboard content is pasted can use the format that suits them best.
- Mac OS: The graphical data are copied to the clipboard (a.k.a. pasteboard) in two 'flavors': 1) in vectorial form as PDF data; 2) in bitmap form as a TIFF image. Applications to which the clipboard content is pasted can use the flavor that suits them best.
- X11 and Wayland: the graphical data are copied to the clipboard as an image in BMP format.

12.27.2 Constructor & Destructor Documentation

12.27.2.1 Fl_Copy_Surface()

```
Fl_Copy_Surface::Fl_Copy_Surface (
    int w,
    int h )
```

the constructor

Parameters

<i>w,h</i>	Width and height of the drawing surface in FLTK units
------------	---

12.27.3 Member Function Documentation

12.27.3.1 is_current()

```
bool Fl_Copy_Surface::is_current ( ) [virtual]
```

Is this surface the current drawing surface?

Reimplemented from [Fl_Surface_Device](#).

12.27.3.2 origin() [1/2]

```
void Fl_Copy_Surface::origin (
    int * x,
    int * y ) [virtual]
```

Computes the coordinates of the current origin of graphics functions.

Parameters

out	<i>x,y</i>	If non-null, *x and *y are set to the horizontal and vertical coordinates of the graphics origin.
-----	------------	---

Reimplemented from [Fl_Widget_Surface](#).

12.27.3.3 origin() [2/2]

```
void Fl_Copy_Surface::origin (
    int x,
    int y ) [virtual]
```

Sets the position of the origin of graphics in the drawable part of the drawing surface.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the drawable area. Suc-

cessive [origin\(\)](#) calls don't combine their effects. [Origin\(\)](#) calls are not affected by [rotate\(\)](#) calls (for classes derived from [Fl_Paged_Device](#)).

Parameters

in	x,y	Horizontal and vertical positions in the drawing surface of the desired origin of graphics.
----	-----	---

Reimplemented from [Fl_Widget_Surface](#).

12.27.3.4 printable_rect()

```
int Fl_Copy_Surface::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the drawable area of the drawing surface.

Values are in the same unit as that used by FLTK drawing functions and are unchanged by calls to [origin\(\)](#). If the object is derived from class [Fl_Paged_Device](#), values account for the user-selected paper type and print orientation and are changed by [scale\(\)](#) calls.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Widget_Surface](#).

12.27.3.5 set_current()

```
void Fl_Copy_Surface::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests. Starting from FLTK 1.4.0, the preferred API to change the current drawing surface is [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Note

It's recommended to use this function only as follows :

- The current drawing surface is the display;
- make current another surface, e.g., an [Fl_Printer](#) or an [Fl_Image_Surface](#) object, calling [set_current\(\)](#) on this object;
- draw to that surface;
- make the display current again with [Fl_Display_Device::display_device\(\)->set_current\(\)](#); . Don't do any other call to [set_current\(\)](#) before this one.

Other scenarios of drawing surface changes should be performed via [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Reimplemented from [Fl_Surface_Device](#).

12.27.3.6 translate()

```
void Fl_Copy_Surface::translate (
    int x,
    int y ) [protected], [virtual]
```

Translates the current graphics origin accounting for the current rotation.

Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call. Successive [translate\(\)](#) calls add up their effects.

Reimplemented from [Fl_Widget_Surface](#).

12.27.3.7 untranslate()

```
void Fl_Copy_Surface::untranslate (
    void ) [protected], [virtual]
```

Undoes the effect of a previous [translate\(\)](#) call.

Reimplemented from [Fl_Widget_Surface](#).

The documentation for this class was generated from the following files:

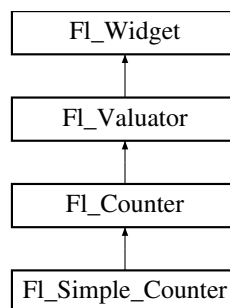
- [Fl_Copy_Surface.H](#)
- [Fl_Copy_Surface.cxx](#)

12.28 Fl_Counter Class Reference

Controls a single floating point value with button (or keyboard) arrows.

```
#include <Fl_Counter.H>
```

Inheritance diagram for [Fl_Counter](#):



Public Member Functions

- [Fl_Counter](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Counter](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- void [lstep](#) (double a)
Sets the increment for the large step buttons.
- double [step](#) () const
Returns the increment for normal step buttons.
- void [step](#) (double a)
Sets the increment for the normal step buttons.
- void [step](#) (double a, double b)
Sets the increments for the normal and large step buttons.
- [Fl_Color](#) [textcolor](#) () const
Gets the font color.
- void [textcolor](#) ([Fl_Color](#) s)
Sets the font color to s.
- [Fl_Font](#) [textfont](#) () const
Gets the text font.
- void [textfont](#) ([Fl_Font](#) s)
Sets the text font to s.
- [Fl_Fontsize](#) [textsize](#) () const
Gets the font size.
- void [textsize](#) ([Fl_Fontsize](#) s)
Sets the font size to s.
- [~Fl_Counter](#) ()
Destroys the valuator.

Public Member Functions inherited from FI_Valuator

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.
- double **step** () const
Gets or sets the step value.
- void **step** (double a, int b)
See double FI_Valuator::step() const
- void **step** (double s)
See double FI_Valuator::step() const.
- void **step** (int a)
See double FI_Valuator::step() const
- double **value** () const
Gets the floating point(double) value.
- int **value** (double)
Sets the current value.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- FI_Align **align** () const
Gets the label alignment.
- void **align** (FI_Align alignment)

- Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
 - Returns an `FI_Group` pointer if this widget is an `FI_Group`.*
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()

- Disables keyboard focus navigation with this widget.*

 - `FI_Color color () const`
Gets the background color of the widget.
 - `void color (FI_Color bg)`
Sets the background color of the widget.
 - `void color (FI_Color bg, FI_Color sel)`
Sets the background and selection color of the widget.
 - `FI_Color color2 () const`
For back compatibility only.
 - `void color2 (unsigned a)`
For back compatibility only.
 - `int contains (const FI_Widget *w) const`
Checks if w is a child of this widget.
 - `void copy_label (const char *new_label)`
Sets the current label.
 - `void copy_tooltip (const char *text)`
Sets the current tooltip text.
 - `uchar damage () const`
Returns non-zero if draw() needs to be called.
 - `void damage (uchar c)`
Sets the damage bits for the widget.
 - `void damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
 - `int damage_resize (int, int, int, int)`
Internal use only.
 - `void deactivate ()`
Deactivates the widget.
 - `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
 - `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
 - `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
 - `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
 - `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
 - `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
 - `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
 - `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
 - `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
 - `int h () const`
Gets the widget height.
 - `virtual void hide ()`
Makes a widget invisible.
 - `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.

- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`
Gets the font size in pixels.
- `void labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- `void labeltype (FI_Labeltype a)`
Sets the label type.
- `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
- `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- `unsigned int output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`
Schedules the drawing of the widget.
- `void redraw_label ()`

- Schedules the drawing of the label.*

 - virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
- `FI_Color selection_color` () const
 - Gets the selection color.*
- void `selection_color` (`FI_Color` a)
 - Sets the selection color.*
- void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
- void `set_changed` ()
 - Marks the value of the widget as changed.*
- void `set_output` ()
 - Sets a widget to output only.*
- void `set_visible` ()
 - Makes the widget visible.*
- void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
- int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void `show` ()
 - Makes a widget visible.*
- void `size` (int W, int H)
 - Changes the size of the widget.*
- int `take_focus` ()
 - Gives the widget the keyboard focus.*
- unsigned int `takeevents` () const
 - Returns if the widget is able to take events.*
- int `test_shortcut` ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
- const char * `tooltip` () const
 - Gets the current tooltip text.*
- void `tooltip` (const char *text)
 - Sets the current tooltip text.*
- `FI_Window * top_window` () const
 - Returns a pointer to the top-level window for the widget.*
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const
 - Finds the x/y offset of the current widget relative to the top-level window.*
- `uchar type` () const
 - Gets the widget type.*
- void `type` (`uchar` t)
 - Sets the widget type.*
- int `use_accents_menu` ()
 - Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*
- void * `user_data` () const
 - Gets the user data for this widget.*
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
 - Sets the user data for this widget.*
- void `user_data` (void *v)
 - Sets the user data for this widget.*

- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FL_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FL_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FL_Widget` ()
Destroys the widget.

Protected Member Functions

- void `arrow_widths` (int &w1, int &w2)
Compute sizes (widths) of arrow boxes.
- void `draw` () `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from `FL_Valuator`

- `FL_Valuator` (int X, int Y, int W, int H, const char *L)
Creates a new `FL_Valuator` widget using the given position, size, and label string.
- void `handle_drag` (double newvalue)
Called during a drag operation, after an `FL_WHEN_CHANGED` event is received and before the callback.
- void `handle_push` ()
Stores the current value in the previous value.
- void `handle_release` ()
Called after an `FL_WHEN_RELEASE` event is received and before the callback.
- int `horizontal` () const
Tells if the valuator is an `FL_HORIZONTAL` one.
- double `previous_value` () const
Gets the previous floating point value before an event changed it.
- void `set_value` (double v)
Sets the current floating point value.
- double `softclamp` (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void `value_damage` ()
Asks for partial redraw.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.28.1 Detailed Description

Controls a single floating point value with button (or keyboard) arrows. Double arrows buttons achieve larger steps than simple arrows.

See also

[FI_Spinner](#) for *value* input with vertical *step* arrows.

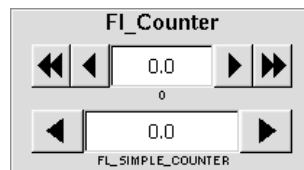


Figure 12.14 [FI_Counter](#)

The type of an [FI_Counter](#) object can be set using [FI_Widget::type\(uchar\)](#) to:

- [FL_NORMAL_COUNTER](#): Displays a counter with 4 arrow buttons.
- [FL_SIMPLE_COUNTER](#): Displays a counter with only 2 arrow buttons.

12.28.2 Constructor & Destructor Documentation

12.28.2.1 [FI_Counter\(\)](#)

```
FI_Counter::FI_Counter (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [FI_Counter](#) widget using the given position, size, and label string. The default type is [FL_NORMAL_COUNTER](#).

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

12.28.3 Member Function Documentation

12.28.3.1 arrow_widths()

```
void Fl_Counter::arrow_widths (
    int & w1,
    int & w2 ) [protected]
```

Compute sizes (widths) of arrow boxes.

This method computes the two sizes of the arrow boxes of [Fl_Counter](#). You can override it in a subclass if you want to draw fancy arrows or change the layout. However, the basic layout is fixed and can't be changed w/o overriding the [draw\(\)](#) and [handle\(\)](#) methods.

Basic layout:

```
+-----+-----+-----+-----+
| « | < | value | > | » |
+-----+-----+-----+-----+
```

The returned value `w2` should be zero if the counter [type\(\)](#) is `FL_SIMPLE_COUNTER`.

Parameters

out	<i>w1</i>	width of single arrow box
out	<i>w2</i>	width of double arrow box

12.28.3.2 draw()

```
void Fl_Counter::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.28.3.3 handle()

```
int Fl_Counter::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
---	---

Return values

1	if the event was used and can be deleted
---	--

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

12.28.3.4 lstep()

```
void Fl_Counter::lstep (
    double a ) [inline]
```

Sets the increment for the large step buttons.
The default value is 1.0.

Parameters

in	<i>a</i>	large step increment.
----	----------	-----------------------

12.28.3.5 step() [1/2]

```
void Fl_Counter::step (
    double a ) [inline]
```

Sets the increment for the normal step buttons.

Parameters

in	<i>a</i>	normal step increment.
----	----------	------------------------

12.28.3.6 step() [2/2]

```
void Fl_Counter::step (
    double a,
    double b ) [inline]
```

Sets the increments for the normal and large step buttons.

Parameters

in	<i>a,b</i>	normal and large step increments.
----	------------	-----------------------------------

The documentation for this class was generated from the following files:

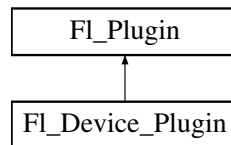
- [Fl_Counter.H](#)
- [Fl_Counter.cxx](#)

12.29 Fl_Device_Plugin Class Reference

This plugin socket allows the integration of new device drivers for special window or screen types.

```
#include <Fl_Device.H>
```

Inheritance diagram for [Fl_Device_Plugin](#):



Public Member Functions

- **FI_Device_Plugin** (const char *pluginName)
The constructor.
- virtual const char * **klass** ()
Returns the class name.
- virtual const char * **name** ()=0
Returns the plugin name.
- virtual int **print** (FL_Widget *w)=0
Prints a widget.
- virtual **FI_RGB_Image** * **rectangle_capture** (FL_Widget *widget, int x, int y, int w, int h)=0
Captures a rectangle of a widget as an image.

Public Member Functions inherited from FI_Plugin

- **FI_Plugin** (const char *klass, const char *name)
Create a plugin.
- virtual ~**FI_Plugin** ()
Clear the plugin and remove it from the database.

Static Public Member Functions

- static **FI_Device_Plugin** * **opengl_plugin** ()
Returns the OpenGL plugin.

12.29.1 Detailed Description

This plugin socket allows the integration of new device drivers for special window or screen types.

This class is not intended for use outside the FLTK library. It is currently used to provide an automated printing service and screen capture for OpenGL windows, if linked with fltk_gl.

12.29.2 Member Function Documentation

12.29.2.1 rectangle_capture()

```

virtual FI_RGB_Image * FI_Device_Plugin::rectangle_capture (
    FI_Widget * widget,
    int x,
    int y,
    int w,
    int h ) [pure virtual]
  
```

Captures a rectangle of a widget as an image.

Returns

The captured pixels as an RGB image

The documentation for this class was generated from the following files:

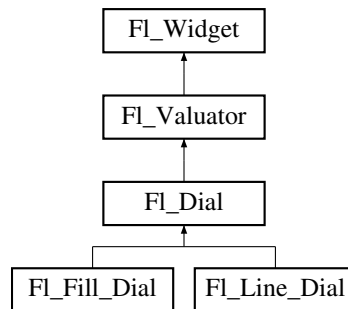
- [FI_Device.H](#)
- [FI_Device.cxx](#)

12.30 FI_Dial Class Reference

The `FI_Dial` widget provides a circular dial to control a single floating point value.

```
#include <FI_Dial.H>
```

Inheritance diagram for `FI_Dial`:



Public Member Functions

- short `angle1` () const
Sets Or gets the angles used for the minimum and maximum values.
- void `angle1` (short a)
See short `angle1()` const.
- short `angle2` () const
See short `angle1()` const.
- void `angle2` (short a)
See short `angle1()` const.
- void `angles` (short a, short b)
See short `angle1()` const.
- `FI_Dial` (int x, int y, int w, int h, const char *l=0)
Creates a new `FI_Dial` widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Allow subclasses to handle event based on current position and size.

Public Member Functions inherited from `FI_Valuator`

- void `bounds` (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double `clamp` (double)
Clamps the passed value to the valuator range.
- virtual int `format` (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double `increment` (double, int)
Adds n times the step value to the passed value.
- double `maximum` () const
Gets the maximum value for the valuator.
- void `maximum` (double a)
Sets the maximum value for the valuator.
- double `minimum` () const
Gets the minimum value for the valuator.
- void `minimum` (double a)
Sets the minimum value for the valuator.
- void `precision` (int digits)

- Sets the step value to $1.0 / 10^{\text{digits}}$.*
- void **range** (double a, double b)
 - Sets the minimum and maximum values for the valuator.*
- double **round** (double)
 - Round the passed value to the nearest step increment.*
- double **step** () const
 - Gets or sets the step value.*
- void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
- void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
- void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double **value** () const
 - Gets the floating point(double) value.*
- int **value** (double)
 - Sets the current value.*

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) **align** () const
 - Gets the label alignment.*
- void **align** ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** ([FI_Image](#) *img)

- Sets the image to use as part of the widget label when in the active state.*

 - void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*

- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `Fl_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `Fl_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`Fl_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`Fl_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`Fl_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`Fl_Widget *widget`, `long arg`, `Fl_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`Fl_Widget *widget`, `void *arg=0`, `Fl_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `Fl_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `Fl_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `Fl_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`Fl_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`Fl_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `Fl_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`Fl_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `Fl_Color labelcolor` () const

- Gets the label color.*
- void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
- [FI_Font](#) [labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype](#) [labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.

- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- void **draw** () [FL_OVERRIDE](#)
Draws dial at current position and size.
- void **draw** (int X, int Y, int W, int H)
Draws dial at given position and size.
- int **handle** (int event, int X, int Y, int W, int H)
Allows subclasses to handle event based on given position and size.

Protected Member Functions inherited from [FI_Valuator](#)

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
Creates a new [FI_Valuator](#) widget using the given position, size, and label string.
- void **handle_drag** (double newvalue)
Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.
- void **handle_push** ()
Stores the current value in the previous value.
- void **handle_release** ()
Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.
- int **horizontal** () const
Tells if the valuator is an [FL_HORIZONTAL](#) one.
- double **previous_value** () const
Gets the previous floating point value before an event changed it.
- void **set_value** (double v)
Sets the current floating point value.
- double **softclamp** (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void **value_damage** ()
Asks for partial redraw.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.

- `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char `*label=0L`)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int `v`)
Internal use only.
- void `set_flag` (unsigned int `c`)
Sets a flag in the flags mask.
- void `w` (int `v`)
Internal use only.
- void `x` (int `v`)
Internal use only.
- void `y` (int `v`)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` `*widget`, void `*data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char `*t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char `*`, const bool `require_alt=false`)
Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
, `OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
, `MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
, `GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,
`AUTO_DELETE_USER_DATA = 1<<23` ,
`MAXIMIZED = 1<<24` , `POPUP = 1<<25` , `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` ,
`USERFLAG1 = 1<<31` }
flags possible values enumeration.

12.30.1 Detailed Description

The `FI_Dial` widget provides a circular dial to control a single floating point value.

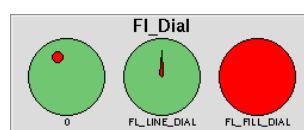


Figure 12.15 `FI_Dial`

Use `type()` to set the type of the dial to:

- FL_NORMAL_DIAL - Draws a normal dial with a knob.
- FL_LINE_DIAL - Draws a dial with a line.
- FL_FILL_DIAL - Draws a dial with a filled arc.

12.30.2 Constructor & Destructor Documentation

12.30.2.1 Fl_Dial()

```
Fl_Dial::Fl_Dial (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Dial](#) widget using the given position, size, and label string. The default type is FL_NORMAL_DIAL.

12.30.3 Member Function Documentation

12.30.3.1 angle1()

```
short Fl_Dial::angle1 ( ) const [inline]
```

Sets Or gets the angles used for the minimum and maximum values.

The default values are 45 and 315 (0 degrees is straight down and the angles progress clockwise). Normally angle1 is less than angle2, but if you reverse them the dial moves counter-clockwise.

12.30.3.2 draw() [1/2]

```
void Fl_Dial::draw (
    void ) [protected], [virtual]
```

Draws dial at current position and size.

Implements [Fl_Widget](#).

12.30.3.3 draw() [2/2]

```
void Fl_Dial::draw (
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Draws dial at given position and size.

Parameters

in	X,Y,W,H	position and size
----	---------	-------------------

12.30.3.4 handle() [1/2]

```
int Fl_Dial::handle (
    int event,
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Allows subclasses to handle event based on given position and size.

Parameters

in	<i>event,X,Y,W,H</i>	event to handle, related position and size.
----	----------------------	---

12.30.3.5 handle() [2/2]

```
int Fl_Dial::handle (
    int e ) [virtual]
```

Allow subclasses to handle event based on current position and size.

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

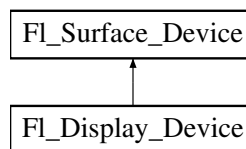
- Fl_Dial.H
- Fl_Dial.cxx

12.31 Fl_Display_Device Class Reference

The computer's display.

```
#include <Fl_Device.H>
```

Inheritance diagram for Fl_Display_Device:

**Static Public Member Functions**

- static [Fl_Display_Device](#) * **display_device** ()
Returns a pointer to the unique display device.

Static Public Member Functions inherited from [Fl_Surface_Device](#)

- static [Fl_Surface_Device](#) * **pop_current** ()
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void **push_current** ([Fl_Surface_Device](#) *new_current)
Pushes new_current on top of the stack of current drawing surfaces, and makes it current.
- static [Fl_Surface_Device](#) * **surface** ()
The current drawing surface.

Additional Inherited Members**Public Member Functions inherited from [Fl_Surface_Device](#)**

- [Fl_Graphics_Driver](#) * **driver** ()
Returns the graphics driver of this drawing surface.
- virtual bool **is_current** ()
Is this surface the current drawing surface?
- virtual void **set_current** (void)
Make this surface the current drawing surface.
- virtual **~Fl_Surface_Device** ()
The destructor.

Protected Member Functions inherited from [Fl_Surface_Device](#)

- void **driver** ([Fl_Graphics_Driver](#) *graphics_driver)
Sets the graphics driver of this drawing surface.
- virtual void **end_current** ()
FLTK calls this each time a surface ceases to be the current drawing surface.
- **Fl_Surface_Device** ([Fl_Graphics_Driver](#) *graphics_driver)
Constructor that sets the graphics driver to use for the created surface.

12.31.1 Detailed Description

The computer's display.

When FLTK begins to access the computer's display, it creates an object of class [Fl_Display_Device](#) and makes it the current drawing surface.

The documentation for this class was generated from the following files:

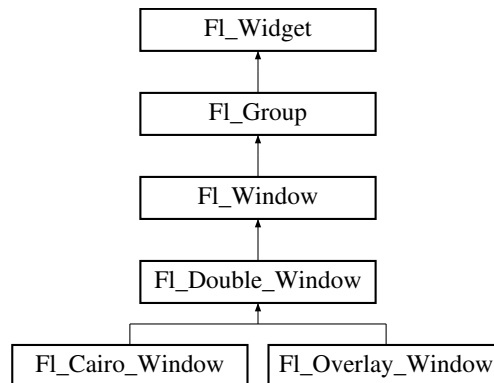
- [Fl_Device.H](#)
- [Fl_Device.cxx](#)

12.32 [Fl_Double_Window](#) Class Reference

The [Fl_Double_Window](#) provides a double-buffered window.

```
#include <Fl_Double_Window.H>
```

Inheritance diagram for [Fl_Double_Window](#):



Public Member Functions

- [Fl_Double_Window](#) * **as_double_window** () **FL_OVERRIDE**
Return non-null if this is an [Fl_Overlay_Window](#) object.
- **Fl_Double_Window** (int W, int H, const char *l=0)
Creates a new [Fl_Double_Window](#) widget using the given position, size, and label (title) string.
- **Fl_Double_Window** (int X, int Y, int W, int H, const char *l=0)
*See [Fl_Double_Window::Fl_Double_Window\(int w, int h, const char *label = 0\)](#)*
- void **flush** () **FL_OVERRIDE**
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- void **hide** () **FL_OVERRIDE**
Makes a widget invisible.
- void **resize** (int, int, int, int) **FL_OVERRIDE**
Changes the size or position of the widget.
- void **show** () **FL_OVERRIDE**
Makes a widget visible.

- void **show** (int a, char **b)
*Same as [FI_Window::show\(int a, char **b\)](#)*
- [~FI_Double_Window](#) ()
The destructor also deletes all the children.

Public Member Functions inherited from [FI_Window](#)

- virtual class [FI_Overlay_Window](#) * [as_overlay_window](#) ()
Return non-null if this is an [FI_Overlay_Window](#) object.
- [FI_Window](#) const * [as_window](#) () const [FL_OVERRIDE](#)
- [FI_Window](#) * [as_window](#) () [FL_OVERRIDE](#)
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- unsigned int **border** () const
Returns whether the window possesses a border.
- void [border](#) (int b)
Sets whether or not the window manager border is around the window.
- void [clear_border](#) ()
Fast inline function to turn the window manager border off.
- void [clear_modal_states](#) ()
Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.
- void **copy_label** (const char *a)
Sets the window titlebar label to a copy of a character string.
- void [cursor](#) (const [FI_RGB_Image](#) *, int, int)
Changes the cursor for this window using the provided image as cursor's shape.
- void [cursor](#) ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void [cursor](#) ([FI_Cursor](#))
Changes the cursor for this window.
- int [decorated_h](#) () const
Returns the window height including any window title bar and any frame added by the window manager.
- int [decorated_w](#) () const
Returns the window width including any frame added by the window manager.
- void [default_cursor](#) ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void [default_cursor](#) ([FI_Cursor](#))
Sets the default window cursor.
- void **draw_backdrop** ()
Draw the background image if one is set and is aligned inside.
- [FI_Window](#) (int w, int h, const char *title=0)
Creates a window from the given width w, height h, and title.
- [FI_Window](#) (int x, int y, int w, int h, const char *title=0)
Creates a window from the given position (x, y), size (w, h) and title.
- void [free_position](#) ()
Undoes the effect of a previous [resize\(\)](#) or [show\(\)](#) so that the next time [show\(\)](#) is called the window manager is free to position the window.
- void [fullscreen](#) ()
Makes the window completely fill one or more screens, without any window manager border visible.
- unsigned int **fullscreen_active** () const
Returns non zero if [FULLSCREEN](#) flag is set, 0 otherwise.
- void **fullscreen_off** ()
Turns off any side effects of [fullscreen\(\)](#)

- void **fullscreen_off** (int X, int Y, int W, int H)
 - Turns off any side effects of [fullscreen\(\)](#) and does [resize\(x,y,w,h\)](#).*
- void **fullscreen_screens** (int top, int bottom, int left, int right)
 - Sets which screens should be used when this window is in fullscreen mode.*
- int **handle** (int) [FL_OVERRIDE](#)
 - Handles the specified event.*
- void **hide** () [FL_OVERRIDE](#)
 - Removes the window from the screen.*
- void **hotspot** (const [FL_Widget](#) &p, int offscreen=0)
 - See void [FL_Window::hotspot\(int x, int y, int offscreen = 0\)](#)*
- void **hotspot** (const [FL_Widget](#) *, int offscreen=0)
 - See void [FL_Window::hotspot\(int x, int y, int offscreen = 0\)](#)*
- void **hotspot** (int x, int y, int offscreen=0)
 - Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.*
- const void * **icon** () const
 - Gets the current icon window target dependent data.*
- void **icon** (const [FL_RGB_Image](#) *)
 - Sets or resets a single window icon.*
- void **icon** (const void *ic)
 - Platform-specific method to set the window icon usable on Windows and X11 only.*
- void **iconize** ()
 - Iconifies the window.*
- const char * **iconlabel** () const
 - See void [FL_Window::iconlabel\(const char*\)](#)*
- void **iconlabel** (const char *)
 - Sets the icon label.*
- void **icons** (const [FL_RGB_Image](#) *[], int)
 - Sets the window icons.*
- void **icons** (HICON big_icon, HICON small_icon)
 - Sets the window icons using HICON handles (Windows platform only).*
- const char * **label** () const
 - See void [FL_Window::label\(const char*\)](#)*
- void **label** (const char *)
 - Sets the window title bar label.*
- void **label** (const char *label, const char *iconlabel)
 - Sets the icon label.*
- void **make_current** ()
 - Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.*
- void **maximize** ()
 - Maximizes a top-level window to its current screen.*
- unsigned int **maximize_active** () const
 - Returns whether the window is currently maximized.*
- unsigned int **menu_window** () const
 - Returns true if this window is a menu window.*
- unsigned int **modal** () const
 - Returns true if this window is modal.*
- unsigned int **non_modal** () const
 - Returns true if this window is modal or non-modal.*

- [fl_uintptr_t os_id](#) ()
Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int **override** () const
Returns non zero if `OVERRIDE` flag is set, 0 otherwise.
- void [resize](#) (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Changes the size and position of the window.
- int **screen_num** ()
The number of the screen containing the mapped window.
- void [screen_num](#) (int screen_num)
Set the number of the screen where to map the window.
- void [set_menu_window](#) ()
Marks the window as a menu window.
- void [set_modal](#) ()
A "modal" window, when [shown\(\)](#), will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void [set_non_modal](#) ()
A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.
- void **set_override** ()
Activates the flags `NOBORDER|OVERRIDE`.
- void [set_tooltip_window](#) ()
Marks the window as a tooltip window.
- const [FI_Image](#) * **shape** ()
Returns the image controlling the window shape or `NULL`.
- void [shape](#) (const [FI_Image](#) &b)
Set the window's shape with an [FI_Image](#).
- void [shape](#) (const [FI_Image](#) *img)
Assigns a non-rectangular shape to the window.
- void [show](#) () [FL_OVERRIDE](#)
Puts the window on the screen.
- void [show](#) (int argc, char **argv)
Puts the window on the screen with [show\(\)](#) and parses command-line arguments.
- int [shown](#) ()
Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).
- void [size_range](#) (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)
Sets the allowable range the user can resize this window to.
- unsigned int **tooltip_window** () const
Returns true if this window is a tooltip window.
- void [un_maximize](#) ()
Returns a previously maximized top-level window to its previous size.
- void [wait_for_expose](#) ()
Waits for the window to be displayed after calling [show\(\)](#).
- int **x_root** () const
Gets the x position of the window on the screen.
- const char * **xclass** () const
Returns the xclass for this window, or a default.
- void [xclass](#) (const char *c)
Sets the xclass for this window.
- int **y_root** () const
Gets the y position of the window on the screen.
- virtual [~FI_Window](#) ()
The destructor also deletes all the children.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *[&_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
Removes the widget at `index` from the group and deletes it.
- void [end](#) ()
Exactly the same as `current(this->parent())`.
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\) const](#).*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does `insert(w, find(before))`.
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)
Removes the widget `o` from the group.
- void [remove](#) (int index)

- Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget * resizable () const`

Returns the group's resizable widget.
- `void resizable (FI_Widget &o)`

Sets the group's resizable widget.
- `void resizable (FI_Widget *o)`

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FI_Group ()`

The destructor also deletes all the children.

Public Member Functions inherited from `FI_Widget`

- `void _clear_fullscreen ()`
- `void _set_fullscreen ()`
- `void activate ()`

Activates the widget.
- `unsigned int active () const`

Returns whether the widget is active.
- `int active_r () const`

Returns whether the widget and all of its parents are active.
- `FI_Align align () const`

Gets the label alignment.
- `void align (FI_Align alignment)`

Sets the label alignment.
- `long argument () const`

Gets the current user data (long) argument that is passed to the callback function.
- `void argument (long v)`

Sets the current user data (long) argument that is passed to the callback function.
- `virtual class FI_Gl_Window * as_gl_window ()`

Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- `virtual class FI_Gl_Window const * as_gl_window () const`
- `void bind_deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
- `void bind_deimage (int f)`

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- `void bind_image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.
- `void bind_image (int f)`

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`

Gets the box type of the widget.
- `void box (FI_Boxtype new_box)`

Sets the box type for the widget.
- `FI_Callback_p callback () const`

Gets the current callback function for the widget.
- `void callback (FI_Callback *cb)`

Sets the current callback function for the widget.
- `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

Sets the current callback function and managed user data for the widget.
- `void callback (FI_Callback *cb, void *p)`

Sets the current callback function and data for the widget.

- void `callback (FI_Callback0 *cb)`
Sets the current callback function for the widget.
- void `callback (FI_Callback1 *cb, long p=0)`
Sets the current callback function for the widget.
- unsigned int `changed () const`
Checks if the widget value changed since the last callback.
- void `clear_active ()`
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed ()`
Marks the value of the widget as unchanged.
- void `clear_damage (uchar c=0)`
Clears or sets the damage flags.
- void `clear_output ()`
Sets a widget to accept input.
- void `clear_visible ()`
Hides the widget.
- void `clear_visible_focus ()`
Disables keyboard focus navigation with this widget.
- `FI_Color color () const`
Gets the background color of the widget.
- void `color (FI_Color bg)`
Sets the background color of the widget.
- void `color (FI_Color bg, FI_Color sel)`
Sets the background and selection color of the widget.
- `FI_Color color2 () const`
For back compatibility only.
- void `color2 (unsigned a)`
For back compatibility only.
- int `contains (const FI_Widget *w) const`
Checks if w is a child of this widget.
- void `copy_label (const char *new_label)`
Sets the current label.
- void `copy_tooltip (const char *text)`
Sets the current tooltip text.
- `uchar damage () const`
Returns non-zero if `draw()` needs to be called.
- void `damage (uchar c)`
Sets the damage bits for the widget.
- void `damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- int `damage_resize (int, int, int, int)`
Internal use only.
- void `deactivate ()`
Deactivates the widget.
- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage (FI_Image *img)`

- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.
- void `do_callback` (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, FI_Align) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- FI_Image * `image` ()

Gets the image that is used as part of the widget label when in the active state.
- const FI_Image * `image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (FI_Image &img)

Sets the image to use as part of the widget label when in the active state.
- void `image` (FI_Image *img)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const FI_Widget *wgt) const

Checks if this widget is a child of wgt.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.
- void `label` (const char *text)

Sets the current label pointer.
- void `label` (FI_Labeltype a, const char *b)

Shortcut to set the label text and type in one call.
- FI_Color `labelcolor` () const

Gets the label color.
- void `labelcolor` (FI_Color c)

Sets the label color.
- FI_Font `labelfont` () const

Gets the font to use.
- void `labelfont` (FI_Font f)

Sets the font to use.
- FI_Fontsize `labelsize` () const

Gets the font size in pixels.
- void `labelsize` (FI_Fontsize pix)

Sets the font size in pixels.
- FI_Labeltype `labeltype` () const

Gets the label type.
- void `labeltype` (FI_Labeltype a)

Sets the label type.
- void `measure_label` (int &ww, int &hh) const

Sets width ww and height hh accordingly with the label size.

- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const

- Gets the widget type.*
- void [type](#) (uchar t)
 - Sets the widget type.*
- int [use_accents_menu](#) ()
 - Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*
- void * [user_data](#) () const
 - Gets the user data for this widget.*
- void [user_data](#) (FI_Callback_User_Data *v, bool auto_free)
 - Sets the user data for this widget.*
- void [user_data](#) (void *v)
 - Sets the user data for this widget.*
- unsigned int [visible](#) () const
 - Returns whether a widget is visible.*
- unsigned int [visible_focus](#) () const
 - Checks whether this widget has a visible focus.*
- void [visible_focus](#) (int v)
 - Modifies keyboard focus navigation.*
- int [visible_r](#) () const
 - Returns whether a widget and all its parents are visible.*
- int [w](#) () const
 - Gets the widget width.*
- [FI_When](#) [when](#) () const
 - Returns the conditions under which the callback is called.*
- void [when](#) (uchar i)
 - Sets the flags used to decide when a callback is called.*
- [FI_Window](#) * [window](#) () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int [x](#) () const
 - Gets the widget position in its window.*
- int [y](#) () const
 - Gets the widget position in its window.*
- virtual [~FI_Widget](#) ()
 - Destroys the widget.*

Additional Inherited Members

Public Types inherited from [FI_Window](#)

- typedef struct HICON__ * [HICON](#)

Static Public Member Functions inherited from [FI_Window](#)

- static [FI_Window](#) * [current](#) ()
 - Returns the last window that was made current.*
- static void [default_callback](#) ([FI_Window](#) *, void *v)
 - Back compatibility: Sets the default callback v for win to call on close event.*
- static void [default_icon](#) (const [FI_RGB_Image](#) *)
 - Sets a single default window icon.*
- static void [default_icons](#) (const [FI_RGB_Image](#) *[], int)
 - Sets the default window icons.*
- static void [default_icons](#) (HICON big_icon, HICON small_icon)
 - Sets the default window icons (Windows platform only).*

- static const char * [default_xclass](#) ()
Returns the default xclass.
- static void [default_xclass](#) (const char *)
Sets the default window xclass.
- static bool [is_a_rescale](#) ()
Returns true when a window is being rescaled.
- static char [show_next_window_iconic](#) ()
Returns the static flag whether the next window should be opened iconified.
- static void [show_next_window_iconic](#) (char stat)
Sets a static flag whether the next window should be opened iconified.

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Window](#)

- void [default_size_range](#) ()
Protected method to calculate the default size range of a window.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- int [force_position](#) () const
Returns the internal state of the window's FORCE_POSITION flag.
- void [force_position](#) (int force)

- Sets an internal flag that tells FLTK and the window manager to honor position requests.*
- void `free_icons` ()
 - Deletes all icons previously attached to the window.*
- int `is_resizable` ()
 - Protected method to determine whether a window is resizable.*

Protected Member Functions inherited from `FI_Group`

- `FI_Rect * bounds` ()
 - Returns the internal array of widget sizes and positions.*
- void `draw_child` (`FI_Widget &widget`) const
 - Forces a child to redraw.*
- void `draw_children` ()
 - Draws all children of the group.*
- void `draw_outside_label` (const `FI_Widget &widget`) const
 - Parents normally call this to draw outside labels of child widgets.*
- virtual int `on_insert` (`FI_Widget *`, int)
 - Allow derived groups to act when a widget is added as a child.*
- virtual int `on_move` (int, int)
 - Allow derived groups to act when a widget is moved within the group.*
- virtual void `on_remove` (int)
 - Allow derived groups to act when a child widget is removed from the group.*
- int * `sizes` ()
 - Returns the internal array of widget sizes and positions.*
- void `update_child` (`FI_Widget &widget`) const
 - Draws a child only if it needs it.*

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
 - Clears a flag in the flags mask.*
- void `draw_backdrop` () const
 - If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.*
- void `draw_box` () const
 - Draws the widget box according its box style.*
- void `draw_box` (`FI_Boxtype t`, `FI_Color c`) const
 - Draws a box of type t, of color c at the widget's position and size.*
- void `draw_box` (`FI_Boxtype t`, int x, int y, int w, int h, `FI_Color c`) const
 - Draws a box of type t, of color c at the position X,Y and size W,H.*
- void `draw_focus` () const
 - Draws a focus rectangle around the widget.*
- void `draw_focus` (`FI_Boxtype t`, int X, int Y, int W, int H) const
 - Draws a focus rectangle around the widget.*
- void `draw_focus` (`FI_Boxtype t`, int x, int y, int w, int h, `FI_Color bg`) const
 - Draws a focus box for the widget at the given position and size.*
- void `draw_label` () const
 - Draws the widget's label at the defined label position.*
- void `draw_label` (int, int, int, int) const
 - Draws the label in an arbitrary bounding box.*
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
 - Creates a widget at the given position and size.*
- unsigned int `flags` () const

- Gets the widget flags mask.*

 - void **h** (int v)

Internal use only.
- void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.
- void **x** (int v)

Internal use only.
- void **y** (int v)

Internal use only.

Static Protected Attributes inherited from [FI_Window](#)

- static [FI_Window](#) * **current_**
- Stores the last window that was made current.*

12.32.1 Detailed Description

The [FI_Double_Window](#) provides a double-buffered window. It will draw the window data into an off-screen pixmap, and then copy it to the on-screen window.

12.32.2 Constructor & Destructor Documentation

12.32.2.1 [~FI_Double_Window\(\)](#)

```
Fl_Double_Window::~~Fl_Double_Window ( )
```

The destructor *also deletes all the children*.

This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code.

12.32.3 Member Function Documentation

12.32.3.1 [as_double_window\(\)](#)

```
Fl_Double_Window * Fl_Double_Window::as_double_window ( ) [inline], [virtual]
```

Return non-null if this is an [FI_Overlay_Window](#) object.

Reimplemented from [FI_Window](#).

12.32.3.2 [flush\(\)](#)

```
void Fl_Double_Window::flush ( ) [virtual]
```

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

Reimplemented from [FI_Window](#).

Reimplemented in [FI_Overlay_Window](#).

12.32.3.3 [hide\(\)](#)

```
void Fl_Double_Window::hide ( ) [virtual]
```

Makes a widget invisible.

See also

[show\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented from [FI_Widget](#).

Reimplemented in [FI_Overlay_Window](#).

12.32.3.4 `resize()`

```
void Fl_Double_Window::resize (
    int x,
    int y,
    int w,
    int h ) [virtual]
```

Changes the size or position of the widget.

This is a virtual function so that the widget may implement its own handling of resizing. The default version does *not* call the `redraw()` method, but instead relies on the parent widget to do so because the parent may know a faster way to update the display, such as scrolling from the old position.

Some window managers under X11 call `resize()` a lot more often than needed. Please verify that the position or size of a widget did actually change before doing any extensive calculations.

`position(X, Y)` is a shortcut for `resize(X, Y, w(), h())`, and `size(W, H)` is a shortcut for `resize(x(), y(), W, H)`.

Parameters

in	<i>x,y</i>	new position relative to the parent window
in	<i>w,h</i>	new size

See also

[position\(int,int\)](#), [size\(int,int\)](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Overlay_Window](#).

12.32.3.5 `show()`

```
void Fl_Double_Window::show ( ) [virtual]
```

Makes a widget visible.

An invisible widget never gets redrawn and does not get keyboard or mouse events, but can receive a few other events like `FL_SHOW`.

The `visible()` method returns true if the widget is set to be visible. The `visible_r()` method returns true if the widget and all of its parents are visible. A widget is only visible if `visible()` is true on it *and all of its parents*.

Changing it will send `FL_SHOW` or `FL_HIDE` events to the widget. *Do not change it if the parent is not visible, as this will send false `FL_SHOW` or `FL_HIDE` events to the widget.* `redraw()` is called if necessary on this or the parent.

See also

[hide\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Overlay_Window](#).

The documentation for this class was generated from the following files:

- [Fl_Double_Window.H](#)
- [Fl_Double_Window.cxx](#)

12.33 Fl_End Class Reference

This is a dummy class that allows you to end a [Fl_Group](#) in a constructor list of a class:

```
#include <Fl_Group.H>
```

Public Member Functions

- [Fl_End \(\)](#)

All it does is calling `Fl_Group::current()->end()`

12.33.1 Detailed Description

This is a dummy class that allows you to end a [Fl_Group](#) in a constructor list of a class:

```
class MyClass {
    Fl_Group group;
    Fl_Button button_in_group;
    Fl_End end;
    Fl_Button button_outside_group;
    MyClass();
};
MyClass::MyClass() :
    group(10,10,100,100),
    button_in_group(20,20,60,30),
    end(),
    button_outside_group(10,120,60,30) {
   [..ctor code..]
}
```

The documentation for this class was generated from the following file:

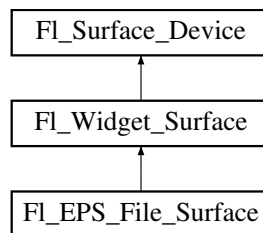
- [Fl_Group.H](#)

12.34 Fl_EPS_File_Surface Class Reference

Encapsulated PostScript drawing surface.

```
#include <Fl_PostScript.H>
```

Inheritance diagram for Fl_EPS_File_Surface:



Public Member Functions

- int [close](#) ()
Completes all EPS output.
- FILE * [file](#) ()
Returns the underlying FILE pointer.
- [Fl_EPS_File_Surface](#) (int width, int height, FILE *eps_output, [Fl_Color](#) background=FL_WHITE, [Fl_PostScript_Close_Command](#) closef=NULL)
Constructor.
- void [origin](#) (int *px, int *py) [FL_OVERRIDE](#)
Computes the coordinates of the current origin of graphics functions.
- void [origin](#) (int x, int y) [FL_OVERRIDE](#)
Sets the position of the origin of graphics in the drawable part of the drawing surface.
- int [printable_rect](#) (int *w, int *h) [FL_OVERRIDE](#)
Computes the width and height of the drawable area of the drawing surface.
- void [translate](#) (int x, int y) [FL_OVERRIDE](#)
Translates the current graphics origin accounting for the current rotation.
- void [untranslate](#) () [FL_OVERRIDE](#)
Undoes the effect of a previous [translate\(\)](#) call.
- [~Fl_EPS_File_Surface](#) ()
Destructor.

Public Member Functions inherited from FI_Widget_Surface

- void [draw](#) (FI_Widget *widget, int delta_x=0, int delta_y=0)
Draws the widget on the drawing surface.
- void [draw_decorated_window](#) (FI_Window *win, int x_offset=0, int y_offset=0)
Draws a window with its title bar and frame if any.
- void [print_window_part](#) (FI_Window *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Draws a rectangular part of an on-screen window.

Public Member Functions inherited from FI_Surface_Device

- FI_Graphics_Driver * **driver** ()
Returns the graphics driver of this drawing surface.
- virtual bool [is_current](#) ()
Is this surface the current drawing surface?
- virtual void [set_current](#) (void)
Make this surface the current drawing surface.
- virtual ~**FI_Surface_Device** ()
The destructor.

Protected Member Functions

- FI_PostScript_Graphics_Driver * **driver** ()
Returns the PostScript driver of this drawing surface.

Protected Member Functions inherited from FI_Widget_Surface

- [FI_Widget_Surface](#) (FI_Graphics_Driver *d)
The constructor.

Protected Member Functions inherited from FI_Surface_Device

- void **driver** (FI_Graphics_Driver *graphics_driver)
Sets the graphics driver of this drawing surface.
- virtual void [end_current](#) ()
FLTK calls this each time a surface ceases to be the current drawing surface.
- **FI_Surface_Device** (FI_Graphics_Driver *graphics_driver)
Constructor that sets the graphics driver to use for the created surface.

Additional Inherited Members

Static Public Member Functions inherited from FI_Surface_Device

- static [FI_Surface_Device](#) * [pop_current](#) ()
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void [push_current](#) ([FI_Surface_Device](#) *new_current)
Pushes new_current on top of the stack of current drawing surfaces, and makes it current.
- static [FI_Surface_Device](#) * [surface](#) ()
The current drawing surface.

Protected Attributes inherited from FI_Widget_Surface

- int **x_offset**
horizontal offset to the origin of graphics coordinates
- int **y_offset**
vertical offset to the origin of graphics coordinates

12.34.1 Detailed Description

Encapsulated PostScript drawing surface.

This drawing surface allows to store any FLTK graphics in vectorial form in an "Encapsulated PostScript" file.

Usage example:

```
Fl_Window *win = ...// Window to draw to an .eps file
int ww = win->decorated_w();
int wh = win->decorated_h();
FILE *eps = fl_fopen("/path/to/mywindow.eps", "w");
if (eps) {
    Fl_EPS_File_Surface *surface = new Fl_EPS_File_Surface(ww, wh, eps, win->color());
    Fl_Surface_Device::push_current(surface);
    surface->draw_decorated_window(win);
    Fl_Surface_Device::pop_current();
    delete surface; // the .eps file is not complete until the destructor was run
}
```

12.34.2 Constructor & Destructor Documentation

12.34.2.1 Fl_EPS_File_Surface()

```
Fl_EPS_File_Surface::Fl_EPS_File_Surface (
    int width,
    int height,
    FILE * eps_output,
    Fl_Color background = FL_WHITE,
    Fl_PostScript_Close_Command closef = NULL )
```

Constructor.

Parameters

<i>width,height</i>	Width and height of the EPS drawing area
<i>eps_output</i>	A writable FILE pointer where the Encapsulated PostScript data will be sent
<i>background</i>	Color expected to cover the background of the EPS drawing area. This parameter affects only the drawing of transparent Fl_RGB_Image objects: transparent areas of RGB images are blended with the <code>background</code> color. Under the X11 + pango platform, transparent RGB images are correctly blended to their background, thus this parameter has no effect.
<i>closef</i>	If not NULL, the destructor or close() will call <code>closef(eps_output)</code> after all EPS data has been sent. If NULL, <code>fclose(eps_output)</code> is called instead. This allows to close the FILE pointer by, e.g., <code>pclose</code> , or, using a function such as <code>"int keep_open(FILE*) {return 0;}"</code> , to keep it open after completion of all output to <code>eps_output</code> . Function <code>closef</code> should return non zero to indicate an error.

12.34.2.2 ~Fl_EPS_File_Surface()

```
Fl_EPS_File_Surface::~Fl_EPS_File_Surface ( )
```

Destructor.

By default, the destructor closes with function `fclose()` the underlying FILE. See the constructor for how to close it differently or to keep it open. Use [close\(\)](#) before object destruction to receive the status code of output operations. If [close\(\)](#) is not used and if EPS output results in error, the destructor displays an alert message with `fl_alert()`.

12.34.3 Member Function Documentation

12.34.3.1 close()

```
int Fl_EPS_File_Surface::close ( )
```

Completes all EPS output.

The only operation possible with the [Fl_EPS_File_Surface](#) object after calling [close\(\)](#) is its destruction.

Returns

The status code of output operations to the FILE object. 0 indicates success.

12.34.3.2 origin() [1/2]

```
void Fl_EPS_File_Surface::origin (
    int * x,
    int * y ) [virtual]
```

Computes the coordinates of the current origin of graphics functions.

Parameters

out	x,y	If non-null, *x and *y are set to the horizontal and vertical coordinates of the graphics origin.
-----	-----	---

Reimplemented from [Fl_Widget_Surface](#).

12.34.3.3 origin() [2/2]

```
void Fl_EPS_File_Surface::origin (
    int x,
    int y ) [virtual]
```

Sets the position of the origin of graphics in the drawable part of the drawing surface.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the drawable area. Successive [origin\(\)](#) calls don't combine their effects. [Origin\(\)](#) calls are not affected by [rotate\(\)](#) calls (for classes derived from [Fl_Paged_Device](#)).

Parameters

in	x,y	Horizontal and vertical positions in the drawing surface of the desired origin of graphics.
----	-----	---

Reimplemented from [Fl_Widget_Surface](#).

12.34.3.4 printable_rect()

```
int Fl_EPS_File_Surface::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the drawable area of the drawing surface.

Values are in the same unit as that used by FLTK drawing functions and are unchanged by calls to [origin\(\)](#). If the object is derived from class [Fl_Paged_Device](#), values account for the user-selected paper type and print orientation and are changed by [scale\(\)](#) calls.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Widget_Surface](#).

12.34.3.5 translate()

```
void Fl_EPS_File_Surface::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call. Successive [translate\(\)](#) calls add up their effects.

Reimplemented from [Fl_Widget_Surface](#).

12.34.3.6 untranslate()

```
void Fl_EPS_File_Surface::untranslate (
    void ) [virtual]
```

Undoes the effect of a previous [translate\(\)](#) call.

Reimplemented from [Fl_Widget_Surface](#).

The documentation for this class was generated from the following file:

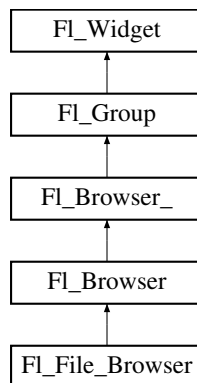
- [Fl_PostScript.H](#)

12.35 Fl_File_Browser Class Reference

The [Fl_File_Browser](#) widget displays a list of filenames, optionally with file-specific icons.

```
#include <Fl_File_Browser.H>
```

Inheritance diagram for [Fl_File_Browser](#):



Public Types

- enum { **FILES** , **DIRECTORIES** }

Public Types inherited from [Fl_Browser](#)

- enum [Fl_Line_Position](#) { **TOP** , **BOTTOM** , **MIDDLE** }

For internal use only?

Public Types inherited from [Fl_Browser_](#)

- enum {
HORIZONTAL = 1 , **VERTICAL** = 2 , **BOTH** = 3 , **ALWAYS_ON** = 4 ,
HORIZONTAL_ALWAYS = 5 , **VERTICAL_ALWAYS** = 6 , **BOTH_ALWAYS** = 7 }

Values for [has_scrollbar\(\)](#).

Public Member Functions

- const char * [errmsg](#) () const
Returns OS error messages, or NULL if none.
- void [errmsg](#) (const char *emsg)
Sets OS error message to a string, which can be NULL.
- int [filetype](#) () const
Sets or gets the file browser type, FILES or DIRECTORIES.
- void [filetype](#) (int t)
Sets or gets the file browser type, FILES or DIRECTORIES.
- const char * [filter](#) () const
Sets or gets the filename filter.
- void [filter](#) (const char *pattern)
Sets or gets the filename filter.
- [Fl_File_Browser](#) (int, int, int, int, const char *=0)

The constructor creates the *FI_File_Browser* widget at the specified position and size.

- `uchar iconsize () const`
Sets or gets the size of the icons.
- `void iconsize (uchar s)`
Sets or gets the size of the icons.
- `int load (const char *directory, FI_File_Sort_F *sort=fl_numericsort)`
Loads the specified directory into the browser.
- `FI_Fontsize textsize () const`
- `void textsize (FI_Fontsize s)`

Public Member Functions inherited from FI_Browser

- `void add (const char *newtext, void *d=0)`
Adds a new line to the end of the browser.
- `void bottomline (int line)`
Scrolls the browser so the bottom item in the browser is showing the specified *line*.
- `void clear ()`
Removes all the lines in the browser.
- `char column_char () const`
Gets the current column separator character.
- `void column_char (char c)`
Sets the column separator to *c*.
- `const int * column_widths () const`
Gets the current column width array.
- `void column_widths (const int *arr)`
Sets the current array to *arr*.
- `void * data (int line) const`
Returns the user *data()* for specified *line*.
- `void data (int line, void *d)`
Sets the user data for specified *line* to *d*.
- `void display (int line, int val=1)`
For back compatibility.
- `int displayed (int line) const`
Returns non-zero if *line* has been scrolled to a position where it is being displayed.
- `FI_Browser (int X, int Y, int W, int H, const char *L=0)`
The constructor makes an empty browser.
- `char format_char () const`
Gets the current format code prefix character, which by default is '@'.
- `void format_char (char c)`
Sets the current format code prefix character to *c*.
- `void hide () FL_OVERRIDE`
Hides the entire *FI_Browser* widget – opposite of *show()*.
- `void hide (int line)`
Makes *line* invisible, preventing selection by the user.
- `FI_Image * icon (int line) const`
Returns the icon currently defined for *line*.
- `void icon (int line, FI_Image *icon)`
Set the image icon for *line* to the value *icon*.
- `void insert (int line, const char *newtext, void *d=0)`
Insert a new entry whose label is *newtext* above given *line*, optional data *d*.
- `void lineposition (int line, FI_Line_Position pos)`

- Updates the browser so that `line` is shown at position `pos`.*

 - int **load** (const char *filename)

Clears the browser and reads the file, adding each line from the file to the browser.
- void **make_visible** (int line)

*Make the item at the specified `line` **visible()**.*
- void **middleline** (int line)

Scrolls the browser so the middle item in the browser is showing the specified `line`.
- void **move** (int to, int from)

Line `from` is removed and reinserted at `to`.
- void **remove** (int line)

Remove entry for given `line` number, making the browser one line shorter.
- void **remove_icon** (int line)

Removes the icon for `line`.
- void **replace** (int a, const char *b)

For back compatibility only.
- int **select** (int line, int val=1)

Sets the selection state of the item at `line` to the value `val`.
- int **selected** (int line) const

Returns 1 if specified `line` is selected, 0 if not.
- void **show** () **FL_OVERRIDE**

*Shows the entire `Fl_Browser` widget – opposite of **hide()**.*
- void **show** (int line)

Makes `line` visible, and available for selection by user.
- int **size** () const

Returns how many lines are in the browser.
- void **size** (int W, int H)
- void **swap** (int a, int b)

Swaps two browser lines `a` and `b`.
- const char * **text** (int line) const

Returns the label text for the specified `line`.
- void **text** (int line, const char *newtext)

Sets the text for the specified `line` to `newtext`.
- **Fl_Fontsize** **textsize** () const

Gets the default text size (in pixels) for the lines in the browser.
- void **textsize** (**Fl_Fontsize** newSize)

Sets the default text size (in pixels) for the lines in the browser to `newSize`.
- int **topline** () const

Returns the line that is currently visible at the top of the browser.
- void **topline** (int line)

Scrolls the browser so the top item in the browser is showing the specified `line`.
- int **value** () const

Returns the line number of the currently selected line, or 0 if none selected.
- void **value** (int line)

*Sets the browser's **value()**, which selects the specified `line`.*
- int **visible** (int line) const

Returns non-zero if the specified `line` is visible, 0 if hidden.
- ~**Fl_Browser** ()

The destructor deletes all list items and destroys the browser.

Public Member Functions inherited from FI_Browser_

- int [deselect](#) (int docallbacks=0)
Deselects all items in the list and returns 1 if the state changed or 0 if it did not.
- void [display](#) (void *item)
*Displays the *item*, scrolling the list as necessary.*
- int [handle](#) (int event) [FL_OVERRIDE](#)
*Handles the *event* within the normal widget bounding box.*
- [uchar has_scrollbar](#) () const
Returns the current scrollbar mode, see [FI_Browser_::has_scrollbar\(uchar\)](#)
- void [has_scrollbar](#) (uchar mode)
Sets whether the widget should have scrollbars or not (default [FI_Browser_::BOTH](#)).
- int [hposition](#) () const
*Gets the horizontal scroll position of the list as a pixel position *pos*.*
- void [hposition](#) (int)
*Sets the horizontal scroll position of the list to pixel position *pos*.*
- int [linespacing](#) () const
Return the height of additional spacing between browser lines.
- void [linespacing](#) (int pixels)
Add some space between browser lines.
- int [position](#) () const
- void [position](#) (int pos)
- void [position](#) (int x, int y)
- void [resize](#) (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Repositions and/or resizes the browser.
- void [scrollbar_left](#) ()
Moves the vertical scrollbar to the lefthand side of the list.
- void [scrollbar_right](#) ()
Moves the vertical scrollbar to the righthand side of the list.
- int [scrollbar_size](#) () const
Gets the current size of the scrollbars' troughs, in pixels.
- void [scrollbar_size](#) (int newSize)
*Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.*
- int [scrollbar_width](#) () const
Returns the global value [FI::scrollbar_size\(\)](#).
- void [scrollbar_width](#) (int width)
Sets the global [FI::scrollbar_size\(\)](#), and forces this instance of the widget to use it.
- int [select](#) (void *item, int val=1, int docallbacks=0)
*Sets the selection state of *item* to *val*, and returns 1 if the state changed or 0 if it did not.*
- int [select_only](#) (void *item, int docallbacks=0)
*Selects *item* and returns 1 if the state changed or 0 if it did not.*
- void [sort](#) (int flags=0)
*Sort the items in the browser based on *flags*.*
- [FI_Color textcolor](#) () const
Gets the default text color for the lines in the browser.
- void [textcolor](#) ([FI_Color](#) col)
*Sets the default text color for the lines in the browser to color *col*.*
- [FI_Font textfont](#) () const
Gets the default text font for the lines in the browser.
- void [textfont](#) ([FI_Font](#) font)
*Sets the default text font for the lines in the browser to *font*.*

- **FL_Fontsize** **textsize** () const
Gets the default text size (in pixels) for the lines in the browser.
- void **textsize** (FL_Fontsize newSize)
Sets the default text size (in pixels) for the lines in the browser to size.
- int **vposition** () const
Gets the vertical scroll position of the list as a pixel position pos.
- void **vposition** (int pos)
Sets the vertical scroll position of the list to pixel position pos.

Public Member Functions inherited from FL_Group

- **FL_Widget** *& **_ddfdesign_kludge** ()
This is for forms compatibility only.
- void **add** (FL_Widget &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void **add** (FL_Widget *o)
See void FL_Group::add(FL_Widget &w)
- void **add_resizable** (FL_Widget &o)
Adds a widget to the group and makes it the resizable widget.
- **FL_Widget** *const * **array** () const
Returns a pointer to the array of children.
- **FL_Group** const * **as_group** () const **FL_OVERRIDE**
- **FL_Group** * **as_group** () **FL_OVERRIDE**
Returns an FL_Group pointer if this widget is an FL_Group.
- void **begin** ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- **FL_Widget** * **child** (int n) const
Returns array()[n].
- int **children** () const
Returns how many child widgets the group has.
- void **clear** ()
Deletes all child widgets from memory recursively.
- unsigned int **clip_children** ()
Returns the current clipping mode.
- void **clip_children** (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int **delete_child** (int n)
Removes the widget at index from the group and deletes it.
- void **end** ()
Exactly the same as current(this->parent()).
- int **find** (const FL_Widget &o) const
*See int FL_Group::find(const FL_Widget *w) const.*
- int **find** (const FL_Widget *) const
Searches the child array for the widget and returns the index.
- **FL_Group** (int, int, int, int, const char *s=0)
Creates a new FL_Group widget using the given position, size, and label string.
- void **focus** (FL_Widget *W)
- void **forms_end** ()
This is for forms compatibility only.
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.

- void `init_sizes` ()
Resets the internal array of widget sizes and positions.
- void `insert` (FI_Widget &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void `insert` (FI_Widget &o, FI_Widget *before)
This does insert(w, find(before)).
- void `remove` (FI_Widget &)
Removes a widget from the group but does not delete it.
- void `remove` (FI_Widget *o)
Removes the widget o from the group.
- void `remove` (int index)
Removes the widget at index from the group but does not delete it.
- FI_Widget * `resizable` () const
Returns the group's resizable widget.
- void `resizable` (FI_Widget &o)
Sets the group's resizable widget.
- void `resizable` (FI_Widget *o)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- void `resize` (int, int, int, int) FL_OVERRIDE
Resizes the FI_Group widget and all of its children.
- virtual `~FI_Group` ()
The destructor also deletes all the children.

Public Member Functions inherited from FI_Widget

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- FI_Align `align` () const
Gets the label alignment.
- void `align` (FI_Align alignment)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument` (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class FI_Gl_Window * `as_gl_window` ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class FI_Gl_Window const * `as_gl_window` () const
- virtual FI_Window * `as_window` ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual FI_Window const * `as_window` () const
- void `bind_deimage` (FI_Image *img)
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

- void `bind_image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box` () const
Gets the box type of the widget.
- void `box` (`FI_Boxtype new_box`)
Sets the box type for the widget.
- `FI_Callback_p callback` () const
Gets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback *cb`, void *p)
Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0 *cb`)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback1 *cb`, long p=0)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar c=0`)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color color` () const
Gets the background color of the widget.
- void `color` (`FI_Color bg`)
Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)
Sets the background and selection color of the widget.
- `FI_Color color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const `FI_Widget *w`) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- `uchar damage` () const

- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)

Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason reason=FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget *widget`, `long arg`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- `FI_Image * image` ()

Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)

Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const

Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.
- void `label` (const char *`text`)

Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char *`b`)

Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const

Gets the label color.

- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font` `labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)

- Changes the size of the widget.*

 - int [take_focus](#) ()

Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

Returns if the widget is able to take events.
- int [test_shortcut](#) ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const

Gets the current tooltip text.
- void [tooltip](#) (const char *text)

Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const

Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const

Gets the widget type.
- void [type](#) ([uchar](#) t)

Sets the widget type.
- int [use_accents_menu](#) ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const

Gets the user data for this widget.
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)

Sets the user data for this widget.
- void [user_data](#) (void *v)

Sets the user data for this widget.
- unsigned int [visible](#) () const

Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const

Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)

Modifies keyboard focus navigation.
- int [visible_r](#) () const

Returns whether a widget and all its parents are visible.
- int [w](#) () const

Gets the widget width.
- [FI_When](#) [when](#) () const

Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)

Sets the flags used to decide when a callback is called.
- [FI_Window](#) * [window](#) () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const

Gets the widget position in its window.
- int [y](#) () const

Gets the widget position in its window.
- virtual [~FI_Widget](#) ()

Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Public Attributes inherited from [FI_Browser_](#)

- [FI_Scrollbar](#) [hscrollbar](#)
Horizontal scrollbar.
- [FI_Scrollbar](#) [scrollbar](#)
Vertical scrollbar.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Browser](#)

- [FL_BLINE](#) * [_remove](#) (int line)
Removes the item at the specified line.
- [FL_BLINE](#) * [find_line](#) (int line) const
Returns the item for specified line.
- void [insert](#) (int line, [FL_BLINE](#) *item)
Insert specified item above line.
- void * [item_at](#) (int line) const [FL_OVERRIDE](#)
Return the item at specified line.
- void * [item_first](#) () const [FL_OVERRIDE](#)
Returns the very first item in the list.

- void * [item_last](#) () const [FL_OVERRIDE](#)
Returns the very last item in the list.
- void * [item_next](#) (void *item) const [FL_OVERRIDE](#)
*Returns the next item after *item*.*
- void * [item_prev](#) (void *item) const [FL_OVERRIDE](#)
*Returns the previous item before *item*.*
- void [item_select](#) (void *item, int val) [FL_OVERRIDE](#)
*Change the selection state of *item* to the value *val*.*
- int [item_selected](#) (void *item) const [FL_OVERRIDE](#)
*See if *item* is selected.*
- void [item_swap](#) (void *a, void *b) [FL_OVERRIDE](#)
*Swap the items *a* and *b*.*
- const char * [item_text](#) (void *item) const [FL_OVERRIDE](#)
*Returns the label text for *item*.*
- int [lineno](#) (void *item) const
*Returns line number corresponding to *item*, or zero if not found.*
- void [swap](#) (FL_BLINE *a, FL_BLINE *b)
*Swap the two items *a* and *b*.*

Protected Member Functions inherited from [FI_Browser_](#)

- void [bbox](#) (int &X, int &Y, int &W, int &H) const
Returns the bounding box for the interior of the list's display window, inside the scrollbars.
- void [deleting](#) (void *item)
*This method should be used when *item* is being deleted from the list.*
- int [displayed](#) (void *item) const
*Returns non-zero if *item* has been scrolled to a position where it is being displayed.*
- void [draw](#) () [FL_OVERRIDE](#)
Draws the list within the normal widget bounding box.
- void * [find_item](#) (int ypos)
*This method returns the item under mouse *y* position *ypos*.*
- [FI_Browser_](#) (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- virtual int [full_width](#) () const
This method may be provided by the subclass to indicate the full width of the item list, in pixels.
- void [inserting](#) (void *a, void *b)
This method should be used when an item is in the process of being inserted into the list.
- virtual int [item_quick_height](#) (void *item) const
*This method may be provided by the subclass to return the height of the *item*, in pixels.*
- int [leftedge](#) () const
This method returns the X position of the left edge of the list area after adjusting for the scrollbar and border, if any.
- void [new_list](#) ()
This method should be called when the list data is completely replaced or cleared.
- void [redraw_line](#) (void *item)
*This method should be called when the contents of *item* has changed, but not its height.*
- void [redraw_lines](#) ()
This method will cause the entire list to be redrawn.
- void [replacing](#) (void *a, void *b)
*This method should be used when item *a* is being replaced by item *b*.*
- void * [selection](#) () const
Returns the item currently selected, or NULL if there is no selection.

- void **swapping** (void *a, void *b)
This method should be used when two items a and b are being swapped.
- void * **top** () const
Returns the item that appears at the top of the list.

Protected Member Functions inherited from **FI_Group**

- **FI_Rect** * **bounds** ()
Returns the internal array of widget sizes and positions.
- void **draw** () **FL_OVERRIDE**
Draws the widget.
- void **draw_child** (**FI_Widget** &widget) const
Forces a child to redraw.
- void **draw_children** ()
Draws all children of the group.
- void **draw_outside_label** (const **FI_Widget** &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int **on_insert** (**FI_Widget** *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int **on_move** (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void **on_remove** (int)
Allow derived groups to act when a child widget is removed from the group.
- int * **sizes** ()
Returns the internal array of widget sizes and positions.
- void **update_child** (**FI_Widget** &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from **FI_Widget**

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (**FI_Boxtype** t, **FI_Color** c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (**FI_Boxtype** t, int x, int y, int w, int h, **FI_Color** c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FI_Boxtype** t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FI_Boxtype** t, int x, int y, int w, int h, **FI_Color** bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)

- Creates a widget at the given position and size.*

 - unsigned int **flags** () const
Gets the widget flags mask.
 - void **h** (int v)
Internal use only.
 - void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
 - void **w** (int v)
Internal use only.
 - void **x** (int v)
Internal use only.
 - void **y** (int v)
Internal use only.

12.35.1 Detailed Description

The [Fl_File_Browser](#) widget displays a list of filenames, optionally with file-specific icons.

12.35.2 Constructor & Destructor Documentation

12.35.2.1 Fl_File_Browser()

```
Fl_File_Browser::Fl_File_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * I = 0 )
```

The constructor creates the [Fl_File_Browser](#) widget at the specified position and size.
The destructor destroys the widget and frees all memory that has been allocated.

12.35.3 Member Function Documentation

12.35.3.1 errmsg() [1/2]

```
const char * Fl_File_Browser::errmsg ( ) const [inline]
```

Returns OS error messages, or NULL if none.
Use when advised.

12.35.3.2 errmsg() [2/2]

```
void Fl_File_Browser::errmsg (
    const char * msg )
```

Sets OS error message to a string, which can be NULL.
Frees previous if any. void [errmsg\(const char *msg\)](#);

12.35.3.3 filetype() [1/2]

```
int Fl_File_Browser::filetype ( ) const [inline]
```

Sets or gets the file browser type, FILES or DIRECTORIES.
When set to FILES, both files and directories are shown. Otherwise only directories are shown.

12.35.3.4 filetype() [2/2]

```
void Fl_File_Browser::filetype (
    int t ) [inline]
```

Sets or gets the file browser type, FILES or DIRECTORIES.
When set to FILES, both files and directories are shown. Otherwise only directories are shown.

12.35.3.5 filter() [1/2]

```
const char * Fl_File_Browser::filter ( ) const [inline]
```

Sets or gets the filename filter.

The pattern matching uses the [fl_filename_match\(\)](#) function in FLTK.

12.35.3.6 filter() [2/2]

```
void Fl_File_Browser::filter (
    const char * pattern )
```

Sets or gets the filename filter.

The pattern matching uses the [fl_filename_match\(\)](#) function in FLTK.

12.35.3.7 iconsize() [1/2]

```
uchar Fl_File_Browser::iconsize ( ) const [inline]
```

Sets or gets the size of the icons.

The default size is 20 pixels.

12.35.3.8 iconsize() [2/2]

```
void Fl_File_Browser::iconsize (
    uchar s ) [inline]
```

Sets or gets the size of the icons.

The default size is 20 pixels.

12.35.3.9 load()

```
int Fl_File_Browser::load (
    const char * directory,
    Fl_File_Sort_F * sort = fl_numeric_sort )
```

Loads the specified directory into the browser.

If icons have been loaded then the correct icon is associated with each file in the list.

If directory is "", all mount points (unix) or drive letters (Windows) are listed.

The sort argument specifies a sort function to be used with [fl_filename_list\(\)](#).

Return value is the number of filename entries, or 0 if none. On error, 0 is returned, and [errmsg\(\)](#) has OS error string if non-NULL.

The documentation for this class was generated from the following files:

- [Fl_File_Browser.H](#)
- [Fl_File_Browser.cxx](#)

12.36 FI_File_Chooser Class Reference

The [Fl_File_Chooser](#) widget displays a standard file selection dialog that supports various selection modes.

Public Types

- enum [Type](#) { [SINGLE](#) = 0 , [MULTI](#) = 1 , [CREATE](#) = 2 , [DIRECTORY](#) = 4 }
- Determines the type of file chooser presented to the user.*

Public Member Functions

- [Fl_Widget](#) * [add_extra](#) ([Fl_Widget](#) *gr)
Adds an extra widget at the bottom of the [Fl_File_Chooser](#) window.
- void [callback](#) (void(*cb)([Fl_File_Chooser](#) *, void *), void *d=0)

- Sets the file chooser callback cb and associated data d.*

 - **FI_Color color** ()

Gets the background color of the [FI_File_Browser](#) list.

- void **color** ([FI_Color](#) c)

Sets the background color of the [FI_File_Browser](#) list.

- int **count** ()

Returns the number of selected files.

- char * **directory** ()

Gets the current directory.

- void **directory** (const char *d)

Sets the current directory.

- const char * **filter** ()

Gets the current filename filter patterns.

- void **filter** (const char *p)

Sets the current filename filter patterns.

- int **filter_value** ()

Gets the current filename filter selection.

- void **filter_value** (int f)

Sets the current filename filter selection.

- [FI_File_Chooser](#) (const char *pathname, const char *pattern, int type_val, const char *title)

The constructor creates the [FI_File_Chooser](#) dialog shown.

- int **h** () const
- void **hide** ()

Hides the [FI_File_Chooser](#) window.

- [uchar](#) **iconsize** ()

Gets the size of the icons in the [FI_File_Browser](#).

- void **iconsize** ([uchar](#) s)

Sets the size of the icons in the [FI_File_Browser](#).

- const char * **label** ()

Gets the title bar text for the [FI_File_Chooser](#).

- void **label** (const char *l)

Sets the title bar text for the [FI_File_Chooser](#).

- const char * **ok_label** ()

Gets the label for the "ok" button in the [FI_File_Chooser](#).

- void **ok_label** (const char *l)

Sets the label for the "ok" button in the [FI_File_Chooser](#).

- void **position** (int x, int y)
- int **preview** () const

Returns the current state of the preview box.

- void **preview** (int e)

Enable or disable the preview tile.

- void **rescan** ()

Reloads the current directory in the [FI_File_Browser](#).

- void **rescan_keep_filename** ()

Rescan the current directory without clearing the filename, then select the file if it is in the list.

- void **resize** (int x, int y, int w, int h)
- void **show** ()

Shows the [FI_File_Chooser](#) window.

- int **shown** ()

Returns non-zero if the file chooser main window [show\(\)](#) has been called, but not [hide\(\)](#).

- void **size** (int w, int h)

- [FI_Color](#) **textcolor** ()
Gets the current [FI_File_Browser](#) text color.
- void **textcolor** ([FI_Color](#) c)
Sets the current [FI_File_Browser](#) text color.
- [FI_Font](#) **textfont** ()
Gets the current [FI_File_Browser](#) text font.
- void **textfont** ([FI_Font](#) f)
Sets the current [FI_File_Browser](#) text font.
- [FI_Fontsize](#) **textsize** ()
Gets the current [FI_File_Browser](#) text size.
- void **textsize** ([FI_Fontsize](#) s)
Sets the current [FI_File_Browser](#) text size.
- int **type** ()
Gets the current type of [FI_File_Chooser](#).
- void **type** (int t)
Sets the current type of [FI_File_Chooser](#).
- void * **user_data** () const
Gets the file chooser user data.
- void **user_data** (void *d)
Sets the file chooser user data d.
- void **value** (const char *filename)
Sets the current value of the selected file.
- const char * **value** (int f=1)
Gets the current value of the selected file(s).
- int **visible** ()
Returns 1 if the [FI_File_Chooser](#) window is visible.
- int **w** () const
- int **x** () const
- int **y** () const
- ~[FI_File_Chooser](#) ()
Destroys the widget and frees all memory used by it.

Public Attributes

- [FI_Button](#) * **newButton**
The "new directory" button is exported so that application developers can control the appearance and use.
- [FI_Check_Button](#) * **previewButton**
The "preview" button is exported so that application developers can control the appearance and use.
- [FI_Check_Button](#) * **showHiddenButton**
When checked, hidden files (i.e., filename begins with dot) are displayed.

Static Public Attributes

- static const char * **add_favorites_label** = "Add to Favorites"
[standard text may be customized at run-time]
- static const char * **all_files_label** = "All Files (*)"
[standard text may be customized at run-time]
- static const char * **custom_filter_label** = "Custom Filter"
[standard text may be customized at run-time]
- static const char * **existing_file_label** = "Please choose an existing file!"
[standard text may be customized at run-time]
- static const char * **favorites_label** = "Favorites"

- [standard text may be customized at run-time]*

 - static const char * **filename_label** = "Filename:"
- [standard text may be customized at run-time]*

 - static const char * **filesystems_label** = [FI::system_driver\(\)](#)->filesystems_label()
- [standard text may be customized at run-time]*

 - static const char * **hidden_label** = "Show hidden files"
- [standard text may be customized at run-time]*

 - static const char * **manage_favorites_label** = "Manage Favorites"
- [standard text may be customized at run-time]*

 - static const char * **new_directory_label** = "New Directory?"
- [standard text may be customized at run-time]*

 - static const char * **new_directory_tooltip** = "Create a new directory."
- [standard text may be customized at run-time]*

 - static const char * **preview_label** = "Preview"
- [standard text may be customized at run-time]*

 - static const char * **save_label** = "Save"
- [standard text may be customized at run-time]*

 - static const char * **show_label** = "Show:"
- [standard text may be customized at run-time]*

 - static [FI_File_Sort_F](#) * **sort** = [fl_numericsort](#)
the sort function that is used when loading the contents of a directory.

Protected Member Functions

- void **show_error_box** (int val)
Show error box if val=1, hide if val=0.

Related Symbols

(Note that these are not member symbols.)

- char * [fl_dir_chooser](#) (const char *message, const char *fname, int relative)
Shows a file chooser dialog and gets a directory.
- char * [fl_file_chooser](#) (const char *message, const char *pat, const char *fname, int relative)
Shows a file chooser dialog and gets a filename.
- void [fl_file_chooser_callback](#) (void(*cb)(const char *))
Set the file chooser callback.
- void [fl_file_chooser_ok_label](#) (const char *l)
Set the "OK" button label.

12.36.1 Detailed Description

The [FI_File_Chooser](#) widget displays a standard file selection dialog that supports various selection modes.

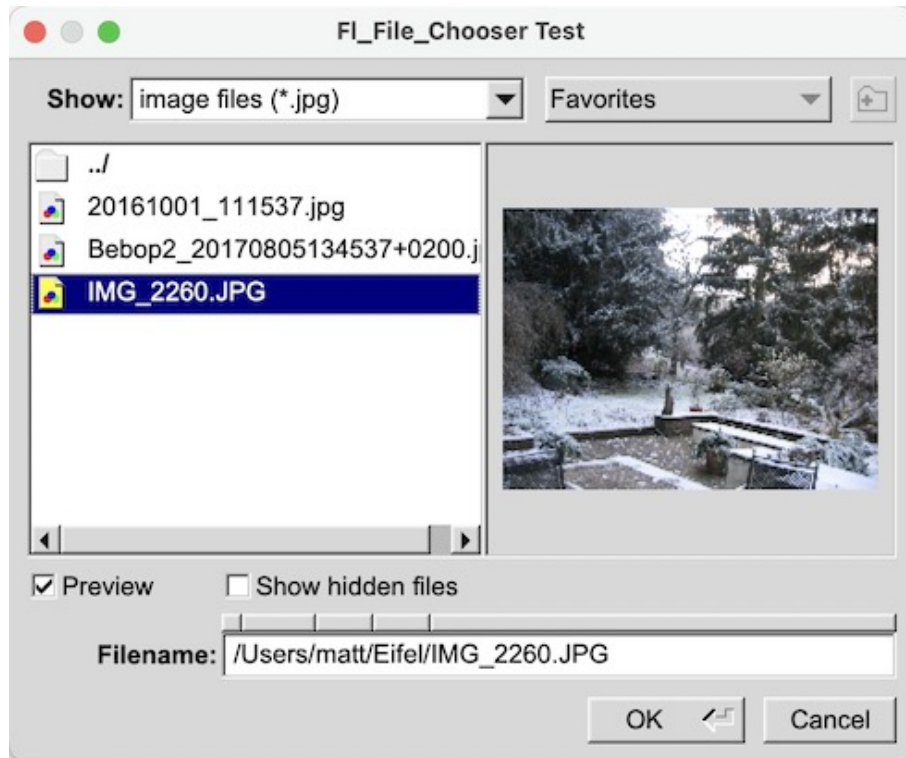


Figure 12.16 FI_File_Chooser

Features include:

- Multiple filter patterns can be specified, with parenthesis around filters, and tabs to separate each pattern, e.g.:


```
char pattern[] = "Image Files (*.{bmp,gif,jpg,png,xbm,xpm})\t"
                "Web Files (*.{htm,html,php})\t"
                "All Files (*)";
```
- If no "*" pattern is provided, then an entry for "All Files (*)" is automatically added.
- An optional file preview box is provided which can be toggled by programmer or user showing images, or the first 2048 bytes of printable text.
- Preview image loading functions can be registered to provide custom file previews.
- The favorites button shows up to 100 user-saved favorite directories, the user's home directory, and a filesystems item.
- A simple dialog is provided for managing saved directories.
- Shortcut keys are provided:

Shortcut	Description
Alt+a	Adds a directory to the favorites list
Alt+m	Manages the favorites list
Alt+f	Shows the filesystem list
Alt+h	Go to the home directory
Alt+0..9	going to any of the first 10 favorites

The [FI_File_Chooser](#) widget transmits UTF-8 encoded filenames to its user. It is recommended to open files that may have non-ASCII names with the [fl_fopen\(\)](#) or [fl_open\(\)](#) utility functions that handle these names in a cross-

platform way (whereas the standard `fopen()/open()` functions fail on the Windows platform to open files with a non-ASCII name).

The `Fl_File_Chooser` class also exports several static values that may be used to localize or customize the appearance of all file chooser dialogs:

Member	Default value
<code>add_favorites_label</code>	"Add to Favorites"
<code>all_files_label</code>	"All Files (*)"
<code>custom_filter_label</code>	"Custom Filter"
<code>existing_file_label</code>	"Please choose an existing file!"
<code>favorites_label</code>	"Favorites"
<code>filename_label</code>	"Filename:"
<code>filesystems_label</code>	"My Computer" (Windows) "File Systems" (all others)
<code>hidden_label</code>	"Show hidden files:"
<code>manage_favorites_label</code>	"Manage Favorites"
<code>new_directory_label</code>	"New Directory?"
<code>new_directory_tooltip</code>	"Create a new directory."
<code>preview_label</code>	"Preview"
<code>save_label</code>	"Save"
<code>show_label</code>	"Show:"
<code>sort</code>	<code>fl_numericsort</code>

The `Fl_File_Chooser::sort` member specifies the sort function that is used when loading the contents of a directory and can be customized at run-time.

The `Fl_File_Chooser` class also exports the `Fl_File_Chooser::newButton` and `Fl_File_Chooser::previewButton` widgets so that application developers can control their appearance and use.

12.36.2 Member Enumeration Documentation

12.36.2.1 Type

```
enum Fl_File_Chooser::Type
```

Determines the type of file chooser presented to the user.

Enumerator

SINGLE	Select a single, existing file.
MULTI	Select one or more existing files.
CREATE	When used alone, select a single, existing file or specify a new filename. Can be combined with DIRECTORY (e.g. CREATE DIRECTORY) to have the same effect for directories.
DIRECTORY	Select a single, existing directory. Can be combined with CREATE.

12.36.3 Constructor & Destructor Documentation

12.36.3.1 Fl_File_Chooser()

```
Fl_File_Chooser::Fl_File_Chooser (
    const char * pathname,
    const char * pattern,
    int type_val,
    const char * title )
```

The constructor creates the [Fl_File_Chooser](#) dialog shown.

- The `pathname` argument can be a directory name or a complete file name (in which case the corresponding file is highlighted in the list and in the filename input field.)
- The `pattern` argument can be a NULL string or "*" to list all files, or it can be a series of descriptions and filter strings separated by tab characters (`\t`). The format of filters is either "Description text (patterns)" or just "patterns". A file chooser that provides filters for HTML and image files might look like:

```
"HTML Files (*.html)\tImage Files (*.{bmp,gif,jpg,png})"
```

The file chooser will automatically add the "All Files (*)" pattern to the end of the string you pass if you do not provide one. The first filter in the string is the default filter. See the FLTK documentation on [fl_filename_match\(\)](#) for the kinds of pattern strings that are supported.
- The `type_val` argument can be one of the [Fl_File_Chooser::Type](#) values.
- The `title` argument is used to set the title bar text for the [Fl_File_Chooser](#) window.

12.36.4 Member Function Documentation

12.36.4.1 `add_extra()`

```
Fl_Widget * Fl_File_Chooser::add_extra (
    Fl_Widget * extra )
```

Adds an extra widget at the bottom of the [Fl_File_Chooser](#) window.

You can use any [Fl_Widget](#) or [Fl_Group](#). If you use an [Fl_Group](#), set its (x, y) coordinates to (0, 0) and position its children relative to (0, 0) inside the [Fl_Group](#) container widget. Make sure that all child widgets of the [Fl_Group](#) are entirely included inside the bounding box of their parents, i.e. the [Fl_Group](#) widget, and the [Fl_File_Chooser](#) window, respectively.

Note

The width of the [Fl_File_Chooser](#) window is an undocumented implementation detail and may change in the future.

If `extra` is NULL any previous extra widget is removed.

Parameters

<code>in</code>	<code>extra</code>	Custom widget or group to be added to the Fl_File_Chooser window.
-----------------	--------------------	---

Returns

Pointer to previous extra widget or NULL if not set previously.

Note

[Fl_File_Chooser](#) does **not** delete the extra widget in its destructor! The extra widget is removed from the [Fl_File_Chooser](#) window before the [Fl_File_Chooser](#) widget gets destroyed. To prevent memory leakage, don't forget to delete unused extra widgets.

12.36.4.2 `filter()`

```
void Fl_File_Chooser::filter (
    const char * p )
```

Sets the current filename filter patterns.

The filter patterns use [fl_filename_match\(\)](#). Multiple patterns can be used by separating them with tabs, like `"*.jpg\t*.png\t*.gif\t*"`. In addition, you can provide human-readable labels with the patterns inside parenthesis, like `"JPEG Files (*.jpg)\tPNG Files (*.png)\tGIF Files (*.gif)\tAll Files (*)"`.

Use `filter(NULL)` to show all files.

12.36.4.3 iconsize() [1/2]

```
uchar Fl_File_Chooser::iconsize ( )
```

Gets the size of the icons in the [Fl_File_Browser](#).

By default the icon size is set to 1.5 times the [textsize\(\)](#).

12.36.4.4 iconsize() [2/2]

```
void Fl_File_Chooser::iconsize (
    uchar s )
```

Sets the size of the icons in the [Fl_File_Browser](#).

By default the icon size is set to 1.5 times the [textsize\(\)](#).

12.36.4.5 preview()

```
void Fl_File_Chooser::preview (
    int e )
```

Enable or disable the preview tile.

1 = enable preview, 0 = disable preview.

12.36.4.6 shown()

```
int Fl_File_Chooser::shown ( )
```

Returns non-zero if the file chooser main window [show\(\)](#) has been called, but not [hide\(\)](#).

See also

[Fl_Window::shown\(\)](#)

12.36.4.7 value()

```
const char * Fl_File_Chooser::value (
    int f = 1 )
```

Gets the current value of the selected file(s).

f is a 1-based index into a list of file names. The number of selected files is returned by [Fl_File_Chooser::count\(\)](#).

This sample code loops through all selected files:

```
// Get list of filenames user selected from a MULTI chooser
for ( int t=1; t<=chooser->count(); t++ ) {
    const char *filename = chooser->value(t);
    ...
}
```

12.36.5 Member Data Documentation**12.36.5.1 showHiddenButton**

```
Fl_File_Chooser::showHiddenButton
```

When checked, hidden files (i.e., filename begins with dot) are displayed.

The "showHiddenButton" button is exported so that application developers can control its appearance.

The documentation for this class was generated from the following files:

- [Fl_File_Chooser.H](#)
- [Fl_File_Chooser.cxx](#)
- [Fl_File_Chooser2.cxx](#)
- [fl_file_dir.cxx](#)

12.37 Fl_File_Icon Class Reference

The [Fl_File_Icon](#) class manages icon images that can be used as labels in other widgets and as icons in the [FileBrowser](#) widget.

```
#include <Fl_File_Icon.H>
```

Public Types

- enum {
 ANY, **PLAIN**, **FIFO**, **DEVICE**,
 LINK, **DIRECTORY** }
- enum {
 END, **COLOR**, **LINE**, **CLOSEDLINE**,
 POLYGON, **OUTLINEPOLYGON**, **VERTEX** }

Public Member Functions

- short * **add** (short d)
 Adds a keyword value to the icon array, returning a pointer to it.
- short * **add_color** (FI_Color c)
 Adds a color value to the icon array, returning a pointer to it.
- short * **add_vertex** (float x, float y)
 Adds a vertex value to the icon array, returning a pointer to it.
- short * **add_vertex** (int x, int y)
 Adds a vertex value to the icon array, returning a pointer to it.
- void **clear** ()
 Clears all icon data from the icon.
- void **draw** (int x, int y, int w, int h, FI_Color ic, int active=1)
 Draws an icon in the indicated area.
- FI_File_Icon (const char *p, int t, int nd=0, short *d=0)
 Creates a new FI_File_Icon with the specified information.
- void **label** (FI_Widget *w)
 Applies the icon to the widget, registering the FI_File_Icon label type as needed.
- void **load** (const char *f)
 Loads the specified icon image.
- int **load_fti** (const char *fti)
 Loads an SGI icon file.
- int **load_image** (const char *i)
 Load an image icon file from an image filename.
- FI_File_Icon * **next** ()
 Returns next file icon object.
- const char * **pattern** ()
 Returns the filename matching pattern for the icon.
- int **size** ()
 Returns the number of words of data used by the icon.
- int **type** ()
 Returns the filetype associated with the icon, which can be one of the following:
- short * **value** ()
 Returns the data array for the icon.
- ~FI_File_Icon ()
 The destructor destroys the icon and frees all memory that has been allocated for it.

Static Public Member Functions

- static FI_File_Icon * **find** (const char *filename, int filetype=ANY)
 Finds an icon that matches the given filename and file type.
- static FI_File_Icon * **first** ()
 Returns a pointer to the first icon in the list.
- static void **labeltype** (const FI_Label *o, int x, int y, int w, int h, FI_Align a)

Draw the icon label.

- static void `load_system_icons` (void)

Loads all system-defined icons.

12.37.1 Detailed Description

The `Fl_File_Icon` class manages icon images that can be used as labels in other widgets and as icons in the `FileBrowser` widget.

12.37.2 Constructor & Destructor Documentation

12.37.2.1 Fl_File_Icon()

```
Fl_File_Icon::Fl_File_Icon (
    const char * p,
    int t,
    int nd = 0,
    short * d = 0 )
```

Creates a new `Fl_File_Icon` with the specified information.

Parameters

in	<i>p</i>	filename pattern
in	<i>t</i>	file type
in	<i>nd</i>	number of data values
in	<i>d</i>	data values

12.37.3 Member Function Documentation

12.37.3.1 add()

```
short * Fl_File_Icon::add (
    short d )
```

Adds a keyword value to the icon array, returning a pointer to it.

Parameters

in	<i>d</i>	data value
----	----------	------------

12.37.3.2 add_color()

```
short * Fl_File_Icon::add_color (
    Fl_Color c ) [inline]
```

Adds a color value to the icon array, returning a pointer to it.

Parameters

in	<i>c</i>	color value
----	----------	-------------

12.37.3.3 add_vertex() [1/2]

```
short * Fl_File_Icon::add_vertex (
    float x,
    float y ) [inline]
```

Adds a vertex value to the icon array, returning a pointer to it.

The floating point version goes from 0.0 to 1.0. The origin (0.0) is in the lower-left hand corner of the icon.

Parameters

in	<i>x,y</i>	vertex coordinates
----	------------	--------------------

12.37.3.4 add_vertex() [2/2]

```
short * Fl_File_Icon::add_vertex (
    int x,
    int y ) [inline]
```

Adds a vertex value to the icon array, returning a pointer to it.

The integer version accepts coordinates from 0 to 10000. The origin (0.0) is in the lower-left hand corner of the icon.

Parameters

in	<i>x,y</i>	vertex coordinates
----	------------	--------------------

12.37.3.5 draw()

```
void Fl_File_Icon::draw (
    int x,
    int y,
    int w,
    int h,
    Fl_Color ic,
    int active = 1 )
```

Draws an icon in the indicated area.

Parameters

in	<i>x,y,w,h</i>	position and size
in	<i>ic</i>	icon color
in	<i>active</i>	status, default is active [non-zero]

12.37.3.6 find()

```
Fl_File_Icon * Fl_File_Icon::find (
    const char * filename,
    int filetype = ANY ) [static]
```

Finds an icon that matches the given filename and file type.

Parameters

in	<i>filename</i>	name of file
in	<i>filetype</i>	enumerated file type

Returns

matching file icon or NULL

12.37.3.7 label()

```
void Fl_File_Icon::label (
    Fl_Widget * w )
```

Applies the icon to the widget, registering the [Fl_File_Icon](#) label type as needed.

Parameters

in	<i>w</i>	widget for which this icon will become the label
----	----------	--

12.37.3.8 labeltype()

```
void Fl_File_Icon::labeltype (
    const Fl_Label * o,
    int x,
    int y,
    int w,
    int h,
    Fl_Align a ) [static]
```

Draw the icon label.

Parameters

in	<i>o</i>	label data
in	<i>x,y,w,h</i>	position and size of label
in	<i>a</i>	label alignment [not used]

12.37.3.9 load()

```
void Fl_File_Icon::load (
    const char * f )
```

Loads the specified icon image.

The format is deduced from the filename.

Parameters

in	<i>f</i>	filename
----	----------	----------

12.37.3.10 load_fti()

```
int Fl_File_Icon::load_fti (
    const char * fti )
```

Loads an SGI icon file.

Parameters

in	<i>fti</i>	icon filename
----	------------	---------------

Returns

0 on success, non-zero on error

12.37.3.11 load_image()

```
int Fl_File_Icon::load_image (
    const char * ifile )
```

Load an image icon file from an image filename.

Parameters

in	<i>ifile</i>	image filename
----	--------------	----------------

Returns

0 on success, non-zero on error

12.37.3.12 load_system_icons()

```
void Fl_File_Icon::load_system_icons (
    void ) [static]
```

Loads all system-defined icons.

This call is useful when using the FileChooser widget and should be used when the application starts:

```
Fl_File_Icon::load_system_icons();
```

12.37.3.13 next()

```
Fl_File_Icon * Fl_File_Icon::next ( ) [inline]
```

Returns next file icon object.

See [Fl_File_Icon::first\(\)](#)

12.37.3.14 type()

```
int Fl_File_Icon::type ( ) [inline]
```

Returns the filetype associated with the icon, which can be one of the following:

- `Fl_File_Icon::ANY`, any kind of file.
- `Fl_File_Icon::PLAIN`, plain files.
- `Fl_File_Icon::FIFO`, named pipes.
- `Fl_File_Icon::DEVICE`, character and block devices.
- `Fl_File_Icon::LINK`, symbolic links.
- `Fl_File_Icon::DIRECTORY`, directories.

The documentation for this class was generated from the following files:

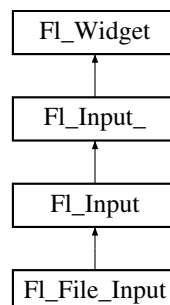
- `Fl_File_Icon.H`
- `Fl_File_Icon.cxx`
- `Fl_File_Icon2.cxx`

12.38 Fl_File_Input Class Reference

This widget displays a pathname in a text input field.

```
#include <Fl_File_Input.H>
```

Inheritance diagram for `Fl_File_Input`:



Public Member Functions

- [FI_Boxtype](#) **down_box** () const
Gets the box type used for the navigation bar.
- void [down_box](#) ([FI_Boxtype](#) b)
Sets the box type to use for the navigation bar.
- [FI_Color](#) **errorcolor** () const
Gets the current error color.
- void [errorcolor](#) ([FI_Color](#) c)
Sets the current error color to c.
- [FI_File_Input](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [FI_File_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int event) [FL_OVERRIDE](#)
Handle events in the widget.
- const char * **value** ()
Returns the current value, which is a pointer to an internal buffer and is valid only until the next event is handled.
- int [value](#) (const char *str)
Sets the value of the widget given a new string value.
- int [value](#) (const char *str, int len)
Sets the value of the widget given a new string value and its length.

Public Member Functions inherited from [FI_Input](#)

- [FI_Input](#) (int, int, int, int, const char *L=0)
Creates a new [FI_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [FI_Input_](#)

- int [append](#) (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool [can_redo](#) () const
Check if there is a redo action available.
- bool [can_undo](#) () const
Check if the last operation can be undone.
- int [copy](#) (int clipboard)
Put the current selection into the clipboard.
- int [copy_cuts](#) ()
Copies the yank buffer to the clipboard.
- [FI_Color](#) [cursor_color](#) () const
Gets the color of the cursor.
- void [cursor_color](#) ([FI_Color](#) n)
Sets the color of the cursor.
- int [cut](#) ()
Deletes the current selection.
- int [cut](#) (int a, int b)
Deletes all characters between index a and b.
- int [cut](#) (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double [dvalue](#) () const
Returns the widget text interpreted as a floating point number.

- `FL_Input_` (int, int, int, int, const char *|=0)
Creates a new `FL_Input_` widget.
- unsigned int `index` (int i) const
Returns the character at index `i`.
- int `input_type` () const
Gets the input field type.
- void `input_type` (int t)
Sets the input field type.
- int `insert` (const char *t, int l=0)
Inserts text at the cursor position.
- int `insert_position` () const
Gets the position of the text cursor.
- int `insert_position` (int p)
Sets the cursor position and mark.
- int `insert_position` (int p, int m)
Sets the index for the cursor and mark.
- int `ivalue` () const
Returns the widget text interpreted as a signed integer.
- int `mark` () const
Gets the current selection mark.
- int `mark` (int m)
Sets the current selection mark.
- int `maximum_size` () const
Gets the maximum length of the input field in characters.
- void `maximum_size` (int m)
Sets the maximum length of the input field in characters.
- int `position` () const
- int `position` (int p)
- int `position` (int p, int m)
- int `readonly` () const
Gets the read-only state of the input field.
- void `readonly` (int b)
Sets the read-only state of the input field.
- int `redo` ()
Redo previous undo operation.
- int `replace` (int b, int e, const char *text, int ilen=0)
Deletes text from `b` to `e` and inserts the new string `text`.
- void `resize` (int, int, int, int) `FL_OVERRIDE`
Changes the size of the widget.
- int `shortcut` () const
Return the shortcut key associated with this widget.
- void `shortcut` (int s)
Sets the shortcut key associated with this widget.
- int `size` () const
Returns the number of bytes in `value()`.
- void `size` (int W, int H)
Sets the width and height of this widget.
- int `static_value` (const char *)
Changes the widget text.
- int `static_value` (const char *, int)
Changes the widget text.

- int `tab_nav` () const
Gets whether the Tab key causes focus navigation in multiline input fields or not.
- void `tab_nav` (int val)
Sets whether the Tab key does focus navigation, or inserts tab characters into `FI_Multiline_Input`.
- `FI_Color` `textcolor` () const
Gets the color of the text in the input field.
- void `textcolor` (`FI_Color` n)
Sets the color of the text in the input field.
- `FI_Font` `textfont` () const
Gets the font of the text in the input field.
- void `textfont` (`FI_Font` s)
Sets the font of the text in the input field.
- `FI_Fontsize` `textsize` () const
Gets the size of the text in the input field.
- void `textsize` (`FI_Fontsize` s)
Sets the size of the text in the input field.
- int `undo` ()
Undoes previous changes to the text buffer.
- const char * `value` () const
Returns the text displayed in the widget.
- int `value` (const char *)
Changes the widget text.
- int `value` (const char *, int)
Changes the widget text.
- int `value` (double value)
Changes the widget text to a floating point number ("%g").
- int `value` (int value)
Changes the widget text to a signed integer number.
- int `wrap` () const
Gets the word wrapping state of the input field.
- void `wrap` (int b)
Sets the word wrapping state of the input field.
- `~FI_Input_` ()
Destroys the widget.

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- `FI_Align` `align` () const
Gets the label alignment.
- void `align` (`FI_Align` alignment)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.

- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) [box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p](#) [callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) (uchar c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.
- void [clear_visible](#) ()
Hides the widget.
- void [clear_visible_focus](#) ()
Disables keyboard focus navigation with this widget.
- [FI_Color](#) [color](#) () const
Gets the background color of the widget.

- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar` c)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar` c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (int, int, int, int)
 - Internal use only.*
- void `deactivate` ()
 - Deactivates the widget.*
- `FI_Image` * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
- const `FI_Image` * `deimage` () const
 - Gets the image that is used as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image` &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with default arguments.*
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `draw_label` (int, int, int, int, `FI_Align`) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int `h` () const
 - Gets the widget height.*
- virtual void `hide` ()
 - Makes a widget invisible.*
- `FI_Image` * `image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
- const `FI_Image` * `image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
- void `image` (`FI_Image` &img)

- Sets the image to use as part of the widget label when in the active state.*

 - void `image` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const

Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.
- void `label` (const char *text)

Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char *b)

Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const

Gets the label color.
- void `labelcolor` (`FI_Color c`)

Sets the label color.
- `FI_Font labelfont` () const

Gets the font to use.
- void `labelfont` (`FI_Font f`)

Sets the font to use.
- `FI_Fontsize labelsize` () const

Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)

Sets the font size in pixels.
- `FI_Labeltype labeltype` () const

Gets the label type.
- void `labeltype` (`FI_Labeltype a`)

Sets the label type.
- void `measure_label` (int &ww, int &hh) const

Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const

Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)

Sets whether this widget needs a keyboard.
- unsigned int `output` () const

Returns if a widget is used for output only.
- `FI_Group * parent` () const

Returns a pointer to the parent widget.
- void `parent` (`FI_Group *p`)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- `FI_Color selection_color` () const

Gets the selection color.

- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

- Modifies keyboard focus navigation.*

 - int `visible_r` () const

Returns whether a widget and all its parents are visible.
 - int `w` () const

Gets the widget width.
 - `Fl_When when` () const

Returns the conditions under which the callback is called.
 - void `when` (uchar i)

Sets the flags used to decide when a callback is called.
 - `Fl_Window * window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
 - int `x` () const

Gets the widget position in its window.
 - int `y` () const

Gets the widget position in its window.
 - virtual `~Fl_Widget` ()

Destroys the widget.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`

Draws the file input widget.

Protected Member Functions inherited from `Fl_Input`

- void `draw` () `FL_OVERRIDE`

Draws the widget.
- int `handle_key` ()

Handles a keystroke.
- int `handle_rmb` ()

Handle right mouse button down events.

Protected Member Functions inherited from `Fl_Input_`

- int `apply_undo` ()

Apply the current undo/redo operation.
- void `drawtext` (int, int, int, int)

Draws the text in the passed bounding box.
- void `drawtext` (int, int, int, int, bool draw_active)

Draws the text in the passed bounding box.
- void `handle_mouse` (int, int, int, int, int keepmark=0)

Handles mouse clicks and mouse moves.
- int `handletext` (int e, int, int, int, int)

Handles all kinds of text field related events.
- int `line_end` (int i) const

Finds the end of a line.
- int `line_start` (int i) const

Finds the start of a line.
- int `linesPerPage` ()
- void `maybe_do_callback` (`Fl_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- int `up_down_position` (int, int keepmark=0)

Moves the cursor to the column given by `up_down_pos`.

- int `word_end` (int i) const
Finds the end of a word.
- int `word_start` (int i) const
Finds the start of a word.
- int `xscroll` () const
- int `yscroll` () const
- void `yscroll` (int yOffset)

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Static Public Attributes inherited from [Fl_Input](#)

- static const char * **copy_menu_text** = "Copy"
[this text may be customized at run-time]
- static const char * **cut_menu_text** = "Cut"
[this text may be customized at run-time]
- static const char * **paste_menu_text** = "Paste"
[this text may be customized at run-time]

Protected Types inherited from [Fl_Widget](#)

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
,
OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
,
MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
,
GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }

flags possible values enumeration.

12.38.1 Detailed Description

This widget displays a pathname in a text input field.

A navigation bar located above the input field allows the user to navigate upward in the directory tree. You may want to handle `FL_WHEN_CHANGED` events for tracking text changes and also `FL_WHEN_RELEASE` for button release when changing to parent dir. `FL_WHEN_RELEASE` callback won't be called if the directory clicked is the same as the current one.

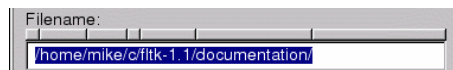


Figure 12.17 `Fl_File_Input`

Note

As all [Fl_Input](#) derived objects, [Fl_File_Input](#) may call its callback when losing focus (see `FL_UNFOCUS`) to update its state like its cursor shape. One resulting side effect is that you should call `clear_changed()` early in your callback to avoid reentrant calls if you plan to show another window or dialog box in the callback.

12.38.2 Constructor & Destructor Documentation

12.38.2.1 `Fl_File_Input()`

```
Fl_File_Input::Fl_File_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_File_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

12.38.3 Member Function Documentation

12.38.3.1 down_box()

```
void Fl_File_Input::down_box (
    Fl_Boxtype b ) [inline]
```

Sets the box type to use for the navigation bar.

12.38.3.2 draw()

```
void Fl_File_Input::draw (
    void ) [protected], [virtual]
```

Draws the file input widget.

Implements [Fl_Widget](#).

12.38.3.3 errorcolor() [1/2]

```
Fl_Color Fl_File_Input::errorcolor ( ) const [inline]
```

Gets the current error color.

Returns FL_RED since FLTK 1.4.0 (default in 1.3.x). Retained for backwards compatibility.

Deprecated Will be removed in FLTK 1.5.0 or higher.

Todo Remove [Fl_File_Input::errorcolor\(\)](#) in FLTK 1.5.0 or higher.

12.38.3.4 errorcolor() [2/2]

```
void Fl_File_Input::errorcolor (
    Fl_Color c ) [inline]
```

Sets the current error color to *c*.

Does nothing since FLTK 1.4.0. Retained for backwards compatibility.

Deprecated Will be removed in FLTK 1.5.0 or higher.

Todo Remove [Fl_File_Input::errorcolor\(Fl_Color\)](#) in FLTK 1.5.0 or higher.

12.38.3.5 handle()

```
int Fl_File_Input::handle (
    int event ) [virtual]
```

Handle events in the widget.

Return non zero if event is handled.

Parameters

in	<i>event</i>	
----	--------------	--

Reimplemented from [Fl_Widget](#).

12.38.3.6 value() [1/2]

```
int Fl_File_Input::value (
    const char * str )
```

Sets the value of the widget given a new string value.
Returns non 0 on success.

Parameters

in	<i>str</i>	new string value
----	------------	------------------

12.38.3.7 value() [2/2]

```
int Fl_File_Input::value (
    const char * str,
    int len )
```

Sets the value of the widget given a new string value and its length.
Returns non 0 on success.

Parameters

in	<i>str</i>	new string value
in	<i>len</i>	length of value

The documentation for this class was generated from the following files:

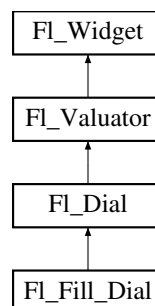
- Fl_File_Input.H
- Fl_File_Input.cxx

12.39 FI_Fill_Dial Class Reference

Draws a dial with a filled arc.

```
#include <Fl_Fill_Dial.H>
```

Inheritance diagram for Fl_Fill_Dial:

**Public Member Functions**

- **Fl_Fill_Dial** (int X, int Y, int W, int H, const char *L)
Creates a filled dial, also setting its type to FL_FILL_DIAL.

Public Member Functions inherited from [Fl_Dial](#)

- short [angle1](#) () const
Sets Or gets the angles used for the minimum and maximum values.
- void [angle1](#) (short a)

- See short [angle1\(\)](#) *const*.
- short **angle2** () *const*
 - See short [angle1\(\)](#) *const*.
- void **angle2** (short a)
 - See short [angle1\(\)](#) *const*.
- void **angles** (short a, short b)
 - See short [angle1\(\)](#) *const*.
- [FI_Dial](#) (int x, int y, int w, int h, const char *|=0)
 - Creates a new *FI_Dial* widget using the given position, size, and label string.
- int **handle** (int) [FL_OVERRIDE](#)
 - Allow subclasses to handle event based on current position and size.

Public Member Functions inherited from [FI_Valuator](#)

- void **bounds** (double a, double b)
 - Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
 - Clamps the passed value to the valuator range.
- virtual int **format** (char *)
 - Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
 - Adds n times the step value to the passed value.
- double **maximum** () *const*
 - Gets the maximum value for the valuator.
- void **maximum** (double a)
 - Sets the maximum value for the valuator.
- double **minimum** () *const*
 - Gets the minimum value for the valuator.
- void **minimum** (double a)
 - Sets the minimum value for the valuator.
- void **precision** (int digits)
 - Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
 - Sets the minimum and maximum values for the valuator.
- double **round** (double)
 - Round the passed value to the nearest step increment.
- double **step** () *const*
 - Gets or sets the step value.
- void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) *const*
- void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) *const*.
- void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) *const*
- double **value** () *const*
 - Gets the floating point(double) value.
- int **value** (double)
 - Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_GI_Window](#) * [as_gi_window](#) ()
Returns an [FI_GI_Window](#) pointer if this widget is an [FI_GI_Window](#).
- virtual class [FI_GI_Window](#) const * [as_gi_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const

Gets the background color of the widget.
- void `color` (`FI_Color` bg)

Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)

Sets the background and selection color of the widget.
- `FI_Color` `color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget` *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar` `damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image` * `deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image` * `deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fonsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fonsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const

Returns if a widget is used for output only.
 - `FI_Group * parent` () const

Returns a pointer to the parent widget.
 - void `parent` (`FI_Group *p`)

Internal use only - "for hacks only".
 - void `position` (int X, int Y)

Repositions the window or widget.
 - void `redraw` ()

Schedules the drawing of the widget.
 - void `redraw_label` ()

Schedules the drawing of the label.
 - virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
 - `FI_Color selection_color` () const

Gets the selection color.
 - void `selection_color` (`FI_Color a`)

Sets the selection color.
 - void `set_active` ()

Marks the widget as active without sending events or changing focus.
 - void `set_changed` ()

Marks the value of the widget as changed.
 - void `set_output` ()

Sets a widget to output only.
 - void `set_visible` ()

Makes the widget visible.
 - void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
 - int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
 - void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
 - virtual void `show` ()

Makes a widget visible.
 - void `size` (int W, int H)

Changes the size of the widget.
 - int `take_focus` ()

Gives the widget the keyboard focus.
 - unsigned int `takeevents` () const

Returns if the widget is able to take events.
 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
 - const char * `tooltip` () const

Gets the current tooltip text.
 - void `tooltip` (const char *text)

Sets the current tooltip text.
 - `FI_Window * top_window` () const

Returns a pointer to the top-level window for the widget.
 - `FI_Window * top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.

- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.
- `int use_accents_menu ()`
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- `void * user_data () const`
Gets the user data for this widget.
- `void user_data (FI_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- `void user_data (void *v)`
Sets the user data for this widget.
- `unsigned int visible () const`
Returns whether a widget is visible.
- `unsigned int visible_focus () const`
Checks whether this widget has a visible focus.
- `void visible_focus (int v)`
Modifies keyboard focus navigation.
- `int visible_r () const`
Returns whether a widget and all its parents are visible.
- `int w () const`
Gets the widget width.
- `FI_When when () const`
Returns the conditions under which the callback is called.
- `void when (uchar i)`
Sets the flags used to decide when a callback is called.
- `FI_Window * window () const`
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~FI_Widget ()`
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- `static void default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- `static unsigned int label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- `static int test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
 - INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,
 - FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7
 - ,
 - OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11
 - ,
 - MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15
 - ,
 - GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU = 1<<19 ,
 - NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
 - AUTO_DELETE_USER_DATA = 1<<23 ,
 - MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
 - USERFLAG1 = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from FI_Dial

- void **draw** () **FL_OVERRIDE**
 - Draws dial at current position and size.*
- void **draw** (int X, int Y, int W, int H)
 - Draws dial at given position and size.*
- int **handle** (int event, int X, int Y, int W, int H)
 - Allows subclasses to handle event based on given position and size.*

Protected Member Functions inherited from FI_Valuator

- FI_Valuator** (int X, int Y, int W, int H, const char *L)
 - Creates a new FI_Valuator widget using the given position, size, and label string.*
- void **handle_drag** (double newvalue)
 - Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.*
- void **handle_push** ()
 - Stores the current value in the previous value.*
- void **handle_release** ()
 - Called after an FL_WHEN_RELEASE event is received and before the callback.*
- int **horizontal** () const
 - Tells if the valuator is an FL_HORIZONTAL one.*
- double **previous_value** () const
 - Gets the previous floating point value before an event changed it.*
- void **set_value** (double v)
 - Sets the current floating point value.*
- double **softclamp** (double)
 - Clamps the value, but accepts v if the previous value is not already out of range.*
- virtual void **value_damage** ()
 - Asks for partial redraw.*

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
 - Clears a flag in the flags mask.*
- void **draw_backdrop** () const
 - If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.*

- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.39.1 Detailed Description

Draws a dial with a filled arc.

The documentation for this class was generated from the following files:

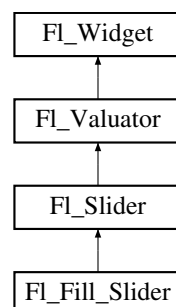
- FI_Fill_Dial.H
- FI_Dial.cxx

12.40 FI_Fill_Slider Class Reference

Widget that draws a filled horizontal slider, useful as a progress or value meter.

```
#include <FI_Fill_Slider.H>
```

Inheritance diagram for FI_Fill_Slider:



Public Member Functions

- **FI_Fill_Slider** (int X, int Y, int W, int H, const char *L=0)
Creates the slider from its position, size and optional title.

Public Member Functions inherited from FI_Slider

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- **FI_Slider** (int X, int Y, int W, int H, const char *L=0)
Creates a new FI_Slider widget using the given position, size, and label string.
- **FI_Slider** (uchar t, int X, int Y, int W, int H, const char *L)
Creates a new FI_Slider widget using the given type, position, size, and label string.
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.
- int **scrollvalue** (int pos, int size, int first, int total)
Sets the size and position of the sliding knob in the box.
- **FI_Boxtype slider** () const
Gets the slider box type.
- void **slider** (**FI_Boxtype** c)
Sets the slider box type.
- float **slider_size** () const
Get the dimensions of the moving piece of slider.
- void **slider_size** (double v)
Set the dimensions of the moving piece of slider.

Public Member Functions inherited from FI_Valuator

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.
- double **step** () const
Gets or sets the step value.

- void **step** (double a, int b)
See double [FI_Valuator::step\(\)](#) const
- void **step** (double s)
See double [FI_Valuator::step\(\)](#) const.
- void **step** (int a)
See double [FI_Valuator::step\(\)](#) const
- double **value** () const
Gets the floating point(double) value.
- int **value** (double)
Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) **box** () const
Gets the box type of the widget.
- void **box** ([FI_Boxtype](#) new_box)
Sets the box type for the widget.

- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) ([uchar](#) c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.
- void [clear_visible](#) ()
Hides the widget.
- void [clear_visible_focus](#) ()
Disables keyboard focus navigation with this widget.
- [FI_Color](#) [color](#) () const
Gets the background color of the widget.
- void [color](#) ([FI_Color](#) bg)
Sets the background color of the widget.
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
Sets the background and selection color of the widget.
- [FI_Color](#) [color2](#) () const
For back compatibility only.
- void [color2](#) (unsigned a)
For back compatibility only.
- int [contains](#) (const [FI_Widget](#) *w) const
Checks if w is a child of this widget.
- void [copy_label](#) (const char *new_label)
Sets the current label.
- void [copy_tooltip](#) (const char *text)
Sets the current tooltip text.
- [uchar](#) [damage](#) () const
Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) ([uchar](#) c)
Sets the damage bits for the widget.
- void [damage](#) ([uchar](#) c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int [damage_resize](#) (int, int, int, int)
Internal use only.
- void [deactivate](#) ()

- Deactivates the widget.*

 - `FI_Image * deimage ()`

Gets the image that is used as part of the widget label when in the inactive state.
 - `const FI_Image * deimage () const`

Gets the image that is used as part of the widget label when in the inactive state.
 - `void deimage (FI_Image &img)`

Sets the image to use as part of the widget label when in the inactive state.
 - `void deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
 - `int deimage_bound () const`

Returns whether the inactive image is managed by the widget.
 - `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with default arguments.
 - `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
 - `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
 - `void draw_label (int, int, int, int, FI_Align) const`

Draws the label in an arbitrary bounding box with an arbitrary alignment.
 - `int h () const`

Gets the widget height.
 - `virtual void hide ()`

Makes a widget invisible.
 - `FI_Image * image ()`

Gets the image that is used as part of the widget label when in the active state.
 - `const FI_Image * image () const`

Gets the image that is used as part of the widget label when in the active state.
 - `void image (FI_Image &img)`

Sets the image to use as part of the widget label when in the active state.
 - `void image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.
 - `int image_bound () const`

Returns whether the image is managed by the widget.
 - `int inside (const FI_Widget *wgt) const`

Checks if this widget is a child of wgt.
 - `int is_label_copied () const`

Returns whether the current label was assigned with `copy_label()`.
 - `const char * label () const`

Gets the current label text.
 - `void label (const char *text)`

Sets the current label pointer.
 - `void label (FI_Labeltype a, const char *b)`

Shortcut to set the label text and type in one call.
 - `FI_Color labelcolor () const`

Gets the label color.
 - `void labelcolor (FI_Color c)`

Sets the label color.
 - `FI_Font labelfont () const`

Gets the font to use.
 - `void labelfont (FI_Font f)`

Sets the font to use.

- [FI_Fontsize](#) `labelsize ()` const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype](#) `labeltype ()` const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()
Makes a widget visible.
- void [size](#) (int W, int H)
Changes the size of the widget.
- int [take_focus](#) ()

- Gives the widget the keyboard focus.*

 - unsigned int `takeevents` () const
Returns if the widget is able to take events.
 - int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
 - const char * `tooltip` () const
Gets the current tooltip text.
 - void `tooltip` (const char *text)
Sets the current tooltip text.
 - `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
 - `uchar` `type` () const
Gets the widget type.
 - void `type` (`uchar` t)
Sets the widget type.
 - int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
 - void * `user_data` () const
Gets the user data for this widget.
 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
 - void `user_data` (void *v)
Sets the user data for this widget.
 - unsigned int `visible` () const
Returns whether a widget is visible.
 - unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
 - void `visible_focus` (int v)
Modifies keyboard focus navigation.
 - int `visible_r` () const
Returns whether a widget and all its parents are visible.
 - int `w` () const
Gets the widget width.
 - `FI_When` `when` () const
Returns the conditions under which the callback is called.
 - void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
 - `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
 - int `x` () const
Gets the widget position in its window.
 - int `y` () const
Gets the widget position in its window.
 - virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void `default_callback` (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
, `OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
, `MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
, `GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,
`AUTO_DELETE_USER_DATA = 1<<23` ,
`MAXIMIZED = 1<<24` , `POPOP = 1<<25` , `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` ,
`USERFLAG1 = 1<<31` }
flags possible values enumeration.

Protected Member Functions inherited from FI_Slider

- void `draw` () `FL_OVERRIDE`
Draws the widget.
- void `draw` (int, int, int, int)
- int `handle` (int, int, int, int, int)

Protected Member Functions inherited from FI_Valuator

- `FI_Valuator` (int X, int Y, int W, int H, const char *L)
Creates a new FI_Valuator widget using the given position, size, and label string.
- void `handle_drag` (double newvalue)
Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.
- void `handle_push` ()
Stores the current value in the previous value.
- void `handle_release` ()
Called after an FL_WHEN_RELEASE event is received and before the callback.
- int `horizontal` () const
Tells if the valuator is an FL_HORIZONTAL one.
- double `previous_value` () const
Gets the previous floating point value before an event changed it.
- void `set_value` (double v)
Sets the current floating point value.
- double `softclamp` (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void `value_damage` ()
Asks for partial redraw.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.40.1 Detailed Description

Widget that draws a filled horizontal slider, useful as a progress or value meter. The documentation for this class was generated from the following files:

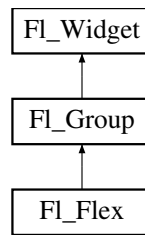
- [FI_Fill_Slider.H](#)
- [FI_Slider.cxx](#)

12.41 FI_Flex Class Reference

[FI_Flex](#) is a container (layout) widget for one row or one column of widgets.

```
#include <FI_Flex.H>
```

Inheritance diagram for [FI_Flex](#):



Public Types

- enum { **VERTICAL** = 0 , **HORIZONTAL** = 1 , **COLUMN** = 0 , **ROW** = 1 }

Public Member Functions

- virtual void **end** ()
Ends automatic child addition and resizes all children.
- void **fixed** (Fl_Widget &w, int size)
Set the horizontal or vertical size of a child widget.
- int **fixed** (Fl_Widget *w) const
Return whether the given widget has a fixed size or resizes dynamically.
- void **fixed** (Fl_Widget *w, int size)
Set the horizontal or vertical size of a child widget.
- Fl_Flex (int direction)
Construct a new Fl_Flex widget specifying its layout.
- Fl_Flex (int w, int h, int direction)
Construct a new Fl_Flex widget specifying its layout and size.
- Fl_Flex (int X, int Y, int W, int H, const char *L=0)
Construct a new Fl_Flex widget with the given position, size, and label.
- Fl_Flex (int x, int y, int w, int h, int direction)
Construct a new Fl_Flex widget specifying its layout, position, and size.
- int **gap** () const
Return the gap size of the widget.
- void **gap** (int g)
Set the gap size of the widget.
- int **horizontal** () const
Returns non-zero (true) if Fl_Flex alignment is horizontal (row mode).
- void **layout** ()
Calculates the layout of the widget and redraws it.
- int **margin** () const
Returns the left margin size of the widget.
- int **margin** (int *left, int *top, int *right, int *bottom) const
Returns all (four) margin sizes of the widget.
- void **margin** (int left, int top, int right, int bottom)
Set the margin sizes at all four edges of the Fl_Flex widget.
- void **margin** (int m, int g=-1)
Set the margin and optionally the gap size of the widget.
- bool **need_layout** () const
Returns whether layout calculation is required.
- void **need_layout** (int set)
Set or reset the request to calculate the layout of children.
- void **resize** (int x, int y, int w, int h) **FL_OVERRIDE**
Resize the container and calculate all child positions and sizes.

- int `spacing` () const
Gets the number of extra pixels of blank space that are added between the children.
- void `spacing` (int i)
Sets the number of extra pixels of blank space that are added between the children.

Public Member Functions inherited from `FL_Group`

- `FL_Widget * & _ddfdesign_kludge` ()
This is for forms compatibility only.
- void `add` (`FL_Widget &`)
The widget is removed from its current group (if any) and then added to the end of this group.
- void `add` (`FL_Widget *o`)
See void `FL_Group::add(FL_Widget &w)`
- void `add_resizable` (`FL_Widget &o`)
Adds a widget to the group and makes it the resizable widget.
- `FL_Widget *const * array` () const
Returns a pointer to the array of children.
- `FL_Group const * as_group` () const `FL_OVERRIDE`
- `FL_Group * as_group` () `FL_OVERRIDE`
Returns an `FL_Group` pointer if this widget is an `FL_Group`.
- void `begin` ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- `FL_Widget * child` (int n) const
Returns `array()[n]`.
- int `children` () const
Returns how many child widgets the group has.
- void `clear` ()
Deletes all child widgets from memory recursively.
- unsigned int `clip_children` ()
Returns the current clipping mode.
- void `clip_children` (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int `delete_child` (int n)
Removes the widget at `index` from the group and deletes it.
- void `end` ()
Exactly the same as `current(this->parent())`.
- int `find` (const `FL_Widget &o`) const
*See int `FL_Group::find(const FL_Widget *w)` const.*
- int `find` (const `FL_Widget *`) const
Searches the child array for the widget and returns the index.
- `FL_Group` (int, int, int, int, const char * = 0)
Creates a new `FL_Group` widget using the given position, size, and label string.
- void `focus` (`FL_Widget *W`)
- void `forms_end` ()
This is for forms compatibility only.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.
- void `init_sizes` ()
Resets the internal array of widget sizes and positions.
- void `insert` (`FL_Widget &`, int i)
The widget is removed from its current group (if any) and then inserted into this group.

- void `insert` (`FI_Widget` &o, `FI_Widget` *before)
 - This does insert(w, find(before)).*
- void `remove` (`FI_Widget` &)
 - Removes a widget from the group but does not delete it.*
- void `remove` (`FI_Widget` *o)
 - Removes the widget o from the group.*
- void `remove` (int index)
 - Removes the widget at index from the group but does not delete it.*
- `FI_Widget` * `resizable` () const
 - Returns the group's resizable widget.*
- void `resizable` (`FI_Widget` &o)
 - Sets the group's resizable widget.*
- void `resizable` (`FI_Widget` *o)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- void `resize` (int, int, int, int) `FL_OVERRIDE`
 - Resizes the FI_Group widget and all of its children.*
- virtual `~FI_Group` ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FI_Align` `align` () const
 - Gets the label alignment.*
- void `align` (`FI_Align` alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
 - Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Window` * `as_window` ()
 - Returns an FI_Window pointer if this widget is an FI_Window.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*

- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) ([uchar](#) c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.
- void [clear_visible](#) ()
Hides the widget.
- void [clear_visible_focus](#) ()
Disables keyboard focus navigation with this widget.
- [FI_Color color](#) () const
Gets the background color of the widget.
- void [color](#) ([FI_Color](#) bg)
Sets the background color of the widget.
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
Sets the background and selection color of the widget.
- [FI_Color color2](#) () const
For back compatibility only.
- void [color2](#) (unsigned a)
For back compatibility only.
- int [contains](#) (const [FI_Widget](#) *w) const
Checks if w is a child of this widget.
- void [copy_label](#) (const char *new_label)
Sets the current label.
- void [copy_tooltip](#) (const char *text)
Sets the current tooltip text.
- [uchar damage](#) () const
Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) ([uchar](#) c)
Sets the damage bits for the widget.
- void [damage](#) ([uchar](#) c, int x, int y, int w, int h)

- Sets the damage bits for an area inside the widget.*

 - int **damage_resize** (int, int, int, int)

Internal use only.
- void **deactivate** ()
 - *Deactivates the widget.*
- **FI_Image * deimage** ()
 - *Gets the image that is used as part of the widget label when in the inactive state.*
- const **FI_Image * deimage** () const
 - *Gets the image that is used as part of the widget label when in the inactive state.*
- void **deimage** (FI_Image &img)
 - *Sets the image to use as part of the widget label when in the inactive state.*
- void **deimage** (FI_Image *img)
 - *Sets the image to use as part of the widget label when in the inactive state.*
- int **deimage_bound** () const
 - *Returns whether the inactive image is managed by the widget.*
- void **do_callback** (FI_Callback_Reason reason=FL_REASON_UNKNOWN)
 - *Calls the widget callback function with default arguments.*
- void **do_callback** (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)
 - *Calls the widget callback function with arbitrary arguments.*
- void **do_callback** (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)
 - *Calls the widget callback function with arbitrary arguments.*
- void **draw_label** (int, int, int, int, FI_Align) const
 - *Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int **h** () const
 - *Gets the widget height.*
- virtual void **hide** ()
 - *Makes a widget invisible.*
- **FI_Image * image** ()
 - *Gets the image that is used as part of the widget label when in the active state.*
- const **FI_Image * image** () const
 - *Gets the image that is used as part of the widget label when in the active state.*
- void **image** (FI_Image &img)
 - *Sets the image to use as part of the widget label when in the active state.*
- void **image** (FI_Image *img)
 - *Sets the image to use as part of the widget label when in the active state.*
- int **image_bound** () const
 - *Returns whether the image is managed by the widget.*
- int **inside** (const FI_Widget *wgt) const
 - *Checks if this widget is a child of wgt.*
- int **is_label_copied** () const
 - *Returns whether the current label was assigned with [copy_label\(\)](#).*
- const char * **label** () const
 - *Gets the current label text.*
- void **label** (const char *text)
 - *Sets the current label pointer.*
- void **label** (FI_Labeltype a, const char *b)
 - *Shortcut to set the label text and type in one call.*
- **FI_Color labelcolor** () const
 - *Gets the label color.*
- void **labelcolor** (FI_Color c)
 - *Sets the label color.*

- [FI_Font labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group * parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- [FI_Color selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()
Makes a widget visible.
- void [size](#) (int W, int H)

- Changes the size of the widget.*

 - int [take_focus](#) ()

Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

Returns if the widget is able to take events.
- int [test_shortcut](#) ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const

Gets the current tooltip text.
- void [tooltip](#) (const char *text)

Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const

Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const

Gets the widget type.
- void [type](#) ([uchar](#) t)

Sets the widget type.
- int [use_accents_menu](#) ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const

Gets the user data for this widget.
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)

Sets the user data for this widget.
- void [user_data](#) (void *v)

Sets the user data for this widget.
- unsigned int [visible](#) () const

Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const

Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)

Modifies keyboard focus navigation.
- int [visible_r](#) () const

Returns whether a widget and all its parents are visible.
- int [w](#) () const

Gets the widget width.
- [FI_When](#) [when](#) () const

Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)

Sets the flags used to decide when a callback is called.
- [FI_Window](#) * [window](#) () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const

Gets the widget position in its window.
- int [y](#) () const

Gets the widget position in its window.
- virtual [~FI_Widget](#) ()

Destroys the widget.

Protected Member Functions

- virtual int `alloc_size` (int `size`) const
Return new size to be allocated for array of fixed size widgets.
- void `draw` () `FL_OVERRIDE`
Draw the widget.
- void `init` (int `t=VERTICAL`)
- void `on_remove` (int) `FL_OVERRIDE`
Allow derived groups to act when a child widget is removed from the group.

Protected Member Functions inherited from `FI_Group`

- `FI_Rect * bounds` ()
Returns the internal array of widget sizes and positions.
- void `draw` () `FL_OVERRIDE`
Draws the widget.
- void `draw_child` (`FI_Widget &widget`) const
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (const `FI_Widget &widget`) const
Parents normally call this to draw outside labels of child widgets.
- virtual int `on_insert` (`FI_Widget *`, int)
Allow derived groups to act when a widget is added as a child.
- virtual int `on_move` (int, int)
Allow derived groups to act when a widget is moved within the group.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`FI_Widget &widget`) const
Draws a child only if it needs it.

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int `c`)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype t`, `FI_Color c`) const
Draws a box of type `t`, of color `c` at the widget's position and size.
- void `draw_box` (`FI_Boxtype t`, int `x`, int `y`, int `w`, int `h`, `FI_Color c`) const
Draws a box of type `t`, of color `c` at the position `X,Y` and size `W,H`.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype t`, int `X`, int `Y`, int `W`, int `H`) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype t`, int `x`, int `y`, int `w`, int `h`, `FI_Color bg`) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const

- Draws the label in an arbitrary bounding box.*
- `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char `*label=0L`)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int `v`)
Internal use only.
- void `set_flag` (unsigned int `c`)
Sets a flag in the flags mask.
- void `w` (int `v`)
Internal use only.
- void `x` (int `v`)
Internal use only.
- void `y` (int `v`)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Group`

- static `FI_Group * current` ()
Returns the currently active group.
- static void `current` (`FI_Group *g`)
Sets the current group.

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget *widget`, void `*data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char `*t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char `*`, const bool `require_alt=false`)
Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

12.41.1 Detailed Description

`Fl_Flex` is a container (layout) widget for one row or one column of widgets.

It provides flexible positioning of its children either in one row or in one column.

`Fl_Flex` is designed to be as simple as possible. You can set individual widget sizes or let `Fl_Flex` position and size the widgets to fit in the container. All "flexible" (i.e. non-fixed size) widgets are assigned the same width or height, respectively. For details see below.

You can set the margins **around** all children at the inner side of the box frame (if any). `Fl_Flex` supports setting different margin sizes on top, bottom, left, and right sides. The default margin size is 0 on all edges of the container. You can set the gap size **between** all children. The gap size is always the same between all of its children. This is similar to the 'spacing' of `Fl_Pack`. The default gap size is 0.

`Fl_Flex` can either consist of a single row, i.e. `type(Fl_Flex::HORIZONTAL)` or a single column, i.e. `type(Fl_Flex::VERTICAL)`. The default value is `Fl_Flex::VERTICAL` for consistency with `Fl_Pack` but you can use `type()` to assign a row (`Fl_Flex::HORIZONTAL`) layout.

If `type() == Fl_Flex::HORIZONTAL` widgets are resized horizontally to fit in the container and their height is the full `Fl_Flex` height minus border size and margins. You can set a fixed widget width by using `fixed()`.

If `type() == Fl_Flex::VERTICAL` widgets are resized vertically to fit in the container and their width is the full `Fl_Flex` width minus border size and margins. You can set a fixed widget height by using `fixed()`.

To create arbitrary spacing you can use invisible boxes of flexible or fixed sizes (see example below).

Alternate constructors let you specify the layout as `Fl_Flex::HORIZONTAL` or `Fl_Flex::VERTICAL` directly.

`Fl_Flex::ROW` is an alias of `Fl_Flex::HORIZONTAL` and `Fl_Flex::COLUMN` is an alias of `Fl_Flex::VERTICAL`.

The default box type is `FL_NO_BOX` as inherited from `Fl_Group`. You **may** need to set a box type with a solid background depending on your layout.

Important: You should always make sure that the `Fl_Flex` container cannot be resized smaller than its designed minimal size. This can usually be done by setting a `size_range()` on the window as shown in the example below.

`Fl_Flex` does not take care of sensible sizes. If it is resized too small the behavior is undefined, i.e. widgets may overlap and/or shrink to zero size.

Hint: In many cases `Fl_Flex` can be used as a drop-in replacement for `Fl_Pack`. This is the recommended single row/column container since FLTK 1.4.0. Its resizing behavior is much more predictable (as expected) than that of `Fl_Pack` which "resizes itself to shrink-wrap itself around all of the children".

`Fl_Flex` containers can be nested so you can create flexible layouts with multiple columns and rows. However, if your UI design is more complex you may want to use `Fl_Grid` instead.

Example:

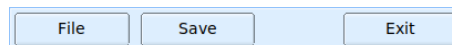


Figure 12.18 `Fl_Flex`

Example code:

```
#include <FL/Fl.H>
#include <FL/Fl_Double_Window.H>
#include <FL/Fl_Flex.H>
#include <FL/Fl_Box.H>
#include <FL/Fl_Button.H>

int main(int argc, char **argv) {
    Fl_Double_Window window(410, 40, "Simple Fl_Flex Demo");
    Fl_Flex flex(5, 5, 400, 30, Fl_Flex::HORIZONTAL);
    Fl_Button b1(0, 0, 0, 0, "File");
    Fl_Button b2(0, 0, 0, 0, "Save");
    Fl_Box bx(0, 0, 0, 0);
    Fl_Button b3(0, 0, 0, 0, "Exit");
    flex.fixed(bx, 60); // set fix width of invisible box
    flex.gap(10);
    flex.end();
    window.resizable(flex);
    window.end();
    window.size_range(300, 30);
    window.show(argc, argv);
    return Fl::run();
}
```

Since

1.4.0

12.41.2 Member Enumeration Documentation

12.41.2.1 anonymous enum

anonymous enum

Enumerator

VERTICAL	vertical layout (one column)
HORIZONTAL	horizontal layout (one row)
COLUMN	alias for VERTICAL
ROW	alias for HORIZONTAL

12.41.3 Constructor & Destructor Documentation

12.41.3.1 FI_Flex() [1/4]

```
FI_Flex::FI_Flex (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Construct a new [FI_Flex](#) widget with the given position, size, and label.

You can set `type(FI_Flex::HORIZONTAL)` or `type(FI_Flex::VERTICAL)`. The default is `type(FI_Flex::VERTICAL)`.

Alternate constructors let you specify the layout as [FI_Flex::HORIZONTAL](#) or [FI_Flex::VERTICAL](#) directly. [FI_Flex::ROW](#) is an alias of [FI_Flex::HORIZONTAL](#) and [FI_Flex::COLUMN](#) is an alias of [FI_Flex::VERTICAL](#).

Parameters

in	<i>X,Y</i>	position
in	<i>W,H</i>	size (width and height)
in	<i>L</i>	label (optional)

See also

[FI_Flex::FI_Flex\(int direction\)](#)

[FI_Flex::FI_Flex\(int w, int h, int direction\)](#)

[FI_Flex::FI_Flex\(int x, int y, int w, int h, int direction\)](#)

[FI_Flex::FI_Flex\(int x, int y, int w, int h, const char *L\)](#)

12.41.3.2 FI_Flex() [2/4]

```
FI_Flex::FI_Flex (
    int direction )
```

Construct a new [FI_Flex](#) widget specifying its layout.

Use [FI_Flex::HORIZONTAL](#) (aka [FI_Flex::ROW](#)) or [FI_Flex::VERTICAL](#) (aka [FI_Flex::COLUMN](#)) as the `direction` argument.

This constructor sets the position and size to (0, 0, 0, 0) which is suitable for nested [FI_Flex](#) widgets. Use one of the other constructors to set the desired position and size as well.

Parameters

in	<i>direction</i>	horizontal (row) or vertical (column) layout
----	------------------	--

See also

[FI_Flex::FI_Flex\(int w, int h, int direction\)](#)
[FI_Flex::FI_Flex\(int x, int y, int w, int h, int direction\)](#)
[FI_Flex::FI_Flex\(int x, int y, int w, int h, const char *L\)](#)

12.41.3.3 FI_Flex() [3/4]

```

FI_Flex::FI_Flex (
    int w,
    int h,
    int direction )

```

Construct a new [FI_Flex](#) widget specifying its layout and size.

Use [FI_Flex::HORIZONTAL](#) (aka [FI_Flex::ROW](#)) or [FI_Flex::VERTICAL](#) (aka [FI_Flex::COLUMN](#)) as the *direction* argument.

This constructor sets the position to ($x = 0$, $y = 0$) which is suitable for nested [FI_Flex](#) widgets. Use one of the other constructors to set the desired position as well.

Parameters

in	<i>w,h</i>	widget size
in	<i>direction</i>	horizontal (row) or vertical (column) layout

See also

[FI_Flex::FI_Flex\(int direction\)](#)
[FI_Flex::FI_Flex\(int x, int y, int w, int h, int direction\)](#)
[FI_Flex::FI_Flex\(int x, int y, int w, int h, const char *L\)](#)

12.41.3.4 FI_Flex() [4/4]

```

FI_Flex::FI_Flex (
    int x,
    int y,
    int w,
    int h,
    int direction )

```

Construct a new [FI_Flex](#) widget specifying its layout, position, and size.

Use [FI_Flex::HORIZONTAL](#) (aka [FI_Flex::ROW](#)) or [FI_Flex::VERTICAL](#) (aka [FI_Flex::COLUMN](#)) as the *direction* argument.

This constructor sets the position and size of the widget which is suitable for top level [FI_Flex](#) widgets but does not set a widget label. Use [FI_Widget::label\(\)](#) to set one if desired.

Parameters

in	<i>x,y</i>	widget position
in	<i>w,h</i>	widget size
in	<i>direction</i>	horizontal (row) or vertical (column) layout

See also

[Fl_Flex::Fl_Flex\(int direction\)](#)

[Fl_Flex::Fl_Flex\(int w, int h, int direction\)](#)

[Fl_Flex::Fl_Flex\(int x, int y, int w, int h, const char *L\)](#)

12.41.4 Member Function Documentation

12.41.4.1 alloc_size()

```
int Fl_Flex::alloc_size (
    int size ) const [protected], [virtual]
```

Return new size to be allocated for array of fixed size widgets.

This method is called when the array of fixed size widgets needs to be expanded. The current `size` is provided (size can be 0). The default method adds 8 to the current size.

This can be used in derived classes to change the allocation strategy. Note that this method only `queries` the new size which shall be allocated but does not allocate the memory.

Parameters

in	size	current size
----	------	--------------

Returns

int new size (to be allocated)

12.41.4.2 draw()

```
void Fl_Flex::draw (
    void ) [protected], [virtual]
```

Draw the widget.

This will finally calculate the layout of the widget and of all its children if necessary and draw the widget.

Some changes of included children may require a new layout to be calculated. If this is the case the user may need to call [layout\(\)](#) to make sure everything is calculated properly.

See also

[layout\(\)](#)

Implements [Fl_Widget](#).

12.41.4.3 end()

```
void Fl_Flex::end ( ) [virtual]
```

Ends automatic child addition and resizes all children.

This marks the [Fl_Flex](#) widget as changed (`need_layout(1)`) which forces the widget to calculate its layout depending on all children and whether they have been assigned fix sizes or not right before it is drawn.

See also

[need_layout\(int\)](#)

[draw\(\)](#)

12.41.4.4 fixed() [1/3]

```
void Fl_Flex::fixed (
    Fl_Widget & w,
    int size ) [inline]
```

Set the horizontal or vertical size of a child widget.

Parameters

in	<i>w</i>	widget to be affected
in	<i>size</i>	width (Fl_Flex::HORIZONTAL) or height (Fl_Flex::VERTICAL)

See also

[fixed\(Fl_Widget *w, int size\)](#)

12.41.4.5 fixed() [2/3]

```
int Fl_Flex::fixed (
    Fl_Widget * w ) const
```

Return whether the given widget has a fixed size or resizes dynamically.

Parameters

in	<i>w</i>	widget
----	----------	--------

Returns

whether the widget has a fixed size

Return values

1	the widget has a fixed size
0	the widget resizes dynamically

12.41.4.6 fixed() [3/3]

```
void Fl_Flex::fixed (
    Fl_Widget * child,
    int size )
```

Set the horizontal or vertical size of a child widget.

This sets either the width or height of a child widget, depending on the [type\(\)](#) of the [Fl_Flex](#) container ([Fl_Flex::HORIZONTAL](#) or [Fl_Flex::VERTICAL](#)). The other dimension is set to the full width or height of the [Fl_Flex](#) widget minus border and margin sizes.

This can be used to set a fixed widget width or height of children of [Fl_Flex](#) so they are not resized dynamically.

If *size* is 0 (zero) or negative the widget size is reset to flexible size.

Parameters

in	<i>child</i>	widget to be affected
in	<i>size</i>	width (Fl_Flex::HORIZONTAL) or height (Fl_Flex::VERTICAL)

12.41.4.7 gap() [1/2]

```
int Fl_Flex::gap ( ) const [inline]
```

Return the gap size of the widget.

Returns

gap size between all child widgets.

12.41.4.8 gap() [2/2]

```
void Fl_Flex::gap (
    int g ) [inline]
```

Set the gap size of the widget.

The gap size is some free space **between** child widgets. The size must be ≥ 0 . Negative values are clamped to 0.

Parameters

in	<i>g</i>	gap size
----	----------	----------

12.41.4.9 horizontal()

```
int Fl_Flex::horizontal ( ) const [inline]
```

Returns non-zero (true) if [Fl_Flex](#) alignment is horizontal (row mode).

Returns

non-zero if [Fl_Flex](#) alignment is horizontal

Return values

1	if <code>type() == Fl_Flex::HORIZONTAL</code>
0	if <code>type() == Fl_Flex::VERTICAL</code>

See class [Fl_Flex](#) documentation for details.

12.41.4.10 layout()

```
void Fl_Flex::layout ( )
```

Calculates the layout of the widget and redraws it.

If you change widgets in the [Fl_Flex](#) container you should call this method to force recalculation of child widget sizes and positions. This can be useful (necessary) if you [hide\(\)](#), [show\(\)](#), [add\(\)](#) or [remove\(\)](#) children.

Call this method if you need to recalculate widget positions for usage in an algorithm that places widgets at certain positions or when you need to display (show) or hide one or more children depending on the current layout (for instance a side bar).

This method also calls [redraw\(\)](#) on the [Fl_Flex](#) widget.

12.41.4.11 margin() [1/4]

```
int Fl_Flex::margin ( ) const [inline]
```

Returns the left margin size of the widget.

This returns the **left** margin of the widget which is not necessarily the same as all other margins.

Note

This method is useful if you never set different margin sizes.

See also

`int margin(int *left, int *top, int *right, int *bottom)` to get all four [margin](#) values.

Returns

size of left margin.

12.41.4.12 margin() [2/4]

```
int Fl_Flex::margin (
    int * left,
    int * top,
    int * right,
    int * bottom ) const [inline]
```

Returns all (four) margin sizes of the widget.

All margin sizes are returned in the given arguments. If any argument is `NULL` the respective value is not returned.

Parameters

in	<i>left</i>	returns left margin if not <code>NULL</code>
in	<i>top</i>	returns top margin if not <code>NULL</code>
in	<i>right</i>	returns right margin if not <code>NULL</code>
in	<i>bottom</i>	returns bottom margin if not <code>NULL</code>

Returns

whether all margins are equal

Return values

1	all margins have the same size
0	at least one margin has a different size

12.41.4.13 margin() [3/4]

```
void Fl_Flex::margin (
    int left,
    int top,
    int right,
    int bottom ) [inline]
```

Set the margin sizes at all four edges of the `Fl_Flex` widget.

The margin is the free space inside the widget border **around** all child widgets.

You must use all four parameters of this method to set the four margins in the order `left, top, right, bottom`.

Negative values are set to 0 (zero).

To set all margins to equal sizes, use `margin(int m)` which sets all four margins to the same size.

Parameters

in	<i>left,top,right,bottom</i>	margin sizes, must be ≥ 0
----	------------------------------	--------------------------------

See also

[margin\(int, int\)](#)

12.41.4.14 margin() [4/4]

```
void Fl_Flex::margin (
    int m,
    int g = -1 ) [inline]
```

Set the margin and optionally the gap size of the widget.

This method can be used to set both the margin and the gap size.

If you don't use the second parameter `g` or supply a negative value the gap size is not changed.

The margin is the free space inside the widget border **around** all child widgets.

This method sets the margin to the same size at all four edges of the [Fl_Flex](#) widget.

The gap size *g* is the free space **between** child widgets. Negative values do not change the gap value. This is the default if this argument is omitted.

Parameters

in	<i>m</i>	margin size, must be ≥ 0
in	<i>g</i>	gap size (ignored, if negative)

See also

[gap\(int\)](#)

12.41.4.15 need_layout() [1/2]

```
bool Fl_Flex::need_layout ( ) const [inline]
```

Returns whether layout calculation is required.

This should rarely be needed by user code. Used internally in [draw\(\)](#).

12.41.4.16 need_layout() [2/2]

```
void Fl_Flex::need_layout (
    int set ) [inline]
```

Set or reset the request to calculate the layout of children.

This is intended for internal use but can also be used by user code to request layout calculation before the widget is drawn.

Call this if you changed attributes or sizes of children to ensure that the layout is calculated properly. Changing other [Fl_Flex](#) attributes or resizing the widget does this automatically.

Note

Never call this with 'set == 0' because this would defeat its purpose to recalculate the layout before the widget is drawn.

12.41.4.17 on_remove()

```
void Fl_Flex::on_remove (
    int index ) [protected], [virtual]
```

Allow derived groups to act when a child widget is removed from the group.

Widgets derived from [Fl_Group](#) may store additional data for their children. Overriding this method will allow derived classes to remove these data structures just before the child is removed.

Parameters

<i>index</i>	remove the child at this position in the array_
--------------	---

Reimplemented from [Fl_Group](#).

12.41.4.18 resize()

```
void Fl_Flex::resize (
    int x,
    int y,
    int w,
    int h ) [virtual]
```

Resize the container and calculate all child positions and sizes.

Parameters

in	<i>x,y</i>	position
in	<i>w,h</i>	width and height

Reimplemented from [Fl_Widget](#).

12.41.4.19 spacing() [1/2]

```
int Fl_Flex::spacing ( ) const [inline]
```

Gets the number of extra pixels of blank space that are added between the children.

This method is the same as 'int [gap\(\)](#)' and is defined to enable using [Fl_Flex](#) as a drop-in replacement of [Fl_Pack](#).

See also

int [gap\(\)](#)

12.41.4.20 spacing() [2/2]

```
void Fl_Flex::spacing (
    int i ) [inline]
```

Sets the number of extra pixels of blank space that are added between the children.

This method is the same as '[gap\(int\)](#)' and is defined to enable using [Fl_Flex](#) as a drop-in replacement of [Fl_Pack](#).

See also

void [gap\(int\)](#)

The documentation for this class was generated from the following files:

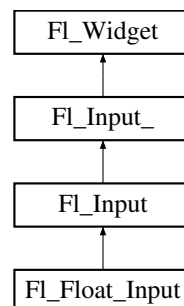
- [Fl_Flex.H](#)
- [Fl_Flex.cxx](#)

12.42 Fl_Float_Input Class Reference

The [Fl_Float_Input](#) class is a subclass of [Fl_Input](#) that only allows the user to type floating point numbers (sign, digits, decimal point, more digits, 'E' or 'e', sign, digits).

```
#include <Fl_Float_Input.H>
```

Inheritance diagram for [Fl_Float_Input](#):



Public Member Functions

- [Fl_Float_Input](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Float_Input](#) widget using the given position, size, and label string.

Public Member Functions inherited from FI_Input

- [FI_Input](#) (int, int, int, int, const char *=0)
Creates a new [FI_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from FI_Input_

- int [append](#) (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool [can_redo](#) () const
Check if there is a redo action available.
- bool [can_undo](#) () const
Check if the last operation can be undone.
- int [copy](#) (int clipboard)
Put the current selection into the clipboard.
- int [copy_cuts](#) ()
Copies the yank buffer to the clipboard.
- [FI_Color](#) [cursor_color](#) () const
Gets the color of the cursor.
- void [cursor_color](#) ([FI_Color](#) n)
Sets the color of the cursor.
- int [cut](#) ()
Deletes the current selection.
- int [cut](#) (int a, int b)
Deletes all characters between index a and b.
- int [cut](#) (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double [dvalue](#) () const
Returns the widget text interpreted as a floating point number.
- [FI_Input_](#) (int, int, int, int, const char *=0)
Creates a new [FI_Input_](#) widget.
- unsigned int [index](#) (int i) const
Returns the character at index i.
- int [input_type](#) () const
Gets the input field type.
- void [input_type](#) (int t)
Sets the input field type.
- int [insert](#) (const char *t, int l=0)
Inserts text at the cursor position.
- int [insert_position](#) () const
Gets the position of the text cursor.
- int [insert_position](#) (int p)
Sets the cursor position and mark.
- int [insert_position](#) (int p, int m)
Sets the index for the cursor and mark.
- int [ivalue](#) () const
Returns the widget text interpreted as a signed integer.
- int [mark](#) () const
Gets the current selection mark.
- int [mark](#) (int m)

- Sets the current selection mark.*
- int `maximum_size` () const
 - Gets the maximum length of the input field in characters.*
- void `maximum_size` (int m)
 - Sets the maximum length of the input field in characters.*
- int `position` () const
- int `position` (int p)
- int `position` (int p, int m)
- int `readonly` () const
 - Gets the read-only state of the input field.*
- void `readonly` (int b)
 - Sets the read-only state of the input field.*
- int `redo` ()
 - Redo previous undo operation.*
- int `replace` (int b, int e, const char *text, int ilen=0)
 - Deletes text from b to e and inserts the new string text.*
- void `resize` (int, int, int, int) `FL_OVERRIDE`
 - Changes the size of the widget.*
- int `shortcut` () const
 - Return the shortcut key associated with this widget.*
- void `shortcut` (int s)
 - Sets the shortcut key associated with this widget.*
- int `size` () const
 - Returns the number of bytes in value().*
- void `size` (int W, int H)
 - Sets the width and height of this widget.*
- int `static_value` (const char *)
 - Changes the widget text.*
- int `static_value` (const char *, int)
 - Changes the widget text.*
- int `tab_nav` () const
 - Gets whether the Tab key causes focus navigation in multiline input fields or not.*
- void `tab_nav` (int val)
 - Sets whether the Tab key does focus navigation, or inserts tab characters into `Fl_Multiline_Input`.*
- `Fl_Color` `textcolor` () const
 - Gets the color of the text in the input field.*
- void `textcolor` (`Fl_Color` n)
 - Sets the color of the text in the input field.*
- `Fl_Font` `textfont` () const
 - Gets the font of the text in the input field.*
- void `textfont` (`Fl_Font` s)
 - Sets the font of the text in the input field.*
- `Fl_Fontsize` `textsize` () const
 - Gets the size of the text in the input field.*
- void `textsize` (`Fl_Fontsize` s)
 - Sets the size of the text in the input field.*
- int `undo` ()
 - Undoes previous changes to the text buffer.*
- const char * `value` () const
 - Returns the text displayed in the widget.*
- int `value` (const char *)

- Changes the widget text.*
- int [value](#) (const char *, int)
 - Changes the widget text.*
- int [value](#) (double value)
 - Changes the widget text to a floating point number ("%g").*
- int [value](#) (int value)
 - Changes the widget text to a signed integer number.*
- int [wrap](#) () const
 - Gets the word wrapping state of the input field.*
- void [wrap](#) (int b)
 - Sets the word wrapping state of the input field.*
- [~FI_Input_](#) ()
 - Destroys the widget.*

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
 - Activates the widget.*
- unsigned int [active](#) () const
 - Returns whether the widget is active.*
- int [active_r](#) () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align align](#) () const
 - Gets the label alignment.*
- void [align](#) ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long [argument](#) () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void [argument](#) (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype box](#) () const
 - Gets the box type of the widget.*

- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar` c)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar` c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (int, int, int, int)

- Internal use only.*

 - void `deactivate` ()
 - Deactivates the widget.*
 - `FI_Image * deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - const `FI_Image * deimage` () const
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - void `deimage` (`FI_Image &img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - void `deimage` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with default arguments.*
 - void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
 - void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
 - void `draw_label` (int, int, int, int, `FI_Align`) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
 - int `h` () const
 - Gets the widget height.*
 - virtual void `hide` ()
 - Makes a widget invisible.*
 - `FI_Image * image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
 - const `FI_Image * image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
 - void `image` (`FI_Image &img`)
 - Sets the image to use as part of the widget label when in the active state.*
 - void `image` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
 - int `image_bound` () const
 - Returns whether the image is managed by the widget.*
 - int `inside` (const `FI_Widget *wgt`) const
 - Checks if this widget is a child of wgt.*
 - int `is_label_copied` () const
 - Returns whether the current label was assigned with `copy_label()`.*
 - const char * `label` () const
 - Gets the current label text.*
 - void `label` (const char *text)
 - Sets the current label pointer.*
 - void `label` (`FI_Labeltype` a, const char *b)
 - Shortcut to set the label text and type in one call.*
 - `FI_Color` `labelcolor` () const
 - Gets the label color.*
 - void `labelcolor` (`FI_Color` c)
 - Sets the label color.*
 - `FI_Font` `labelfont` () const
 - Gets the font to use.*

- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()

- Gives the widget the keyboard focus.*

 - unsigned int `takeevents` () const
Returns if the widget is able to take events.
 - int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
 - const char * `tooltip` () const
Gets the current tooltip text.
 - void `tooltip` (const char *text)
Sets the current tooltip text.
 - `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
 - `uchar` `type` () const
Gets the widget type.
 - void `type` (`uchar` t)
Sets the widget type.
 - int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
 - void * `user_data` () const
Gets the user data for this widget.
 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
 - void `user_data` (void *v)
Sets the user data for this widget.
 - unsigned int `visible` () const
Returns whether a widget is visible.
 - unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
 - void `visible_focus` (int v)
Modifies keyboard focus navigation.
 - int `visible_r` () const
Returns whether a widget and all its parents are visible.
 - int `w` () const
Gets the widget width.
 - `FI_When` `when` () const
Returns the conditions under which the callback is called.
 - void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
 - `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
 - int `x` () const
Gets the widget position in its window.
 - int `y` () const
Gets the widget position in its window.
 - virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Static Public Attributes inherited from [FI_Input](#)

- static const char * [copy_menu_text](#) = "Copy"
[this text may be customized at run-time]
- static const char * [cut_menu_text](#) = "Cut"
[this text may be customized at run-time]
- static const char * [paste_menu_text](#) = "Paste"
[this text may be customized at run-time]

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Input](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- int [handle_key](#) ()
Handles a keystroke.
- int [handle_rmb](#) ()
Handle right mouse button down events.

Protected Member Functions inherited from [FI_Input_](#)

- int [apply_undo](#) ()
Apply the current undo/redo operation.
- void [drawtext](#) (int, int, int, int)
Draws the text in the passed bounding box.
- void [drawtext](#) (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.

- void **handle_mouse** (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int **handletext** (int e, int, int, int, int)
Handles all kinds of text field related events.
- int **line_end** (int i) const
Finds the end of a line.
- int **line_start** (int i) const
Finds the start of a line.
- int **linesPerPage** ()
- void **maybe_do_callback** (FI_Callback_Reason reason=FL_REASON_UNKNOWN)
- int **up_down_position** (int, int keepmark=0)
Moves the cursor to the column given by up_down_pos.
- int **word_end** (int i) const
Finds the end of a word.
- int **word_start** (int i) const
Finds the start of a word.
- int **xscroll** () const
- int **yscroll** () const
- void **yscroll** (int yOffset)

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.

- void `x` (int v)

Internal use only.

- void `y` (int v)

Internal use only.

12.42.1 Detailed Description

The `Fl_Float_Input` class is a subclass of `Fl_Input` that only allows the user to type floating point numbers (sign, digits, decimal point, more digits, 'E' or 'e', sign, digits).

12.42.2 Constructor & Destructor Documentation

12.42.2.1 `Fl_Float_Input()`

```
Fl_Float_Input::Fl_Float_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Float_Input` widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

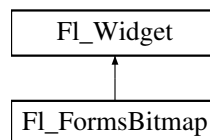
- `Fl_Float_Input.H`
- `Fl_Input.cxx`

12.43 `Fl_FormsBitmap` Class Reference

Forms compatibility Bitmap Image Widget.

```
#include <Fl_FormsBitmap.H>
```

Inheritance diagram for `Fl_FormsBitmap`:



Public Member Functions

- `Fl_Bitmap * bitmap () const`
Gets a the current associated `Fl_Bitmap` objects.
- void `bitmap (Fl_Bitmap *B)`
Sets a new bitmap.
- `Fl_FormsBitmap (Fl_Boxtype, int, int, int, int, const char *=0)`
Creates a bitmap widget from a box type, position, size and optional label specification.
- void `set (int W, int H, const uchar *bits)`
Sets a new bitmap bits with size W,H.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (FI_Align alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window** * **as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window** const * **as_gl_window** () const
- virtual **FI_Group** * **as_group** ()
Returns an FI_Group pointer if this widget is an FI_Group.
- virtual **FI_Group** const * **as_group** () const
- virtual **FI_Window** * **as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (FI_Image *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (FI_Boxtype new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (FI_Callback *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (FI_Color bg)

Sets the background color of the widget.
- void `color` (FI_Color bg, FI_Color sel)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const FI_Widget *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (FI_Image &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (FI_Image *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual int `handle` (int event)
Handles the specified event.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype` a, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const

- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard` (bool needs)

Sets whether this widget needs a keyboard.
- unsigned int `output` () const

Returns if a widget is used for output only.
- `FI_Group * parent` () const

Returns a pointer to the parent widget.
- void `parent` (`FI_Group *p`)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
- `FI_Color selection_color` () const

Gets the selection color.
- void `selection_color` (`FI_Color a`)

Sets the selection color.
- void `set_active` ()

Marks the widget as active without sending events or changing focus.
- void `set_changed` ()

Marks the value of the widget as changed.
- void `set_output` ()

Sets a widget to output only.
- void `set_visible` ()

Makes the widget visible.
- void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()

Makes a widget visible.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window * top_window` () const

Returns a pointer to the top-level window for the widget.

- `Fl_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- `void type` (uchar t)
Sets the widget type.
- `int use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- `void * user_data` () const
Gets the user data for this widget.
- `void user_data` (Fl_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- `void user_data` (void *v)
Sets the user data for this widget.
- `unsigned int visible` () const
Returns whether a widget is visible.
- `unsigned int visible_focus` () const
Checks whether this widget has a visible focus.
- `void visible_focus` (int v)
Modifies keyboard focus navigation.
- `int visible_r` () const
Returns whether a widget and all its parents are visible.
- `int w` () const
Gets the widget width.
- `Fl_When when` () const
Returns the conditions under which the callback is called.
- `void when` (uchar i)
Sets the flags used to decide when a callback is called.
- `Fl_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x` () const
Gets the widget position in its window.
- `int y` () const
Gets the widget position in its window.
- `virtual ~Fl_Widget` ()
Destroys the widget.

Protected Member Functions

- `void draw` () `FL_OVERRIDE`
Draws the bitmap and its associated box.

Protected Member Functions inherited from Fl_Widget

- `void clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- `void draw_backdrop` () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- `void draw_box` () const
Draws the widget box according its box style.
- `void draw_box` (Fl_Boxtype t, Fl_Color c) const
Draws a box of type t, of color c at the widget's position and size.

- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
,
[OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
,
[MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
,
[GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

12.43.1 Detailed Description

Forms compatibility Bitmap Image Widget.

12.43.2 Member Function Documentation

12.43.2.1 draw()

```
void Fl_FormsBitmap::draw (
    void ) [protected], [virtual]
```

Draws the bitmap and its associated box.

Implements [Fl_Widget](#).

12.43.2.2 set()

```
void Fl_FormsBitmap::set (
    int W,
    int H,
    const uchar * bits )
```

Sets a new bitmap bits with size W,H.

Deletes the previous one.

The documentation for this class was generated from the following files:

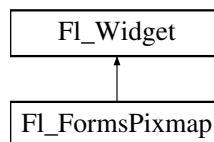
- [Fl_FormsBitmap.H](#)
- [forms_bitmap.cxx](#)

12.44 Fl_FormsPixmap Class Reference

Forms pixmap drawing routines.

```
#include <Fl_FormsPixmap.H>
```

Inheritance diagram for Fl_FormsPixmap:



Public Member Functions

- [Fl_FormsPixmap](#) ([Fl_Boxtype](#) t, int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_FormsPixmap](#) widget using the given box type, position, size and label string.
- [Fl_Pixmap](#) * [Pixmap](#) () const
Get the internal pixmap pointer.
- void [Pixmap](#) ([Fl_Pixmap](#) *B)
Set the internal pixmap pointer to an existing pixmap.
- void [set](#) (char *const *bits)
Set/create the internal pixmap using raw data.

Public Member Functions inherited from [Fl_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const

- Returns whether the widget is active.*

 - int `active_r` () const
- Returns whether the widget and all of its parents are active.*

 - `FI_Align align` () const

Gets the label alignment.

 - void `align` (`FI_Align alignment`)

Sets the label alignment.

 - long `argument` () const

Gets the current user data (long) argument that is passed to the callback function.

 - void `argument` (long v)

Sets the current user data (long) argument that is passed to the callback function.

 - virtual class `FI_Gl_Window` * `as_gl_window` ()

Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.

 - virtual class `FI_Gl_Window` const * `as_gl_window` () const
 - virtual `FI_Group` * `as_group` ()

Returns an `FI_Group` pointer if this widget is an `FI_Group`.

 - virtual `FI_Group` const * `as_group` () const
 - virtual `FI_Window` * `as_window` ()

Returns an `FI_Window` pointer if this widget is an `FI_Window`.

 - virtual `FI_Window` const * `as_window` () const
 - void `bind_deimage` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the inactive state.

 - void `bind_deimage` (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

 - void `bind_image` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the active state.

 - void `bind_image` (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.

 - `FI_Boxtype box` () const

Gets the box type of the widget.

 - void `box` (`FI_Boxtype new_box`)

Sets the box type for the widget.

 - `FI_Callback_p callback` () const

Gets the current callback function for the widget.

 - void `callback` (`FI_Callback *cb`)

Sets the current callback function for the widget.

 - void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool auto_free)

Sets the current callback function and managed user data for the widget.

 - void `callback` (`FI_Callback *cb`, void *p)

Sets the current callback function and data for the widget.

 - void `callback` (`FI_Callback0 *cb`)

Sets the current callback function for the widget.

 - void `callback` (`FI_Callback1 *cb`, long p=0)

Sets the current callback function for the widget.

 - unsigned int `changed` () const

Checks if the widget value changed since the last callback.

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.

 - void `clear_changed` ()

Marks the value of the widget as unchanged.

 - void `clear_damage` (`uchar c=0`)

- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `draw_label` (int, int, int, int, `FI_Align`) const
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

- int `h` () const
Gets the widget height.
- virtual int `handle` (int event)
Handles the specified event.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group * parent` () const

- Returns a pointer to the parent widget.*

 - void [parent](#) ([FI_Group](#) *p)

Internal use only - "for hacks only".
- void [position](#) (int X, int Y)

Repositions the window or widget.
- void [redraw](#) ()

Schedules the drawing of the widget.
- void [redraw_label](#) ()

Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)

Changes the size or position of the widget.
- [FI_Color](#) [selection_color](#) () const

Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)

Sets the selection color.
- void [set_active](#) ()

Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()

Marks the value of the widget as changed.
- void [set_output](#) ()

Sets a widget to output only.
- void [set_visible](#) ()

Makes the widget visible.
- void [set_visible_focus](#) ()

Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()

Makes a widget visible.
- void [size](#) (int W, int H)

Changes the size of the widget.
- int [take_focus](#) ()

Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

Returns if the widget is able to take events.
- int [test_shortcut](#) ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const

Gets the current tooltip text.
- void [tooltip](#) (const char *text)

Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const

Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const

Gets the widget type.
- void [type](#) ([uchar](#) t)

Sets the widget type.

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (FI_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- FI_When **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- FI_Window * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual ~FI_Widget ()
Destroys the widget.

Protected Member Functions

- void **draw** () **FL_OVERRIDE**
Draws the widget.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.

- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

12.44.1 Detailed Description

Forms pixmap drawing routines.

12.44.2 Constructor & Destructor Documentation

12.44.2.1 Fl_FormsPixmap()

```
Fl_FormsPixmap::Fl_FormsPixmap (
    Fl_Boxtype t,
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_FormsPixmap](#) widget using the given box type, position, size and label string.

Parameters

in	<i>t</i>	box type
in	<i>X,Y,W,H</i>	position and size
in	<i>L</i>	widget label, default is no label

12.44.3 Member Function Documentation

12.44.3.1 draw()

```
void Fl_FormsPixmap::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.44.3.2 Pixmap()

```
void Fl_FormsPixmap::Pixmap (
    Fl_Pixmap * B ) [inline]
```

Set the internal pixmap pointer to an existing pixmap.

Parameters

in	<i>B</i>	existing pixmap
----	----------	-----------------

12.44.3.3 set()

```
void Fl_FormsPixmap::set (
    char *const * bits )
```

Set/create the internal pixmap using raw data.

Parameters

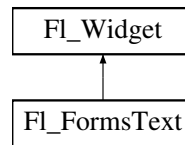
in	<i>bits</i>	raw data
----	-------------	----------

The documentation for this class was generated from the following files:

- [Fl_FormsPixmap.H](#)
- [forms_pixmap.cxx](#)

12.45 Fl_FormsText Class Reference

Inheritance diagram for Fl_FormsText:



Public Member Functions

- **Fl_FormsText** ([Fl_Boxtype](#) b, int X, int Y, int W, int H, const char *l=0)

Public Member Functions inherited from [Fl_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [Fl_Align](#) [align](#) () const
Gets the label alignment.
- void [align](#) ([Fl_Align](#) alignment)
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [Fl_Gl_Window](#) * [as_gl_window](#) ()
Returns an [Fl_Gl_Window](#) pointer if this widget is an [Fl_Gl_Window](#).
- virtual class [Fl_Gl_Window](#) const * **as_gl_window** () const
- virtual [Fl_Group](#) * [as_group](#) ()
Returns an [Fl_Group](#) pointer if this widget is an [Fl_Group](#).
- virtual [Fl_Group](#) const * **as_group** () const
- virtual [Fl_Window](#) * [as_window](#) ()
Returns an [Fl_Window](#) pointer if this widget is an [Fl_Window](#).
- virtual [Fl_Window](#) const * **as_window** () const
- void [bind_deimage](#) ([Fl_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([Fl_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [Fl_Boxtype](#) [box](#) () const
Gets the box type of the widget.
- void [box](#) ([Fl_Boxtype](#) new_box)
Sets the box type for the widget.

- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) ([uchar](#) c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.
- void [clear_visible](#) ()
Hides the widget.
- void [clear_visible_focus](#) ()
Disables keyboard focus navigation with this widget.
- [FI_Color color](#) () const
Gets the background color of the widget.
- void [color](#) ([FI_Color](#) bg)
Sets the background color of the widget.
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
Sets the background and selection color of the widget.
- [FI_Color color2](#) () const
For back compatibility only.
- void [color2](#) (unsigned a)
For back compatibility only.
- int [contains](#) (const [FI_Widget](#) *w) const
Checks if w is a child of this widget.
- void [copy_label](#) (const char *new_label)
Sets the current label.
- void [copy_tooltip](#) (const char *text)
Sets the current tooltip text.
- [uchar damage](#) () const
Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) ([uchar](#) c)
Sets the damage bits for the widget.
- void [damage](#) ([uchar](#) c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int [damage_resize](#) (int, int, int, int)
Internal use only.
- void [deactivate](#) ()

- Deactivates the widget.*

 - `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
 - `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
 - `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
 - `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
 - `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
 - `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
 - `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
 - `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
 - `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
 - `int h () const`
Gets the widget height.
 - `virtual int handle (int event)`
Handles the specified event.
 - `virtual void hide ()`
Makes a widget invisible.
 - `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
 - `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
 - `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
 - `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
 - `int image_bound () const`
Returns whether the image is managed by the widget.
 - `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
 - `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
 - `const char * label () const`
Gets the current label text.
 - `void label (const char *text)`
Sets the current label pointer.
 - `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
 - `FI_Color labelcolor () const`
Gets the label color.
 - `void labelcolor (FI_Color c)`
Sets the label color.
 - `FI_Font labelfont () const`
Gets the font to use.

- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)

- Changes the size of the widget.*

 - int `take_focus` ()
- Gives the widget the keyboard focus.*

 - unsigned int `takeevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)
- Sets the current tooltip text.*

 - `Fl_Window` * `top_window` () const
- Returns a pointer to the top-level window for the widget.*

 - `Fl_Window` * `top_window_offset` (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - `uchar` `type` () const
- Gets the widget type.*

 - void `type` (`uchar` t)
- Sets the widget type.*

 - int `use_accents_menu` ()
- Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*

 - void * `user_data` () const
- Gets the user data for this widget.*

 - void `user_data` (`Fl_Callback_User_Data` *v, bool auto_free)
- Sets the user data for this widget.*

 - void `user_data` (void *v)
- Sets the user data for this widget.*

 - unsigned int `visible` () const
- Returns whether a widget is visible.*

 - unsigned int `visible_focus` () const
- Checks whether this widget has a visible focus.*

 - void `visible_focus` (int v)
- Modifies keyboard focus navigation.*

 - int `visible_r` () const
- Returns whether a widget and all its parents are visible.*

 - int `w` () const
- Gets the widget width.*

 - `Fl_When` `when` () const
- Returns the conditions under which the callback is called.*

 - void `when` (`uchar` i)
- Sets the flags used to decide when a callback is called.*

 - `Fl_Window` * `window` () const
- Returns a pointer to the nearest parent window up the widget hierarchy.*

 - int `x` () const
- Gets the widget position in its window.*

 - int `y` () const
- Gets the widget position in its window.*

 - virtual `~Fl_Widget` ()
- Destroys the widget.*

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [Fl_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.45.1 Member Function Documentation

12.45.1.1 draw()

```
void Fl_FormsText::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

The documentation for this class was generated from the following file:

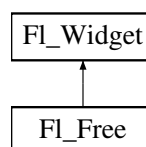
- forms.H

12.46 Fl_Free Class Reference

Emulation of the Forms "free" widget.

```
#include <Fl_Free.H>
```

Inheritance diagram for [Fl_Free](#):



Public Member Functions

- [Fl_Free](#) ([uchar](#) t, int X, int Y, int W, int H, const char *L, [FL_HANDLEPTR](#) hdl)
 - Create a new [Fl_Free](#) widget with type, position, size, label and handler.*
- int [handle](#) (int e) [FL_OVERRIDE](#)
 - Handles the specified event.*
- [~Fl_Free](#) ()
 - The destructor will call the handle function with the event [FL_FREE_MEM](#).*

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_GI_Window](#) * **as_gi_window** ()
Returns an [FI_GI_Window](#) pointer if this widget is an [FI_GI_Window](#).
- virtual class [FI_GI_Window](#) const * **as_gi_window** () const
- virtual [FI_Group](#) * **as_group** ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) **box** () const
Gets the box type of the widget.
- void **box** ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p](#) **callback** () const
Gets the current callback function for the widget.
- void **callback** ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void **callback** ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void **callback** ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (FI_Color bg)

Sets the background color of the widget.
- void `color` (FI_Color bg, FI_Color sel)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const FI_Widget *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (FI_Image &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (FI_Image *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fonsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fonsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const

Returns if a widget is used for output only.
- `Fl_Group * parent` () const
- Returns a pointer to the parent widget.*
- void `parent` (`Fl_Group *p`)
- Internal use only - "for hacks only".*
- void `position` (int X, int Y)
- Repositions the window or widget.*
- void `redraw` ()
- Schedules the drawing of the widget.*
- void `redraw_label` ()
- Schedules the drawing of the label.*
- virtual void `resize` (int x, int y, int w, int h)
- Changes the size or position of the widget.*
- `Fl_Color selection_color` () const
- Gets the selection color.*
- void `selection_color` (`Fl_Color a`)
- Sets the selection color.*
- void `set_active` ()
- Marks the widget as active without sending events or changing focus.*
- void `set_changed` ()
- Marks the value of the widget as changed.*
- void `set_output` ()
- Sets a widget to output only.*
- void `set_visible` ()
- Makes the widget visible.*
- void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*
- int `shortcut_label` () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*
- void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void `show` ()
- Makes a widget visible.*
- void `size` (int W, int H)
- Changes the size of the widget.*
- int `take_focus` ()
- Gives the widget the keyboard focus.*
- unsigned int `takeevents` () const
- Returns if the widget is able to take events.*
- int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*
- const char * `tooltip` () const
- Gets the current tooltip text.*
- void `tooltip` (const char *text)
- Sets the current tooltip text.*
- `Fl_Window * top_window` () const
- Returns a pointer to the top-level window for the widget.*
- `Fl_Window * top_window_offset` (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

- [uchar](#) `type` () const
Gets the widget type.
- void `type` ([uchar](#) t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` ([FI_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- [FI_When](#) `when` () const
Returns the conditions under which the callback is called.
- void `when` ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [FI_Window](#) * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- void `draw` () [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from [FI_Widget](#)

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.

- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void `default_callback` (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

12.46.1 Detailed Description

Emulation of the Forms "free" widget.

This emulation allows the free demo to run, and appears to be useful for porting programs written in Forms which use the free widget or make subclasses of the Forms widgets.

There are five types of free, which determine when the handle function is called:

- `FL_NORMAL_FREE` normal event handling.
- `FL_SLEEPING_FREE` deactivates event handling (widget is inactive).
- `FL_INPUT_FREE` accepts `FL_FOCUS` events.
- `FL_CONTINUOUS_FREE` sets a timeout callback 100 times a second and provides an `FL_STEP` event. This has obvious detrimental effects on machine performance.
- `FL_ALL_FREE` same as `FL_INPUT_FREE` and `FL_CONTINUOUS_FREE`.

12.46.2 Constructor & Destructor Documentation

12.46.2.1 Fl_Free()

```
Fl_Free::Fl_Free (
    uchar t,
    int X,
    int Y,
    int W,
    int H,
    const char * L,
    FL_HANDLEPTR hdl )
```

Create a new [Fl_Free](#) widget with type, position, size, label and handler.

Parameters

in	<i>t</i>	type
in	<i>X, Y, W, H</i>	position and size
in	<i>L</i>	widget label
in	<i>hdl</i>	handler function

The constructor takes both the type and the handle function. The handle function should be declared as follows:

```
int handle_function(Fl_Widget *w,
    int event,
    float event_x,
    float event_y,
    char key)
```

This function is called from the [handle\(\)](#) method in response to most events, and is called by the [draw\(\)](#) method.

The event argument contains the event type:

```
// old event names for compatibility:
#define FL_MOUSE          FL_DRAG
#define FL_DRAW           0
#define FL_STEP           9
#define FL_FREEMEM       12
#define FL_FREEZE        FL_UNMAP
#define FL_THAW          FL_MAP
```

12.46.3 Member Function Documentation

12.46.3.1 draw()

```
void Fl_Free::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.46.3.2 handle()

```
int Fl_Free::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

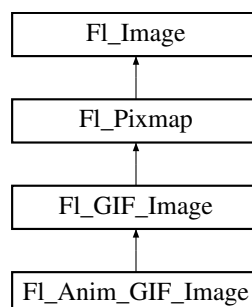
- `Fl_Free.H`
- `forms_free.cxx`

12.47 Fl_GIF_Image Class Reference

The [Fl_GIF_Image](#) class supports loading, caching, and drawing of CompuServe GIFSM images.

```
#include <Fl_GIF_Image.H>
```

Inheritance diagram for [Fl_GIF_Image](#):



Classes

- struct [GIF_FRAME](#)

Public Member Functions

- [FI_GIF_Image](#) (const char *filename)
This constructor loads a GIF image from the given file.
- [FI_GIF_Image](#) (const char *imagename, const unsigned char *data)
This constructor loads a GIF image from memory (deprecated).
- [FI_GIF_Image](#) (const char *imagename, const unsigned char *data, const size_t length)
This constructor loads a GIF image from memory.

Public Member Functions inherited from [FI_Pixmap](#)

- int [cache_h](#) ()
- int [cache_w](#) ()
- void [color_average](#) ([FI_Color](#) c, float i) [FL_OVERRIDE](#)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [FI_Image](#) * [copy](#) () const
- [FI_Image](#) * [copy](#) (int W, int H) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void [desaturate](#) () [FL_OVERRIDE](#)
The [desaturate\(\)](#) method converts an image to grayscale.
- void [draw](#) (int X, int Y)
- void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0) [FL_OVERRIDE](#)
Draws the image to the current drawing surface with a bounding box.
- [FI_Pixmap](#) (char *const *D)
The constructors create a new pixmap from the specified XPM data.
- [FI_Pixmap](#) (const char *const *D)
The constructors create a new pixmap from the specified XPM data.
- [FI_Pixmap](#) (const uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- [FI_Pixmap](#) (uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- void [label](#) ([FI_Menu_Item](#) *m) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a menu item.
- void [label](#) ([FI_Widget](#) *w) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a widget or menu item.
- void [uncache](#) () [FL_OVERRIDE](#)
If the image has been cached for display, delete the cache data.
- virtual ~[FI_Pixmap](#) ()
The destructor frees all memory and server resources that are used by the pixmap.

Public Member Functions inherited from [FI_Image](#)

- virtual class [FI_Shared_Image](#) * [as_shared_image](#) ()
Returns whether an image is an [FI_Shared_Image](#) or not.
- [FI_Image](#) * [copy](#) () const
Creates a copy of the image in the same size.
- int [count](#) () const
Returns the number of data values associated with the image.
- int [d](#) () const

- Returns the image depth.*

 - const char *const * **data** () const

Returns a pointer to the current image data array.
- int **data_h** () const

Returns the height of the image data.
- int **data_w** () const

Returns the width of the image data.
- void **draw** (int X, int Y)

Draws the image to the current drawing surface.
- int **fail** () const

Returns a value that is not 0 if there is currently no image available.
- **FI_Image** (int W, int H, int D)

The constructor creates an empty image with the specified width, height, and depth.
- int **h** () const

Returns the current image drawing height in FLTK units.
- void **inactive** ()

*The **inactive()** method calls **color_average(FL_BACKGROUND_COLOR, 0.33f)** to produce an image that appears grayed out.*
- int **ld** () const

Returns the current line data size in bytes.
- virtual void **release** ()

*Releases an **FI_Image** - the same as 'delete this'.*
- virtual void **scale** (int width, int height, int proportional=1, int can_expand=0)

Sets the drawing size of the image.
- int **w** () const

Returns the current image drawing width in FLTK units.
- virtual ~**FI_Image** ()

The destructor is a virtual method that frees all memory used by the image.

Static Public Member Functions

- static bool **is_animated** (const char *name_)

Static Public Member Functions inherited from **FI_Image**

- static **FI_Labeltype** **define_FL_IMAGE_LABEL** ()
 - static **FI_RGB_Scaling** **RGB_scaling** ()
- Returns the currently used RGB image scaling method.*
- static void **RGB_scaling** (**FI_RGB_Scaling**)
- Sets the RGB image scaling method used for copy(int, int).*
- static **FI_RGB_Scaling** **scaling_algorithm** ()
- Gets what algorithm is used when resizing a source image to draw it.*
- static void **scaling_algorithm** (**FI_RGB_Scaling** algorithm)
- Sets what algorithm is used when resizing a source image to draw it.*

Static Public Attributes

- static bool **animate** = false
- Sets how the shared image core routine should treat animated GIF files.*

Static Public Attributes inherited from [FI_Image](#)

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
True after [fl_register_images\(\)](#) was called, false before.

Protected Member Functions

- **FI_GIF_Image** ()
The default constructor creates an empty GIF image.
- **FI_GIF_Image** (const char *filename, bool anim)
- **FI_GIF_Image** (const char *imagename, const unsigned char *data, const size_t length, bool anim)
- void **load** (const char *filename, bool anim)
The protected [load\(\)](#) methods are used by [FI_Anim_GIF_Image](#) to request loading of animated GIF's.
- void **load** (const char *imagename, const unsigned char *data, const size_t length, bool anim)
- void **load_gif_** (class [FI_Image_Reader](#) &rdr, bool anim=false)
- virtual void **on_extension_data** ([GIF_FRAME](#) &)
- virtual void **on_frame_data** ([GIF_FRAME](#) &)

Protected Member Functions inherited from [FI_Pixmap](#)

- void **measure** ()

Protected Member Functions inherited from [FI_Image](#)

- void **d** (int D)
Sets the current image depth.
- void **data** (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void **draw_empty** (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int **draw_scaled** (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void **h** (int H)
Sets the height of the image data.
- void **ld** (int LD)
Sets the current line data size in bytes.
- void **w** (int W)
Sets the width of the image data.

Additional Inherited Members

Public Attributes inherited from [FI_Pixmap](#)

- int **alloc_data**

Static Protected Member Functions inherited from [FI_Image](#)

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

12.47.1 Detailed Description

The [Fl_GIF_Image](#) class supports loading, caching, and drawing of Compuserve GIFSM images. The class loads the first image and supports transparency.

12.47.2 Constructor & Destructor Documentation

12.47.2.1 Fl_GIF_Image() [1/3]

```
Fl_GIF_Image::Fl_GIF_Image (
    const char * filename )
```

This constructor loads a GIF image from the given file.

If a GIF image is animated, [Fl_GIF_Image](#) will only read and display the first frame of the animation.

The destructor frees all memory and server resources that are used by the image.

Use [Fl_Image::fail\(\)](#) to check if [Fl_GIF_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the GIF format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

Parameters

in	<i>filename</i>	a full path and name pointing to a GIF image file.
----	-----------------	--

See also

[Fl_GIF_Image::Fl_GIF_Image\(const char *imagename, const unsigned char *data, const long length\)](#)

12.47.2.2 Fl_GIF_Image() [2/3]

```
Fl_GIF_Image::Fl_GIF_Image (
    const char * imagename,
    const unsigned char * data )
```

This constructor loads a GIF image from memory (deprecated).

Deprecated Please use [Fl_GIF_Image\(const char *imagename, const unsigned char *data, const size_t length\)](#) instead.

Note

Buffer overruns will not be checked.

This constructor should not be used because the caller can't supply the memory size and the image reader can't check for "end of memory" errors.

Note

A new constructor with parameter `length` is available since FLTK 1.4.0.

Parameters

in	<i>imagename</i>	A name given to this image or NULL
in	<i>data</i>	Pointer to the start of the GIF image in memory.

See also

[Fl_GIF_Image\(const char *filename\)](#)

[Fl_GIF_Image\(const char *imagename, const unsigned char *data, const size_t length\)](#)

12.47.2.3 FI_GIF_Image() [3/3]

```
Fl_GIF_Image::Fl_GIF_Image (
    const char * imagename,
    const unsigned char * data,
    const size_t length )
```

This constructor loads a GIF image from memory.

Construct an image from a block of memory inside the application. Fluid offers "binary data" chunks as a great way to add image data into the C++ source code. *imagename* can be `NULL`. If a name is given, the image is added to the list of shared images and will be available by that name.

If a GIF image is animated, [FI_GIF_Image](#) will only read and display the first frame of the animation.

The destructor frees all memory and server resources that are used by the image.

The third parameter *length* is used to test for buffer overruns, i.e. truncated images.

Use [FI_Image::fail\(\)](#) to check if [FI_GIF_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the GIF format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

Parameters

in	<i>imagename</i>	A name given to this image or <code>NULL</code>
in	<i>data</i>	Pointer to the start of the GIF image in memory.
in	<i>length</i>	Length of the GIF image in memory.

See also

[FI_GIF_Image::FI_GIF_Image\(const char *filename\)](#)

[FI_Shared_Image](#)

Since

1.4.0

12.47.3 Member Data Documentation

12.47.3.1 animate

```
bool Fl_GIF_Image::animate = false [static]
```

Sets how the shared image core routine should treat animated GIF files.

The default is to treat them as ordinary GIF's e.g. it creates a [FI_GIF_Image](#) object. If this variable is set, then an animated GIF object [FI_Anim_GIF_Image](#) is created.

The documentation for this class was generated from the following files:

- [FI_GIF_Image.H](#)
- [FI_Anim_GIF_Image.cxx](#)
- [FI_GIF_Image.cxx](#)

12.48 FI_GI_Choice Class Reference

Public Member Functions

- [FI_GI_Choice](#) (int m, const int *alistp, [FI_GI_Choice](#) *n)

Friends

- class [FI_GI_Window_Driver](#)

The documentation for this class was generated from the following file:

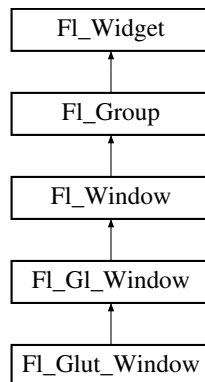
- [FI_GI_Choice.H](#)

12.49 Fl_Gl_Window Class Reference

The `Fl_Gl_Window` widget sets things up so OpenGL works.

```
#include <Fl_Gl_Window.H>
```

Inheritance diagram for `Fl_Gl_Window`:



Public Member Functions

- `Fl_Gl_Window` const * `as_gl_window` () const `FL_OVERRIDE`
- `Fl_Gl_Window` * `as_gl_window` () `FL_OVERRIDE`
Returns an `Fl_Gl_Window` pointer if this widget is an `Fl_Gl_Window`.
- int `can_do` ()
Returns non-zero if the hardware supports the current OpenGL mode.
- int `can_do_overlay` ()
Returns true if the hardware overlay is possible.
- `GLContext` `context` () const
Returns a pointer to the window's OpenGL rendering context.
- void `context` (`GLContext`, int `destroy_flag`=0)
Sets a pointer to the `GLContext` that this window is using.
- char `context_valid` () const
Will only be set if the OpenGL context is created or recreated.
- void `context_valid` (char v)
See char `Fl_Gl_Window::context_valid()` const.
- `Fl_Gl_Window` (int W, int H, const char *l=0)
Creates a new `Fl_Gl_Window` widget using the given size, and label string.
- `Fl_Gl_Window` (int X, int Y, int W, int H, const char *l=0)
Creates a new `Fl_Gl_Window` widget using the given position, size, and label string.
- void `flush` () `FL_OVERRIDE`
Forces the window to be drawn, this window is also made current and calls `draw()`.
- int `handle` (int) `FL_OVERRIDE`
Handle some FLTK events as needed.
- void `hide` () `FL_OVERRIDE`
Hides the window and destroys the OpenGL context.
- void `hide_overlay` ()
Hides the window if it is not this window, does nothing in Windows.
- void `invalidate` ()
The `invalidate()` method turns off `valid()` and is equivalent to calling `value(0)`.
- void `make_current` ()
The `make_current()` method selects the OpenGL context for the widget.
- void `make_overlay_current` ()

- Selects the OpenGL context for the widget's overlay.*

 - `FL_Mode mode () const`
Returns the current OpenGL capabilities of the window.
 - `int mode (const int *a)`
Set the OpenGL capabilities of the window using platform-specific data.
 - `int mode (int a)`
Set or change the OpenGL capabilities of the window.
 - `void ortho ()`
Sets the projection so 0,0 is in the lower left of the window and each pixel is 1 unit wide/tall.
 - `int pixel_h ()`
Gives the window height in OpenGL pixels.
 - `int pixel_w ()`
Gives the window width in OpenGL pixels.
 - `float pixels_per_unit ()`
The number of pixels per FLTK unit of length for the window.
 - `void redraw_overlay ()`
Causes draw_overlay() to be called at a later time.
 - `void resize (int, int, int, int) FL_OVERRIDE`
Changes the size or position of the widget.
 - `void show () FL_OVERRIDE`
Makes a widget visible.
 - `void show (int a, char **b)`
*Same as `FL_Window::show(int a, char **b)`*
 - `void swap_buffers ()`
The `swap_buffers()` method swaps the back and front buffers.
 - `int swap_interval () const`
Gets the rate at which the GL windows swaps buffers.
 - `void swap_interval (int)`
Sets the rate at which the GL windows swaps buffers.
 - `char valid () const`
Is turned off when FLTK creates a new context for this window or when the window resizes, and is turned on after `draw()` is called.
 - `void valid (char v)`
See char `FL_Gl_Window::valid()` const.
 - `~FL_Gl_Window ()`
The destructor removes the widget and destroys the OpenGL context associated with it.

Public Member Functions inherited from `FL_Window`

- virtual class `FL_Double_Window * as_double_window ()`
Return non-null if this is an `FL_Double_Window` object.
- virtual class `FL_Overlay_Window * as_overlay_window ()`
Return non-null if this is an `FL_Overlay_Window` object.
- `FL_Window const * as_window () const FL_OVERRIDE`
- `FL_Window * as_window () FL_OVERRIDE`
Returns an `FL_Window` pointer if this widget is an `FL_Window`.
- unsigned int `border () const`
Returns whether the window possesses a border.
- void `border (int b)`
Sets whether or not the window manager border is around the window.
- void `clear_border ()`

- Fast inline function to turn the window manager border off.*

 - void `clear_modal_states ()`
 - Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.*
 - void `copy_label (const char *a)`
 - Sets the window titlebar label to a copy of a character string.*
 - void `cursor (const FI_RGB_Image *, int, int)`
 - Changes the cursor for this window using the provided image as cursor's shape.*
 - void `cursor (FI_Cursor c, FI_Color, FI_Color=FL_WHITE)`
 - For back compatibility only.*
 - void `cursor (FI_Cursor)`
 - Changes the cursor for this window.*
 - int `decorated_h () const`
 - Returns the window height including any window title bar and any frame added by the window manager.*
 - int `decorated_w () const`
 - Returns the window width including any frame added by the window manager.*
 - void `default_cursor (FI_Cursor c, FI_Color, FI_Color=FL_WHITE)`
 - For back compatibility only.*
 - void `default_cursor (FI_Cursor)`
 - Sets the default window cursor.*
 - void `draw_backdrop ()`
 - Draw the background image if one is set and is aligned inside.*
 - `FI_Window (int w, int h, const char *title=0)`
 - Creates a window from the given width *w*, height *h*, and *title*.*
 - `FI_Window (int x, int y, int w, int h, const char *title=0)`
 - Creates a window from the given position (*x*, *y*), size (*w*, *h*) and *title*.*
 - void `free_position ()`
 - Undoes the effect of a previous `resize()` or `show()` so that the next time `show()` is called the window manager is free to position the window.*
 - void `fullscreen ()`
 - Makes the window completely fill one or more screens, without any window manager border visible.*
 - unsigned int `fullscreen_active () const`
 - Returns non zero if FULLSCREEN flag is set, 0 otherwise.*
 - void `fullscreen_off ()`
 - Turns off any side effects of `fullscreen()`*
 - void `fullscreen_off (int X, int Y, int W, int H)`
 - Turns off any side effects of `fullscreen()` and does `resize(x,y,w,h)`.*
 - void `fullscreen_screens (int top, int bottom, int left, int right)`
 - Sets which screens should be used when this window is in fullscreen mode.*
 - int `handle (int) FL_OVERRIDE`
 - Handles the specified event.*
 - void `hide () FL_OVERRIDE`
 - Removes the window from the screen.*
 - void `hotspot (const FI_Widget &p, int offscreen=0)`
 - See void `FI_Window::hotspot(int x, int y, int offscreen = 0)`*
 - void `hotspot (const FI_Widget *, int offscreen=0)`
 - See void `FI_Window::hotspot(int x, int y, int offscreen = 0)`*
 - void `hotspot (int x, int y, int offscreen=0)`
 - Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.*
 - const void * `icon () const`
 - Gets the current icon window target dependent data.*

- void [icon](#) (const [FL_RGB_Image](#) *)
Sets or resets a single window icon.
- void [icon](#) (const void *ic)
Platform-specific method to set the window icon usable on Windows and X11 only.
- void [iconize](#) ()
Iconifies the window.
- const char * [iconlabel](#) () const
See void [FL_Window::iconlabel\(const char\)](#)*
- void [iconlabel](#) (const char *)
Sets the icon label.
- void [icons](#) (const [FL_RGB_Image](#) *[], int)
Sets the window icons.
- void [icons](#) (HICON big_icon, HICON small_icon)
Sets the window icons using HICON handles (Windows platform only).
- const char * [label](#) () const
See void [FL_Window::label\(const char\)](#)*
- void [label](#) (const char *)
Sets the window title bar label.
- void [label](#) (const char *label, const char *iconlabel)
Sets the icon label.
- void [make_current](#) ()
Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.
- void [maximize](#) ()
Maximizes a top-level window to its current screen.
- unsigned int [maximize_active](#) () const
Returns whether the window is currently maximized.
- unsigned int [menu_window](#) () const
Returns true if this window is a menu window.
- unsigned int [modal](#) () const
Returns true if this window is modal.
- unsigned int [non_modal](#) () const
Returns true if this window is modal or non-modal.
- [fl_uintptr_t](#) [os_id](#) ()
Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int [override](#) () const
Returns non zero if [OVERRIDE](#) flag is set, 0 otherwise.
- void [resize](#) (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Changes the size and position of the window.
- int [screen_num](#) ()
The number of the screen containing the mapped window.
- void [screen_num](#) (int screen_num)
Set the number of the screen where to map the window.
- void [set_menu_window](#) ()
Marks the window as a menu window.
- void [set_modal](#) ()
A "modal" window, when [shown\(\)](#), will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void [set_non_modal](#) ()

A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.

- void **set_override** ()
Activates the flags NOBORDER|OVERRIDE.
- void **set_tooltip_window** ()
Marks the window as a tooltip window.
- const **FL_Image** * **shape** ()
Returns the image controlling the window shape or NULL.
- void **shape** (const **FL_Image** &b)
Set the window's shape with an [FL_Image](#).
- void **shape** (const **FL_Image** *img)
Assigns a non-rectangular shape to the window.
- void **show** () **FL_OVERRIDE**
Puts the window on the screen.
- void **show** (int argc, char **argv)
Puts the window on the screen with [show\(\)](#) and parses command-line arguments.
- int **shown** ()
Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).
- void **size_range** (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)
Sets the allowable range the user can resize this window to.
- unsigned int **tooltip_window** () const
Returns true if this window is a tooltip window.
- void **un_maximize** ()
Returns a previously maximized top-level window to its previous size.
- void **wait_for_expose** ()
Waits for the window to be displayed after calling [show\(\)](#).
- int **x_root** () const
Gets the x position of the window on the screen.
- const char * **xclass** () const
Returns the xclass for this window, or a default.
- void **xclass** (const char *c)
Sets the xclass for this window.
- int **y_root** () const
Gets the y position of the window on the screen.
- virtual **~FL_Window** ()
The destructor also deletes all the children.

Public Member Functions inherited from [FL_Group](#)

- **FL_Widget** *& **_ddfdesign_kludge** ()
This is for forms compatibility only.
- void **add** (**FL_Widget** &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void **add** (**FL_Widget** *o)
See void [FL_Group::add\(FL_Widget &w\)](#)
- void **add_resizable** (**FL_Widget** &o)
Adds a widget to the group and makes it the resizable widget.
- **FL_Widget** *const * **array** () const
Returns a pointer to the array of children.
- **FL_Group** const * **as_group** () const **FL_OVERRIDE**
- **FL_Group** * **as_group** () **FL_OVERRIDE**

- Returns an *FI_Group* pointer if this widget is an *FI_Group*.
- void **begin** ()
 - Sets the current group so you can build the widget tree by just constructing the widgets.
- *FI_Widget* * **child** (int n) const
 - Returns *array()[n]*.
- int **children** () const
 - Returns how many child widgets the group has.
- void **clear** ()
 - Deletes all child widgets from memory recursively.
- unsigned int **clip_children** ()
 - Returns the current clipping mode.
- void **clip_children** (int c)
 - Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int **delete_child** (int n)
 - Removes the widget at *index* from the group and deletes it.
- void **end** ()
 - Exactly the same as *current(this->parent())*.
- int **find** (const *FI_Widget* &o) const
 - See *int FI_Group::find(const FI_Widget *w) const*.
- int **find** (const *FI_Widget* *) const
 - Searches the child array for the widget and returns the index.
- *FI_Group* (int, int, int, int, const char *s)
 - Creates a new *FI_Group* widget using the given position, size, and label string.
- void **focus** (*FI_Widget* *w)
- void **forms_end** ()
 - This is for forms compatibility only.
- void **init_sizes** ()
 - Resets the internal array of widget sizes and positions.
- void **insert** (*FI_Widget* &, int i)
 - The widget is removed from its current group (if any) and then inserted into this group.
- void **insert** (*FI_Widget* &o, *FI_Widget* *before)
 - This does *insert(w, find(before))*.
- void **remove** (*FI_Widget* &o)
 - Removes a widget from the group but does not delete it.
- void **remove** (*FI_Widget* *o)
 - Removes the widget *o* from the group.
- void **remove** (int index)
 - Removes the widget at *index* from the group but does not delete it.
- *FI_Widget* * **resizable** () const
 - Returns the group's resizable widget.
- void **resizable** (*FI_Widget* &o)
 - Sets the group's resizable widget.
- void **resizable** (*FI_Widget* *o)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- virtual ~*FI_Group* ()
 - The destructor also deletes all the children.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- void [bind_deimage](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#), [FI_Callback_User_Data *p](#), bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback *cb](#), void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0 *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1 *cb](#), long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) (uchar c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()

- Sets a widget to accept input.*

 - void `clear_visible ()`

Hides the widget.
- void `clear_visible_focus ()`

Disables keyboard focus navigation with this widget.
- `FI_Color color ()` const

Gets the background color of the widget.
- void `color (FI_Color bg)`

Sets the background color of the widget.
- void `color (FI_Color bg, FI_Color sel)`

Sets the background and selection color of the widget.
- `FI_Color color2 ()` const

For back compatibility only.
- void `color2 (unsigned a)`

For back compatibility only.
- int `contains (const FI_Widget *w)` const

Checks if w is a child of this widget.
- void `copy_label (const char *new_label)`

Sets the current label.
- void `copy_tooltip (const char *text)`

Sets the current tooltip text.
- `uchar damage ()` const

Returns non-zero if `draw()` needs to be called.
- void `damage (uchar c)`

Sets the damage bits for the widget.
- void `damage (uchar c, int x, int y, int w, int h)`

Sets the damage bits for an area inside the widget.
- int `damage_resize (int, int, int, int)`

Internal use only.
- void `deactivate ()`

Deactivates the widget.
- `FI_Image * deimage ()`

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage ()` const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage (FI_Image &img)`

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound ()` const

Returns whether the inactive image is managed by the widget.
- void `do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with default arguments.
- void `do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
- void `do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
- void `draw_label (int, int, int, int, FI_Align)` const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h ()` const

Gets the widget height.

- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`
Gets the font size in pixels.
- `void labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- `void labeltype (FI_Labeltype a)`
Sets the label type.
- `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
- `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- `unsigned int output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`

- Schedules the drawing of the widget.*

 - void `redraw_label` ()
- Schedules the drawing of the label.*

 - `FI_Color selection_color` () const
- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)
- Sets the selection color.*

 - void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()
- Marks the value of the widget as changed.*

 - void `set_output` ()
- Sets a widget to output only.*

 - void `set_visible` ()
- Makes the widget visible.*

 - void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - void `size` (int W, int H)
- Changes the size of the widget.*

 - int `take_focus` ()
- Gives the widget the keyboard focus.*

 - unsigned int `takesevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)
- Sets the current tooltip text.*

 - `FI_Window * top_window` () const
- Returns a pointer to the top-level window for the widget.*

 - `FI_Window * top_window_offset` (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - `uchar type` () const
- Gets the widget type.*

 - void `type` (`uchar` t)
- Sets the widget type.*

 - int `use_accents_menu` ()
- Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.*

 - void * `user_data` () const
- Gets the user data for this widget.*

 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
- Sets the user data for this widget.*

 - void `user_data` (void *v)
- Sets the user data for this widget.*

 - unsigned int `visible` () const
- Returns whether a widget is visible.*

- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FL_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FL_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FL_Widget` ()
Destroys the widget.

Static Public Member Functions

- static int `can_do` (const int *m)
Returns non-zero if the hardware supports the given OpenGL mode.
- static int `can_do` (int m)
Returns non-zero if the hardware supports the given OpenGL mode.

Static Public Member Functions inherited from `FL_Window`

- static `FL_Window` * `current` ()
Returns the last window that was made current.
- static void `default_callback` (`FL_Window` *, void *v)
Back compatibility: Sets the default callback v for win to call on close event.
- static void `default_icon` (const `FL_RGB_Image` *)
Sets a single default window icon.
- static void `default_icons` (const `FL_RGB_Image` *[], int)
Sets the default window icons.
- static void `default_icons` (HICON big_icon, HICON small_icon)
Sets the default window icons (Windows platform only).
- static const char * `default_xclass` ()
Returns the default xclass.
- static void `default_xclass` (const char *)
Sets the default window xclass.
- static bool `is_a_rescale` ()
Returns true when a window is being rescaled.
- static char `show_next_window_iconic` ()
Returns the static flag whether the next window should be opened iconified.
- static void `show_next_window_iconic` (char stat)
Sets a static flag whether the next window should be opened iconified.

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Member Functions

- void [draw](#) () [FL_OVERRIDE](#)
Draws the [FI_GI_Window](#).
- void [draw_begin](#) ()
Supports drawing to an [FI_GI_Window](#) with the FLTK 2D drawing API.
- void [draw_end](#) ()
To be used as a match for a previous call to [FI_GI_Window::draw_begin\(\)](#).

Protected Member Functions inherited from [FI_Window](#)

- void [default_size_range](#) ()
Protected method to calculate the default size range of a window.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- int [force_position](#) () const
Returns the internal state of the window's [FORCE_POSITION](#) flag.
- void [force_position](#) (int force)
Sets an internal flag that tells FLTK and the window manager to honor position requests.
- void [free_icons](#) ()
Deletes all icons previously attached to the window.
- int [is_resizable](#) ()
Protected method to determine whether a window is resizable.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * [bounds](#) ()
Returns the internal array of widget sizes and positions.
- void [draw_child](#) ([FI_Widget](#) &widget) const
Forces a child to redraw.
- void [draw_children](#) ()
Draws all children of the group.
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int [on_insert](#) ([FI_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int [on_move](#) (int, int)

- Allow derived groups to act when a widget is moved within the group.*

 - virtual void `on_remove` (int)
- Allow derived groups to act when a child widget is removed from the group.*

 - int * `sizes` ()

Returns the internal array of widget sizes and positions.
- void `update_child` (FI_Widget &widget) const

Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)

Clears a flag in the flags mask.
- void `draw_backdrop` () const

If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void `draw_box` () const

Draws the widget box according its box style.
- void `draw_box` (FI_Boxtype t, FI_Color c) const

Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const

Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const

Draws a focus box for the widget at the given position and size.
- void `draw_label` () const

Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int `flags` () const

Gets the widget flags mask.
- void `h` (int v)

Internal use only.
- void `set_flag` (unsigned int c)

Sets a flag in the flags mask.
- void `w` (int v)

Internal use only.
- void `x` (int v)

Internal use only.
- void `y` (int v)

Internal use only.

Friends

- class FI_GI_Window_Driver

Additional Inherited Members

Public Types inherited from FI_Window

- typedef struct HICON__ * HICON

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

Static Protected Attributes inherited from [FI_Window](#)

- static [FI_Window](#) * [current_](#)
 - Stores the last window that was made current.*

12.49.1 Detailed Description

The [FI_GI_Window](#) widget sets things up so OpenGL works.

It also keeps an OpenGL "context" for that window, so that changes to the lighting and projection may be reused between redraws. [FI_GI_Window](#) also flushes the OpenGL streams and swaps buffers after [draw\(\)](#) returns.

OpenGL hardware typically provides some overlay bit planes, which are very useful for drawing UI controls atop your 3D graphics. If the overlay hardware is not provided, FLTK tries to simulate the overlay. This works pretty well if your graphics are double buffered, but not very well for single-buffered.

Please note that the FLTK drawing and clipping functions will not work inside an [FI_GI_Window](#). All drawing should be done using OpenGL calls exclusively.

See also

[OpenGL and support of HighDPI displays](#)

Note

FLTK 1.4 introduces a driver system for graphic calls. It is now possible to add a selection of widgets to an OpenGL window. The widgets will draw on top of any OpenGL rendering. The number of supported widgets will increase as the driver development improves. Program `test/cube.cxx` illustrates how to do that.

FLTK expects that when an [FI_GI_Window](#) is a child of a parent [FI_Window](#), the child window lies entirely inside its parent window. If that's not the case, what happens to the part of the GL subwindow which leaks outside its parent is undefined and susceptible to be platform-specific.

12.49.2 Constructor & Destructor Documentation

12.49.2.1 [FI_GI_Window\(\)](#) [1/2]

```
FI_GI_Window::FI_GI_Window (
    int W,
    int H,
    const char * l = 0 ) [inline]
```

Creates a new [FI_GI_Window](#) widget using the given size, and label string.

The default boxtype is `FL_NO_BOX`. The default mode is `FL_RGB|FL_DOUBLE|FL_DEPTH`.

12.49.2.2 Fl_Gl_Window() [2/2]

```
Fl_Gl_Window::Fl_Gl_Window (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 ) [inline]
```

Creates a new [Fl_Gl_Window](#) widget using the given position, size, and label string. The default boxtype is `FL_NO_BOX`. The default mode is `FL_RGB|FL_DOUBLE|FL_DEPTH`.

12.49.3 Member Function Documentation

12.49.3.1 as_gl_window() [1/2]

```
Fl_Gl_Window const * Fl_Gl_Window::as_gl_window ( ) const [inline], [virtual]
```

Reimplemented from [Fl_Widget](#).

12.49.3.2 as_gl_window() [2/2]

```
Fl_Gl_Window * Fl_Gl_Window::as_gl_window ( ) [inline], [virtual]
```

Returns an [Fl_Gl_Window](#) pointer if this widget is an [Fl_Gl_Window](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [Fl_Gl_Window](#). If it returns non-NULL, then the widget in question is derived from [Fl_Gl_Window](#).

Return values

NULL	if this widget is not derived from Fl_Gl_Window .
------	---

Note

This method is provided to avoid `dynamic_cast`.

See also

[Fl_Widget::as_group\(\)](#), [Fl_Widget::as_window\(\)](#)

Reimplemented from [Fl_Widget](#).

12.49.3.3 can_do()

```
static int Fl_Gl_Window::can_do (
    const int * m ) [inline], [static]
```

Returns non-zero if the hardware supports the given OpenGL mode.

See also

[Fl_Gl_Window::mode\(const int *a\)](#)

12.49.3.4 can_do_overlay()

```
int Fl_Gl_Window::can_do_overlay ( )
```

Returns true if the hardware overlay is possible.

If this is false, FLTK will try to simulate the overlay, with significant loss of update speed. Calling this will cause FLTK to open the display.

12.49.3.5 context() [1/2]

```
GLContext Fl_Gl_Window::context ( ) const [inline]
```

Returns a pointer to the window's OpenGL rendering context.

See also

void [context\(GLContext c, int destroy_flag\)](#)

12.49.3.6 context() [2/2]

```
void Fl_Gl_Window::context (
    GLContext v,
    int destroy_flag = 0 )
```

Sets a pointer to the GLContext that this window is using.

This is a system-dependent structure, but it is portable to copy the context from one window to another. You can also set it to NULL, which will force FLTK to recreate the context the next time [make_current\(\)](#) is called, this is useful for getting around bugs in OpenGL implementations.

If *destroy_flag* is true the context will be destroyed by fltk when the window is destroyed, or when the [mode\(\)](#) is changed, or the next time [context\(x\)](#) is called.

12.49.3.7 context_valid()

```
char Fl_Gl_Window::context_valid ( ) const [inline]
```

Will only be set if the OpenGL context is created or recreated.

It differs from [Fl_Gl_Window::valid\(\)](#) which is also set whenever the context changes size.

12.49.3.8 draw()

```
void Fl_Gl_Window::draw (
    void ) [protected], [virtual]
```

Draws the [Fl_Gl_Window](#).

You **must subclass** [Fl_Gl_Window](#) and provide an implementation for [draw\(\)](#). You may also provide an implementation of [draw_overlay\(\)](#) if you want to draw into the overlay planes. You can avoid reinitializing the viewport and lights and other things by checking [valid\(\)](#) at the start of [draw\(\)](#) and only doing the initialization if it is false.

The [draw\(\)](#) method can *only* use OpenGL calls. Do not attempt to call X, any of the functions in [<FL/fl_draw.H>](#), or glX directly. Do not call [gl_start\(\)](#) or [gl_finish\(\)](#).

If double-buffering is enabled in the window, the back and front buffers are swapped after this function is completed.

The following pseudo-code shows how to use "if (!valid())" to initialize the viewport:

```
void mywindow::draw() {
    if (!valid()) {
        glViewport(0,0,pixel_w(),pixel_h());
        glFrustum(...) or glOrtho(...)
        ...other initialization...
    }
    if (!context_valid()) {
        ...load textures, etc. ...
    }
    // clear screen
    glClearColor(...);
    glClear(...);
    ... draw your geometry here ...
}
```

Actual example code to clear screen to black and draw a 2D white "X":

```
void mywindow::draw() {
    if (!valid()) {
        glLoadIdentity();
        glViewport(0,0,pixel_w(),pixel_h());
        glOrtho(-w(),w(),-h(),h(),-1,1);
    }
    // Clear screen
    glClear(GL_COLOR_BUFFER_BIT);
    // Draw white 'X'
    glColor3f(1.0, 1.0, 1.0);
    glBegin(GL_LINE_STRIP); glVertex2f(w(), h()); glVertex2f(-w(),-h()); glEnd();
    glBegin(GL_LINE_STRIP); glVertex2f(w(),-h()); glVertex2f(-w(), h()); glEnd();
}
```

Regular FLTK widgets can be added as children to the [Fl_Gl_Window](#). To correctly overlay the widgets, [Fl_Gl_Window::draw\(\)](#) must be called after rendering the main scene.

```
void mywindow::draw() {
    // draw 3d graphics scene
    Fl_Gl_Window::draw();
    // -- or --
    draw_begin();
    Fl_Window::draw();
}
```

```
    // other 2d drawing calls, overlays, etc.
    draw_end();
}
```

Implements [Fl_Widget](#).

Reimplemented in [Fl_Glut_Window](#).

12.49.3.9 draw_begin()

```
void Fl_Gl_Window::draw_begin ( ) [protected]
```

Supports drawing to an [Fl_Gl_Window](#) with the FLTK 2D drawing API.

See also

[Using FLTK widgets in OpenGL Windows](#)

12.49.3.10 draw_end()

```
void Fl_Gl_Window::draw_end ( ) [protected]
```

To be used as a match for a previous call to [Fl_Gl_Window::draw_begin\(\)](#).

See also

[Using FLTK widgets in OpenGL Windows](#)

12.49.3.11 flush()

```
void Fl_Gl_Window::flush ( ) [virtual]
```

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

Reimplemented from [Fl_Widget](#).

12.49.3.12 handle()

```
int Fl_Gl_Window::handle (
    int event ) [virtual]
```

Handle some FLTK events as needed.

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Glut_Window](#).

12.49.3.13 hide()

```
void Fl_Gl_Window::hide ( ) [virtual]
```

Hides the window and destroys the OpenGL context.

Reimplemented from [Fl_Widget](#).

12.49.3.14 make_current()

```
void Fl_Gl_Window::make_current ( )
```

The [make_current\(\)](#) method selects the OpenGL context for the widget.

It is called automatically prior to the [draw\(\)](#) method being called and can also be used to implement feedback and/or selection within the [handle\(\)](#) method.

12.49.3.15 make_overlay_current()

```
void Fl_Gl_Window::make_overlay_current ( )
```

Selects the OpenGL context for the widget's overlay.

This method is called automatically prior to the [draw_overlay\(\)](#) method being called and can also be used to implement feedback and/or selection within the [handle\(\)](#) method.

12.49.3.16 mode() [1/3]

```
Fl_Mode Fl_Gl_Window::mode ( ) const [inline]
```

Returns the current OpenGL capabilities of the window.

Don't use this if capabilities were set through [Fl_Gl_Window::mode\(const int *a\)](#).

12.49.3.17 mode() [2/3]

```
int Fl_Gl_Window::mode (
    const int * a ) [inline]
```

Set the OpenGL capabilities of the window using platform-specific data.

Parameters

<i>a</i>	zero-ending array of platform-specific attributes and attribute values
----------	--

Unix/Linux platform: attributes are GLX attributes adequate for the 3rd argument of the `glXChooseVisual()` function (e.g., `GLX_DOUBLEBUFFER`, defined by including `<GL/glx.h>`).

Note

What attributes are adequate here is subject to change. The preferred, stable public API is [Fl_Gl_Window::mode\(int a\)](#).

Windows platform: this member function is of no use.

Mac OS X platform: attributes belong to the `CGLPixelFormatAttribute` enumeration (defined by including `<OpenGL/OpenGL.h>`, e.g., `kCGLPFADoubleBuffer`) and may be followed by adequate attribute values.

12.49.3.18 mode() [3/3]

```
int Fl_Gl_Window::mode (
    int a ) [inline]
```

Set or change the OpenGL capabilities of the window.

The value can be any of the following OR'd together:

- `FL_RGB` - RGB color (not indexed)
- `FL_RGB8` - RGB color with at least 8 bits of each color
- `FL_INDEX` - Indexed mode
- `FL_SINGLE` - not double buffered
- `FL_DOUBLE` - double buffered
- `FL_ACCUM` - accumulation buffer
- `FL_ALPHA` - alpha channel in color
- `FL_DEPTH` - depth buffer
- `FL_STENCIL` - stencil buffer
- `FL_MULTISAMPLE` - multisample antialiasing
- `FL_OPENGL3` - use OpenGL version 3.0 or more.

`FL_RGB` and `FL_SINGLE` have a value of zero, so they are "on" unless you give `FL_INDEX` or `FL_DOUBLE`.

If the desired combination cannot be done, FLTK will try turning off `FL_MULTISAMPLE`. If this also fails the [show\(\)](#) will call [Fl::error\(\)](#) and not show the window.

You can change the mode while the window is displayed. This is most useful for turning double-buffering on and off. Under X this will cause the old X window to be destroyed and a new one to be created. If this is a top-level window this will unfortunately also cause the window to blink, raise to the top, and be de-iconized, and the `xid()` will change, possibly breaking other code. It is best to make the GL window a child of another window if you wish to do this!

`mode()` must not be called within [draw\(\)](#) since it changes the current context.

The `FL_OPENGL3` flag is required to access OpenGL version 3 or more under the X11 and MacOS platforms; it's optional under Windows and Wayland. See more details in [Using OpenGL 3.0 \(or higher versions\)](#).

Version

the `FL_OPENGL3` flag appeared in version 1.3.4

12.49.3.19 ortho()

```
void Fl_Gl_Window::ortho ( )
```

Sets the projection so 0,0 is in the lower left of the window and each pixel is 1 unit wide/tall. If you are drawing 2D images, your `draw()` method may want to call this if `valid()` is false.

12.49.3.20 pixel_h()

```
int Fl_Gl_Window::pixel_h ( ) [inline]
```

Gives the window height in OpenGL pixels.

When an `Fl_Gl_Window` is mapped to a HighDPI display, the value given by `Fl_Gl_Window::h()` which is expressed in FLTK units, may differ from the window height in pixels. Calls to OpenGL functions expecting pixel values (e.g., `glViewport`) should therefore use `pixel_h()` rather than `h()`. Method `pixel_h()` detects when the GUI is rescaled or when the window has been moved between low and high resolution displays and automatically adjusts the returned value.

Version

1.3.4

12.49.3.21 pixel_w()

```
int Fl_Gl_Window::pixel_w ( ) [inline]
```

Gives the window width in OpenGL pixels.

When an `Fl_Gl_Window` is mapped to a HighDPI display, the value given by `Fl_Gl_Window::w()` which is expressed in FLTK units, may differ from the window width in pixels. Calls to OpenGL functions expecting pixel values (e.g., `glViewport`) should therefore use `pixel_w()` rather than `w()`. Method `pixel_w()` detects when the GUI is rescaled or when the window has been moved between low and high resolution displays and automatically adjusts the returned value.

Version

1.3.4

12.49.3.22 pixels_per_unit()

```
float Fl_Gl_Window::pixels_per_unit ( )
```

The number of pixels per FLTK unit of length for the window.

This method dynamically adjusts its value when the GUI is rescaled or when the window is moved to/from displays of distinct resolutions. This method is useful, e.g., to convert, in a window's `handle()` method, the FLTK units returned by `Fl::event_x()` and `Fl::event_y()` to the pixel units used by the OpenGL source code.

Version

1.3.4

12.49.3.23 redraw_overlay()

```
void Fl_Gl_Window::redraw_overlay ( )
```

Causes `draw_overlay()` to be called at a later time.

Initially the overlay is clear. If you want the window to display something in the overlay when it first appears, you must call this immediately after you `show()` your window.

12.49.3.24 `resize()`

```
void Fl_Gl_Window::resize (
    int x,
    int y,
    int w,
    int h ) [virtual]
```

Changes the size or position of the widget.

This is a virtual function so that the widget may implement its own handling of resizing. The default version does *not* call the `redraw()` method, but instead relies on the parent widget to do so because the parent may know a faster way to update the display, such as scrolling from the old position.

Some window managers under X11 call `resize()` a lot more often than needed. Please verify that the position or size of a widget did actually change before doing any extensive calculations.

`position(X, Y)` is a shortcut for `resize(X, Y, w(), h())`, and `size(W, H)` is a shortcut for `resize(x(), y(), W, H)`.

Parameters

in	<i>x,y</i>	new position relative to the parent window
in	<i>w,h</i>	new size

See also

[position\(int,int\)](#), [size\(int,int\)](#)

Reimplemented from [Fl_Widget](#).

12.49.3.25 `show()`

```
void Fl_Gl_Window::show ( ) [virtual]
```

Makes a widget visible.

An invisible widget never gets redrawn and does not get keyboard or mouse events, but can receive a few other events like `FL_SHOW`.

The `visible()` method returns true if the widget is set to be visible. The `visible_r()` method returns true if the widget and all of its parents are visible. A widget is only visible if `visible()` is true on it *and all of its parents*.

Changing it will send `FL_SHOW` or `FL_HIDE` events to the widget. *Do not change it if the parent is not visible, as this will send false `FL_SHOW` or `FL_HIDE` events to the widget.* `redraw()` is called if necessary on this or the parent.

See also

[hide\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented from [Fl_Widget](#).

12.49.3.26 `swap_buffers()`

```
void Fl_Gl_Window::swap_buffers ( )
```

The `swap_buffers()` method swaps the back and front buffers.

It is called automatically after the `draw()` method is called.

12.49.3.27 `swap_interval()` [1/2]

```
int Fl_Gl_Window::swap_interval ( ) const
```

Gets the rate at which the GL windows swaps buffers.

This method can be called after the OpenGL context was created, typically within the user overridden `Fl_Gl_Window::draw()` method that will be overridden by the user.

Note

This method depends highly on the underlying OpenGL contexts and driver implementation. Some drivers return no information, most drivers don't support intervals with multiple frames and return only 0 or 1.

Some drivers have the ability to set the swap interval but no way to query it, hence this method may return -1 even though the interval was set correctly. Conversely a return value greater zero does not guarantee that the driver actually honors the setting.

Returns

an integer greater zero if vertical blanking is taken into account when swapping OpenGL buffers

0 if the vertical blanking is ignored

-1 if the information can not be retrieved

12.49.3.28 swap_interval() [2/2]

```
void Fl_Gl_Window::swap_interval (
    int frames )
```

Sets the rate at which the GL windows swaps buffers.

This method can be called after the OpenGL context was created, typically within the user overridden `Fl_Gl_Window::draw()` method that will be overridden by the user.

Note

This method depends highly on the underlying OpenGL contexts and driver implementation. Most driver seem to accept only 0 and 1 to swap buffer asynchronously or in sync with the vertical blank.

Parameters

in	<i>frames</i>	set the number of vertical frame blanks between OpenGL buffer swaps
----	---------------	---

12.49.3.29 valid()

```
char Fl_Gl_Window::valid ( ) const [inline]
```

Is turned off when FLTK creates a new context for this window or when the window resizes, and is turned on *after* `draw()` is called.

You can use this inside your `draw()` method to avoid unnecessarily initializing the OpenGL context. Just do this:

```
void mywindow::draw() {
    if (!valid()) {
        glViewport(0,0,pixel_w(),pixel_h());
        glFrustum(...);
        ...other initialization...
    }
    if (!context_valid()) {
        ...load textures, etc. ...
    }
    ... draw your geometry here ...
}
```

You can turn `valid()` on by calling `valid(1)`. You should only do this after fixing the transformation inside a `draw()` or after `make_current()`. This is done automatically after `draw()` returns.

The documentation for this class was generated from the following files:

- Fl_Gl_Window.H
- Fl_Gl_Overlay.cxx
- Fl_Gl_Window.cxx

12.50 Fl_Glut_Bitmap_Font Struct Reference

fltk glut font/size attributes used in the glutXXX functions

```
#include <glut.H>
```

Public Attributes

- [Fl_Font](#) font
- [Fl_Fontsize](#) size

12.50.1 Detailed Description

fltk glut font/size attributes used in the glutXXX functions

The documentation for this struct was generated from the following file:

- glut.H

12.51 FI_Glut_StrokeChar Struct Reference

Public Attributes

- int **Number**
- GLfloat **Right**
- const [Fl_Glut_StrokeStrip](#) * **Strips**

The documentation for this struct was generated from the following file:

- glut.H

12.52 FI_Glut_StrokeFont Struct Reference

Public Attributes

- const [Fl_Glut_StrokeChar](#) ** **Characters**
- GLfloat **Height**
- char * **Name**
- int **Quantity**

The documentation for this struct was generated from the following file:

- glut.H

12.53 FI_Glut_StrokeStrip Struct Reference

Public Attributes

- int **Number**
- const [Fl_Glut_StrokeVertex](#) * **Vertices**

The documentation for this struct was generated from the following file:

- glut.H

12.54 FI_Glut_StrokeVertex Struct Reference

Public Attributes

- GLfloat **X**
- GLfloat **Y**

The documentation for this struct was generated from the following file:

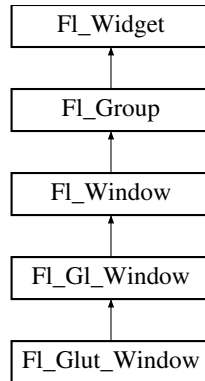
- glut.H

12.55 Fl_Glut_Window Class Reference

GLUT is emulated using this window class and these static variables (plus several more static variables hidden in glut_compatibility.cxx):

```
#include <glut.H>
```

Inheritance diagram for Fl_Glut_Window:



Public Member Functions

- **Fl_Glut_Window** (int w, int h, const char *t=0)
Creates a glut window, registers to the glut windows list.
- **Fl_Glut_Window** (int x, int y, int w, int h, const char *t=0)
Creates a glut window, registers to the glut windows list.
- void **make_current** ()
- ~**Fl_Glut_Window** ()
Destroys the glut window, first unregister it from the glut windows list.

Public Member Functions inherited from Fl_Gl_Window

- [Fl_Gl_Window](#) const * **as_gl_window** () const [FL_OVERRIDE](#)
- [Fl_Gl_Window](#) * **as_gl_window** () [FL_OVERRIDE](#)
Returns an [Fl_Gl_Window](#) pointer if this widget is an [Fl_Gl_Window](#).
- int **can_do** ()
Returns non-zero if the hardware supports the current OpenGL mode.
- int **can_do_overlay** ()
Returns true if the hardware overlay is possible.
- [GLContext](#) **context** () const
Returns a pointer to the window's OpenGL rendering context.
- void **context** ([GLContext](#), int destroy_flag=0)
Sets a pointer to the GLContext that this window is using.
- char **context_valid** () const
Will only be set if the OpenGL context is created or recreated.
- void **context_valid** (char v)
See char [Fl_Gl_Window::context_valid\(\)](#) const.
- [Fl_Gl_Window](#) (int W, int H, const char *l=0)
Creates a new [Fl_Gl_Window](#) widget using the given size, and label string.
- [Fl_Gl_Window](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Gl_Window](#) widget using the given position, size, and label string.
- void **flush** () [FL_OVERRIDE](#)
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- void **hide** () [FL_OVERRIDE](#)

- Hides the window and destroys the OpenGL context.*

 - void **hide_overlay** ()

Hides the window if it is not this window, does nothing in Windows.
- void **invalidate** ()

The `invalidate()` method turns off `valid()` and is equivalent to calling `value(0)`.
- void **make_current** ()

The `make_current()` method selects the OpenGL context for the widget.
- void **make_overlay_current** ()

Selects the OpenGL context for the widget's overlay.
- **FI_Mode mode** () const

Returns the current OpenGL capabilities of the window.
- int **mode** (const int *a)

Set the OpenGL capabilities of the window using platform-specific data.
- int **mode** (int a)

Set or change the OpenGL capabilities of the window.
- void **ortho** ()

Sets the projection so 0,0 is in the lower left of the window and each pixel is 1 unit wide/tall.
- int **pixel_h** ()

Gives the window height in OpenGL pixels.
- int **pixel_w** ()

Gives the window width in OpenGL pixels.
- float **pixels_per_unit** ()

The number of pixels per FLTK unit of length for the window.
- void **redraw_overlay** ()

Causes `draw_overlay()` to be called at a later time.
- void **resize** (int, int, int, int) **FL_OVERRIDE**

Changes the size or position of the widget.
- void **show** () **FL_OVERRIDE**

Makes a widget visible.
- void **show** (int a, char **b)

*Same as `FI_Window::show(int a, char **b)`*
- void **swap_buffers** ()

The `swap_buffers()` method swaps the back and front buffers.
- int **swap_interval** () const

Gets the rate at which the GL windows swaps buffers.
- void **swap_interval** (int)

Sets the rate at which the GL windows swaps buffers.
- char **valid** () const

Is turned off when FLTK creates a new context for this window or when the window resizes, and is turned on after `draw()` is called.
- void **valid** (char v)

See char `FI_GL_Window::valid()` const.
- **~FI_GL_Window** ()

The destructor removes the widget and destroys the OpenGL context associated with it.

Public Member Functions inherited from FI_Window

- virtual class [FI_Double_Window](#) * [as_double_window](#) ()
Return non-null if this is an [FI_Double_Window](#) object.
- virtual class [FI_Overlay_Window](#) * [as_overlay_window](#) ()
Return non-null if this is an [FI_Overlay_Window](#) object.
- [FI_Window](#) const * [as_window](#) () const [FL_OVERRIDE](#)
- [FI_Window](#) * [as_window](#) () [FL_OVERRIDE](#)
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- unsigned int **border** () const
Returns whether the window possesses a border.
- void [border](#) (int b)
Sets whether or not the window manager border is around the window.
- void [clear_border](#) ()
Fast inline function to turn the window manager border off.
- void [clear_modal_states](#) ()
Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.
- void **copy_label** (const char *a)
Sets the window titlebar label to a copy of a character string.
- void [cursor](#) (const [FI_RGB_Image](#) *, int, int)
Changes the cursor for this window using the provided image as cursor's shape.
- void [cursor](#) ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void [cursor](#) ([FI_Cursor](#))
Changes the cursor for this window.
- int [decorated_h](#) () const
Returns the window height including any window title bar and any frame added by the window manager.
- int [decorated_w](#) () const
Returns the window width including any frame added by the window manager.
- void [default_cursor](#) ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void [default_cursor](#) ([FI_Cursor](#))
Sets the default window cursor.
- void **draw_backdrop** ()
Draw the background image if one is set and is aligned inside.
- [FI_Window](#) (int w, int h, const char *title=0)
Creates a window from the given width w, height h, and title.
- [FI_Window](#) (int x, int y, int w, int h, const char *title=0)
Creates a window from the given position (x, y), size (w, h) and title.
- void [free_position](#) ()
Undoes the effect of a previous [resize\(\)](#) or [show\(\)](#) so that the next time [show\(\)](#) is called the window manager is free to position the window.
- void [fullscreen](#) ()
Makes the window completely fill one or more screens, without any window manager border visible.
- unsigned int **fullscreen_active** () const
Returns non zero if [FULLSCREEN](#) flag is set, 0 otherwise.
- void **fullscreen_off** ()
Turns off any side effects of [fullscreen\(\)](#)
- void **fullscreen_off** (int X, int Y, int W, int H)
Turns off any side effects of [fullscreen\(\)](#) and does [resize\(x,y,w,h\)](#).
- void [fullscreen_screens](#) (int top, int bottom, int left, int right)

- Sets which screens should be used when this window is in fullscreen mode.*

 - int **handle** (int) **FL_OVERRIDE**

Handles the specified event.
- void **hide** () **FL_OVERRIDE**

Removes the window from the screen.
- void **hotspot** (const **FL_Widget** &p, int offscreen=0)

See void [FL_Widget::hotspot](#)(int x, int y, int offscreen = 0)
- void **hotspot** (const **FL_Widget** *, int offscreen=0)

See void [FL_Widget::hotspot](#)(int x, int y, int offscreen = 0)
- void **hotspot** (int x, int y, int offscreen=0)

Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.
- const void * **icon** () const

Gets the current icon window target dependent data.
- void **icon** (const **FL_RGB_Image** *)

Sets or resets a single window icon.
- void **icon** (const void *ic)

Platform-specific method to set the window icon usable on Windows and X11 only.
- void **iconize** ()

Iconifies the window.
- const char * **iconlabel** () const

See void [FL_Widget::iconlabel](#)(const char)*
- void **iconlabel** (const char *)

Sets the icon label.
- void **icons** (const **FL_RGB_Image** *[], int)

Sets the window icons.
- void **icons** (HICON big_icon, HICON small_icon)

Sets the window icons using HICON handles (Windows platform only).
- const char * **label** () const

See void [FL_Widget::label](#)(const char)*
- void **label** (const char *)

Sets the window title bar label.
- void **label** (const char *label, const char *iconlabel)

Sets the icon label.
- void **make_current** ()

Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.
- void **maximize** ()

Maximizes a top-level window to its current screen.
- unsigned int **maximize_active** () const

Returns whether the window is currently maximized.
- unsigned int **menu_window** () const

Returns true if this window is a menu window.
- unsigned int **modal** () const

Returns true if this window is modal.
- unsigned int **non_modal** () const

Returns true if this window is modal or non-modal.
- **fl_uintptr_t** **os_id** ()

Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int **override** () const

- Returns non zero if `OVERRIDE` flag is set, 0 otherwise.*
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`

Changes the size and position of the window.
- int `screen_num` ()

The number of the screen containing the mapped window.
- void `screen_num` (int screen_num)

Set the number of the screen where to map the window.
- void `set_menu_window` ()

Marks the window as a menu window.
- void `set_modal` ()

A "modal" window, when `shown()`, will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void `set_non_modal` ()

A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a `modal()` one in that it remains on top, but it has no effect on event delivery.
- void `set_override` ()

Activates the flags `NOBORDER|OVERRIDE`.
- void `set_tooltip_window` ()

Marks the window as a tooltip window.
- const `Fl_Image * shape` ()

Returns the image controlling the window shape or `NULL`.
- void `shape` (const `Fl_Image &b`)

Set the window's shape with an `Fl_Image`.
- void `shape` (const `Fl_Image *img`)

Assigns a non-rectangular shape to the window.
- void `show` () `FL_OVERRIDE`

Puts the window on the screen.
- void `show` (int argc, char **argv)

Puts the window on the screen with `show()` and parses command-line arguments.
- int `shown` ()

Returns non-zero if `show()` has been called (but not `hide()`).
- void `size_range` (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)

Sets the allowable range the user can resize this window to.
- unsigned int `tooltip_window` () const

Returns true if this window is a tooltip window.
- void `un_maximize` ()

Returns a previously maximized top-level window to its previous size.
- void `wait_for_expose` ()

Waits for the window to be displayed after calling `show()`.
- int `x_root` () const

Gets the x position of the window on the screen.
- const char * `xclass` () const

Returns the xclass for this window, or a default.
- void `xclass` (const char *c)

Sets the xclass for this window.
- int `y_root` () const

Gets the y position of the window on the screen.
- virtual `~Fl_Window` ()

The destructor also deletes all the children.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) * & [_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
Removes the widget at `index` from the group and deletes it.
- void [end](#) ()
Exactly the same as `current(this->parent())`.
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\) const](#).*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does `insert(w, find(before))`.
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)
Removes the widget `o` from the group.
- void [remove](#) (int index)

- Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget * resizable () const`
Returns the group's resizable widget.
 - `void resizable (FI_Widget &o)`
Sets the group's resizable widget.
 - `void resizable (FI_Widget *o)`
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FI_Group ()`
The destructor also deletes all the children.

Public Member Functions inherited from `FI_Widget`

- `void _clear_fullscreen ()`
- `void _set_fullscreen ()`
- `void activate ()`
Activates the widget.
- `unsigned int active () const`
Returns whether the widget is active.
- `int active_r () const`
Returns whether the widget and all of its parents are active.
- `FI_Align align () const`
Gets the label alignment.
- `void align (FI_Align alignment)`
Sets the label alignment.
- `long argument () const`
Gets the current user data (long) argument that is passed to the callback function.
- `void argument (long v)`
Sets the current user data (long) argument that is passed to the callback function.
- `void bind_deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void bind_deimage (int f)`
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- `void bind_image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `void bind_image (int f)`
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`
Gets the box type of the widget.
- `void box (FI_Boxtype new_box)`
Sets the box type for the widget.
- `FI_Callback_p callback () const`
Gets the current callback function for the widget.
- `void callback (FI_Callback *cb)`
Sets the current callback function for the widget.
- `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`
Sets the current callback function and managed user data for the widget.
- `void callback (FI_Callback *cb, void *p)`
Sets the current callback function and data for the widget.
- `void callback (FI_Callback0 *cb)`
Sets the current callback function for the widget.
- `void callback (FI_Callback1 *cb, long p=0)`

- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
 - void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
 - void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
 - void `clear_damage` (uchar c=0)
 - Clears or sets the damage flags.*
 - void `clear_output` ()
 - Sets a widget to accept input.*
 - void `clear_visible` ()
 - Hides the widget.*
 - void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
 - `FI_Color` `color` () const
 - Gets the background color of the widget.*
 - void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
 - void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
 - `FI_Color` `color2` () const
 - For back compatibility only.*
 - void `color2` (unsigned a)
 - For back compatibility only.*
 - int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
 - void `copy_label` (const char *new_label)
 - Sets the current label.*
 - void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
 - void `damage` (uchar c)
 - Sets the damage bits for the widget.*
 - void `damage` (uchar c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
 - int `damage_resize` (int, int, int, int)
 - Internal use only.*
 - void `deactivate` ()
 - Deactivates the widget.*
 - `FI_Image` * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - const `FI_Image` * `deimage` () const
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - void `deimage` (`FI_Image` &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - void `deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*

- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- `FI_Image` * `image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image` * `image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image` &img)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image` *img)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget` *wgt) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype` a, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color` `labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font` `labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)

- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
 - Returns if a widget is used for output only.*
 - `FI_Group * parent` () const
 - Returns a pointer to the parent widget.*
 - void `parent` (`FI_Group *p`)
 - Internal use only - "for hacks only".*
 - void `position` (int X, int Y)
 - Repositions the window or widget.*
 - void `redraw` ()
 - Schedules the drawing of the widget.*
 - void `redraw_label` ()
 - Schedules the drawing of the label.*
 - `FI_Color selection_color` () const
 - Gets the selection color.*
 - void `selection_color` (`FI_Color a`)
 - Sets the selection color.*
 - void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
 - void `set_changed` ()
 - Marks the value of the widget as changed.*
 - void `set_output` ()
 - Sets a widget to output only.*
 - void `set_visible` ()
 - Makes the widget visible.*
 - void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
 - int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
 - void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
 - void `size` (int W, int H)
 - Changes the size of the widget.*
 - int `take_focus` ()
 - Gives the widget the keyboard focus.*
 - unsigned int `takeevents` () const
 - Returns if the widget is able to take events.*
 - int `test_shortcut` ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
 - const char * `tooltip` () const
 - Gets the current tooltip text.*
 - void `tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `FI_Window * top_window` () const
 - Returns a pointer to the top-level window for the widget.*
 - `FI_Window * top_window_offset` (int &xoff, int &yoff) const
 - Finds the x/y offset of the current widget relative to the top-level window.*
 - `uchar type` () const
 - Gets the widget type.*
 - void `type` (`uchar t`)
 - Sets the widget type.*

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (Fl_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- Fl_When **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- Fl_Window * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual ~Fl_Widget ()
Destroys the widget.

Public Attributes

- void(* **display**)()
- void(* **entry**)(int)
- void(* **keyboard**)(uchar, int x, int y)
- int **menu** [3]
- void(* **motion**)(int x, int y)
- void(* **mouse**)(int b, int state, int x, int y)
- int **number**
- void(* **overlaydisplay**)()
- void(* **passivemotion**)(int x, int y)
- void(* **reshape**)(int w, int h)
- void(* **special**)(int, int x, int y)
- void(* **visibility**)(int)

Protected Member Functions

- void **draw** () **FL_OVERRIDE**
Draws the Fl_Gl_Window.
- void **draw_overlay** () **FL_OVERRIDE**
You must implement this virtual function if you want to draw into the overlay.
- int **handle** (int) **FL_OVERRIDE**
Handle some FLTK events as needed.

Protected Member Functions inherited from [FI_Gl_Window](#)

- void [draw_begin](#) ()
Supports drawing to an [FI_Gl_Window](#) with the FLTK 2D drawing API.
- void [draw_end](#) ()
To be used as a match for a previous call to [FI_Gl_Window::draw_begin\(\)](#).

Protected Member Functions inherited from [FI_Window](#)

- void [default_size_range](#) ()
Protected method to calculate the default size range of a window.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- int [force_position](#) () const
Returns the internal state of the window's [FORCE_POSITION](#) flag.
- void [force_position](#) (int force)
Sets an internal flag that tells FLTK and the window manager to honor position requests.
- void [free_icons](#) ()
Deletes all icons previously attached to the window.
- int [is_resizable](#) ()
Protected method to determine whether a window is resizable.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * [bounds](#) ()
Returns the internal array of widget sizes and positions.
- void [draw_child](#) ([FI_Widget](#) &widget) const
Forces a child to redraw.
- void [draw_children](#) ()
Draws all children of the group.
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int [on_insert](#) ([FI_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int [on_move](#) (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void [on_remove](#) (int)
Allow derived groups to act when a child widget is removed from the group.
- int * [sizes](#) ()
Returns the internal array of widget sizes and positions.
- void [update_child](#) ([FI_Widget](#) &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const

- Draws a box of type t, of color c at the widget's position and size.*

 - void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const

Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int **flags** () const

Gets the widget flags mask.
- void **h** (int v)

Internal use only.
- void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.
- void **x** (int v)

Internal use only.
- void **y** (int v)

Internal use only.

Additional Inherited Members

Public Types inherited from FI_Window

- typedef struct HICON__ * **HICON**

Static Public Member Functions inherited from FI_GI_Window

- static int **can_do** (const int *m)
- Returns non-zero if the hardware supports the given OpenGL mode.*
- static int **can_do** (int m)
- Returns non-zero if the hardware supports the given OpenGL mode.*

Static Public Member Functions inherited from FI_Window

- static FI_Window * **current** ()
- Returns the last window that was made current.*
- static void **default_callback** (FI_Window *, void *v)
- Back compatibility: Sets the default callback v for win to call on close event.*
- static void **default_icon** (const FI_RGB_Image *)
- Sets a single default window icon.*
- static void **default_icons** (const FI_RGB_Image *[], int)
- Sets the default window icons.*
- static void **default_icons** (HICON big_icon, HICON small_icon)
- Sets the default window icons (Windows platform only).*

- static const char * [default_xclass](#) ()
Returns the default xclass.
- static void [default_xclass](#) (const char *)
Sets the default window xclass.
- static bool [is_a_rescale](#) ()
Returns true when a window is being rescaled.
- static char [show_next_window_iconic](#) ()
Returns the static flag whether the next window should be opened iconified.
- static void [show_next_window_iconic](#) (char stat)
Sets a static flag whether the next window should be opened iconified.

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Static Protected Attributes inherited from [FI_Window](#)

- static [FI_Window](#) * [current_](#)
Stores the last window that was made current.

12.55.1 Detailed Description

GLUT is emulated using this window class and these static variables (plus several more static variables hidden in `glut_compatibility.cxx`):

12.55.2 Member Function Documentation

12.55.2.1 draw()

```
void Fl_Glut_Window::draw (
    void ) [protected], [virtual]
```

Draws the [Fl_Gl_Window](#).

You **must subclass** [Fl_Gl_Window](#) and provide an implementation for [draw\(\)](#). You may also provide an implementation of [draw_overlay\(\)](#) if you want to draw into the overlay planes. You can avoid reinitializing the viewport and lights and other things by checking [valid\(\)](#) at the start of [draw\(\)](#) and only doing the initialization if it is false.

The [draw\(\)](#) method can *only* use OpenGL calls. Do not attempt to call X, any of the functions in [<FL/fl_draw.H>](#), or glX directly. Do not call [gl_start\(\)](#) or [gl_finish\(\)](#).

If double-buffering is enabled in the window, the back and front buffers are swapped after this function is completed.

The following pseudo-code shows how to use "if (!valid())" to initialize the viewport:

```
void mywindow::draw() {
    if (!valid()) {
        glViewport(0,0,pixel_w(),pixel_h());
        glFrustum(...) or glOrtho(...)
        ...other initialization...
    }
    if (!context_valid()) {
        ...load textures, etc. ...
    }
    // clear screen
    glClearColor(...);
    glClear(...);
    ... draw your geometry here ...
}
```

Actual example code to clear screen to black and draw a 2D white "X":

```
void mywindow::draw() {
    if (!valid()) {
        glLoadIdentity();
        glViewport(0,0,pixel_w(),pixel_h());
        glOrtho(-w(),w(),-h(),h(),-1,1);
    }
    // Clear screen
    glClear(GL_COLOR_BUFFER_BIT);
    // Draw white 'X'
    glColor3f(1.0, 1.0, 1.0);
    glBegin(GL_LINE_STRIP); glVertex2f(w(), h()); glVertex2f(-w(),-h()); glEnd();
    glBegin(GL_LINE_STRIP); glVertex2f(w(),-h()); glVertex2f(-w(), h()); glEnd();
}
}
```

Regular FLTK widgets can be added as children to the [Fl_Gl_Window](#). To correctly overlay the widgets, [Fl_Gl_Window::draw\(\)](#) must be called after rendering the main scene.

```
void mywindow::draw() {
    // draw 3d graphics scene
    Fl_Gl_Window::draw();
    // -- or --
    draw_begin();
    Fl_Window::draw();
    // other 2d drawing calls, overlays, etc.
    draw_end();
}
```

Reimplemented from [Fl_Gl_Window](#).

12.55.2.2 draw_overlay()

```
void Fl_Glut_Window::draw_overlay ( ) [protected], [virtual]
```

You must implement this virtual function if you want to draw into the overlay.

The overlay is cleared before this is called. You should draw anything that is not clear using OpenGL. You must use [gl_color\(i\)](#) to choose colors (it allocates them from the colormap using system-specific calls), and remember that you are in an indexed OpenGL mode and drawing anything other than flat-shaded will probably not work.

Both this function and [Fl_Gl_Window::draw\(\)](#) should check [Fl_Gl_Window::valid\(\)](#) and set the same transformation. If you don't your code may not work on other systems. Depending on the OS, and on whether overlays are real or simulated, the OpenGL context may be the same or different between the overlay and main window.

Reimplemented from [Fl_Gl_Window](#).

12.55.2.3 handle()

```
int Fl_Glut_Window::handle (
    int event ) [protected], [virtual]
```

Handle some FLTK events as needed.

Reimplemented from [Fl_Gl_Window](#).

The documentation for this class was generated from the following files:

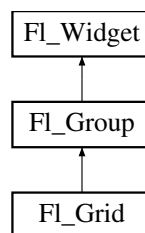
- [glut.H](#)
- [glut_compatibility.cxx](#)

12.56 Fl_Grid Class Reference

[Fl_Grid](#) is a container (layout) widget with multiple columns and rows.

```
#include <Fl_Grid.H>
```

Inheritance diagram for [Fl_Grid](#):



Classes

- class [Cell](#)

Public Member Functions

- [Fl_Grid::Cell * cell](#) ([Fl_Widget *widget](#)) const
Get the grid cell of widget `widget`.
- [Fl_Grid::Cell * cell](#) (int row, int col) const
Get the grid cell of row `row` and column `col`.
- virtual void [clear_layout](#) ()
Reset the layout w/o removing widgets.
- void [col_gap](#) (const int *value, [size_t size](#))
Set more than one column gaps at once.
- int [col_gap](#) (int col) const
- void [col_gap](#) (int col, int value)
Set the gap of column `col`.
- void [col_weight](#) (const int *value, [size_t size](#))
Set the weight of more than one column.
- int [col_weight](#) (int col) const
- void [col_weight](#) (int col, int value)
Set the weight of a column.
- void [col_width](#) (const int *value, [size_t size](#))
Set minimal widths of more than one column.
- int [col_width](#) (int col) const
- void [col_width](#) (int col, int value)
Set the minimal width of a column.
- short [cols](#) () const
- int [computed_col_width](#) (int col) const
- int [computed_row_height](#) (int row) const
- void [debug](#) (int level=127)
Output layout information of this [Fl_Grid](#) to stderr.

- `FI_Grid` (int X, int Y, int W, int H, const char *L=0)
Create a new `FI_Grid` widget.
- void `gap` (int *row_gap, int *col_gap) const
Get the default gaps for rows and columns.
- virtual void `gap` (int row_gap, int col_gap=-1)
Set default gaps for rows and columns.
- virtual void `layout` ()
Calculate the grid layout and resize and position all widgets.
- virtual void `layout` (int rows, int cols, int margin=-1, int gap=-1)
Set the basic layout parameters of the `FI_Grid` widget.
- int `margin` (int *left, int *top, int *right, int *bottom) const
Returns all outside margin sizes of the grid.
- virtual void `margin` (int left, int top=-1, int right=-1, int bottom=-1)
Set all margins (left, top, right, bottom).
- bool `need_layout` () const
Return whether layout calculation is required.
- void `need_layout` (int set)
Request or reset the request to calculate the layout of children.
- virtual void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`
Recalculate the layout and position and resize all widgets.
- void `row_gap` (const int *value, size_t size)
Set more than one row gaps at once.
- int `row_gap` (int row) const
- void `row_gap` (int row, int value)
Set the gap of row `row`.
- void `row_height` (const int *value, size_t size)
Set the minimal row height of more than one row.
- int `row_height` (int row) const
- void `row_height` (int row, int value)
Set the minimal row height of row `row`.
- void `row_weight` (const int *value, size_t size)
Set the weight of more than one row.
- int `row_weight` (int row) const
- void `row_weight` (int row, int value)
Set the row weight of row `row`.
- short `rows` () const
- void `show_grid` (int set)
Enable or disable drawing of the grid helper lines for visualization.
- void `show_grid` (int set, `FI_Color` col)
Enable or disable drawing of the grid helper lines for visualization.
- `FI_Grid::Cell` * `widget` (`FI_Widget` *wi, int row, int col, `FI_Grid_Align` align=`FL_GRID_FILL`)
Assign a widget to a grid cell and set its alignment.
- `FI_Grid::Cell` * `widget` (`FI_Widget` *wi, int row, int col, int rowspan, int colspan, `FI_Grid_Align` align=`FL_GRID_FILL`)
Assign a widget to a grid cell and set cell spanning and alignment.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *[_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
Removes the widget at `index` from the group and deletes it.
- void [end](#) ()
Exactly the same as `current(this->parent())`.
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\) const](#).*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does `insert(w, find(before))`.
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)

- Removes the widget `o` from the group.*
- void `remove` (int index)
 - Removes the widget at `index` from the group but does not delete it.*
- `FL_Widget * resizable` () const
 - Returns the group's resizable widget.*
- void `resizable` (`FL_Widget &o`)
 - Sets the group's resizable widget.*
- void `resizable` (`FL_Widget *o`)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- void `resize` (int, int, int) `FL_OVERRIDE`
 - Resizes the `FL_Group` widget and all of its children.*
- virtual `~FL_Group` ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from `FL_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FL_Align align` () const
 - Gets the label alignment.*
- void `align` (`FL_Align alignment`)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FL_Gl_Window * as_gl_window` ()
 - Returns an `FL_Gl_Window` pointer if this widget is an `FL_Gl_Window`.*
- virtual class `FL_Gl_Window` const * `as_gl_window` () const
- virtual `FL_Window * as_window` ()
 - Returns an `FL_Window` pointer if this widget is an `FL_Window`.*
- virtual `FL_Window` const * `as_window` () const
- void `bind_deimage` (`FL_Image *img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FL_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FL_Boxtype box` () const
 - Gets the box type of the widget.*
- void `box` (`FL_Boxtype new_box`)
 - Sets the box type for the widget.*
- `FL_Callback_p callback` () const

- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback` *cb, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1` *cb, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar` c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h () const`
Gets the widget height.
- `virtual void hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`

- Gets the font size in pixels.*

 - void [labelsize](#) ([FI_Fontsize](#) pix)
- Sets the font size in pixels.*

 - [FI_Labeltype](#) [labeltype](#) () const
- Gets the label type.*

 - void [labeltype](#) ([FI_Labeltype](#) a)
- Sets the label type.*

 - void [measure_label](#) (int &ww, int &hh) const
- Sets width ww and height hh accordingly with the label size.*

 - bool [needs_keyboard](#) () const
- Returns whether this widget needs a keyboard.*

 - void [needs_keyboard](#) (bool needs)
- Sets whether this widget needs a keyboard.*

 - unsigned int [output](#) () const
- Returns if a widget is used for output only.*

 - [FI_Group](#) * [parent](#) () const
- Returns a pointer to the parent widget.*

 - void [parent](#) ([FI_Group](#) *p)
- Internal use only - "for hacks only".*

 - void [position](#) (int X, int Y)
- Repositions the window or widget.*

 - void [redraw](#) ()
- Schedules the drawing of the widget.*

 - void [redraw_label](#) ()
- Schedules the drawing of the label.*

 - [FI_Color](#) [selection_color](#) () const
- Gets the selection color.*

 - void [selection_color](#) ([FI_Color](#) a)
- Sets the selection color.*

 - void [set_active](#) ()
- Marks the widget as active without sending events or changing focus.*

 - void [set_changed](#) ()
- Marks the value of the widget as changed.*

 - void [set_output](#) ()
- Sets a widget to output only.*

 - void [set_visible](#) ()
- Makes the widget visible.*

 - void [set_visible_focus](#) ()
- Enables keyboard focus navigation with this widget.*

 - int [shortcut_label](#) () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void [shortcut_label](#) (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void [show](#) ()
- Makes a widget visible.*

 - void [size](#) (int W, int H)
- Changes the size of the widget.*

 - int [take_focus](#) ()
- Gives the widget the keyboard focus.*

 - unsigned int [takeevents](#) () const
- Returns if the widget is able to take events.*

- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- uchar `type` () const
Gets the widget type.
- void `type` (uchar t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- `Cell * add_cell` (int row, int col)
- virtual void `draw` () `FL_OVERRIDE`
Draws the `FL_Grid` widget and all children.
- virtual void `draw_grid` ()
Draws the grid helper lines for design and debugging purposes.
- void `init` ()
- void `on_remove` (int) `FL_OVERRIDE`
`FL_Group` calls this method when a child widget is about to be removed.
- void `remove_cell` (int row, int col)

Protected Member Functions inherited from `FL_Group`

- `FL_Rect * bounds` ()
Returns the internal array of widget sizes and positions.
- void `draw` () `FL_OVERRIDE`
Draws the widget.
- void `draw_child` (`FL_Widget` &widget) const
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (const `FL_Widget` &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int `on_insert` (`FL_Widget` *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int `on_move` (int, int)
Allow derived groups to act when a widget is moved within the group.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`FL_Widget` &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from `FL_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FL_Boxtype` t, `FL_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FL_Boxtype` t, int x, int y, int w, int h, `FL_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FL_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FL_Boxtype` t, int x, int y, int w, int h, `FL_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const

- Draws the widget's label at the defined label position.*
- void `draw_label` (int, int, int, int) const
 - Draws the label in an arbitrary bounding box.*
- `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)
 - Creates a widget at the given position and size.*
- unsigned int `flags` () const
 - Gets the widget flags mask.*
- void `h` (int `v`)
 - Internal use only.*
- void `set_flag` (unsigned int `c`)
 - Sets a flag in the flags mask.*
- void `w` (int `v`)
 - Internal use only.*
- void `x` (int `v`)
 - Internal use only.*
- void `y` (int `v`)
 - Internal use only.*

Protected Attributes

- bool `draw_grid_`
- `FI_Color` `grid_color`

Friends

- class `FI_Grid_Type`

Additional Inherited Members

Static Public Member Functions inherited from `FI_Group`

- static `FI_Group` * `current` ()
 - Returns the currently active group.*
- static void `current` (`FI_Group` *`g`)
 - Sets the current group.*

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *`widget`, void *`data`)
 - The default callback for all widgets that don't set a callback.*
- static unsigned int `label_shortcut` (const char *`t`)
 - Returns the Unicode value of the '&x' shortcut in a given text.*
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
 - Returns true if the given text `t` contains the entered '&x' shortcut.*

Protected Types inherited from `FI_Widget`

- enum {
 - `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
 - `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 - ,
 - `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 - ,
 - `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 - ,

```

GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
USERFLAG1 = 1<<31 }

```

flags possible values enumeration.

12.56.1 Detailed Description

`Fl_Grid` is a container (layout) widget with multiple columns and rows.

This container widget features very flexible layouts in columns and rows w/o the need to position each child widget in x/y coordinates.

Widgets are assigned to grid cells (column, row) with their minimal sizes in `w()` and `h()`. The `x()` and `y()` positions are ignored and can be (0, 0). `Fl_Grid` calculates widget positions and resizes the widgets to fit into the grid. It is possible to create a single row or column of widgets with `Fl_Grid`.

You should design your grid with the smallest possible sizes of all widgets in mind. `Fl_Grid` will automatically assign additional space to cells according to some rules (described later) when resizing the `Fl_Grid` widget.

Hint: You should set a minimum window size to make sure the `Fl_Grid` is never resized below its minimal sizes. Resizing below the given widget sizes results in undefined behavior.

`Fl_Grid` and other container widgets (e.g. `Fl_Group`) can be nested. One main advantage of this usage is that widget coordinates in embedded `Fl_Group` widgets become relative to the group and will be positioned as expected.

Todo This (relative group coordinates of nested groups of `Fl_Grid`) needs explanation and maybe an example.

`Fl_Grid` child widgets are handled by its base class `Fl_Group` but `Fl_Grid` stores additional data corresponding to each widget in internal grid cells.

`Fl_Grid` children are allowed to span multiple columns and rows like HTML `<table>` cells. Individual children can have fixed sizes or be aligned inside their cells (left, right, top, bottom, and more) and/or follow their cell sizes when the `Fl_Grid` container is resized.

Note to resizing: since `Fl_Grid` uses its own layout algorithm the normal `Fl_Group::resizable()` widget is ignored (if set). Calling `init_sizes()` is not necessary.

Note

`Fl_Grid` is, as of FLTK 1.4.0, still in experimental state and should be used with caution. The API can still be changed although it is assumed to be almost stable - as stable as possible for a first release.

Example: Simple 3x3 `Fl_Grid` with five buttons:

```

#include <FL/Fl.H>
#include <FL/Fl_Double_Window.H>
#include <FL/Fl_Grid.H>
#include <FL/Fl_Button.H>

int main(int argc, char **argv) {
    Fl_Double_Window *win = new Fl_Double_Window(320, 180, "3x3 Fl_Grid with Buttons");
    // create the Fl_Grid container with five buttons
    Fl_Grid *grid = new Fl_Grid(0, 0, win->w(), win->h());
    grid->layout(3, 3, 10, 10);
    grid->color(FL_WHITE);
    Fl_Button *b0 = new Fl_Button(0, 0, 0, 0, "New");
    Fl_Button *b1 = new Fl_Button(0, 0, 0, 0, "Options");
    Fl_Button *b3 = new Fl_Button(0, 0, 0, 0, "About");
    Fl_Button *b4 = new Fl_Button(0, 0, 0, 0, "Help");
    Fl_Button *b6 = new Fl_Button(0, 0, 0, 0, "Quit");
    // assign buttons to grid positions
    grid->widget(b0, 0, 0);
    grid->widget(b1, 0, 2);
    grid->widget(b3, 1, 1);
    grid->widget(b4, 2, 0);
    grid->widget(b6, 2, 2);
    grid->show_grid(0); // 1 to display grid helper lines
    grid->end();
    win->end();
    win->resizable(grid);
    win->size_range(300, 100);
    win->show(argc, argv);
    return Fl::run();
}

```



Figure 12.19 Simple 3x3 Fl_Grid

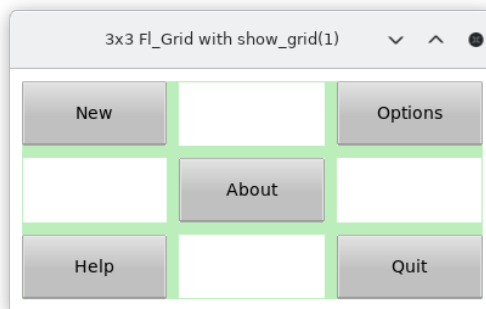


Figure 12.20 show_grid() set to 1

12.56.2 Constructor & Destructor Documentation

12.56.2.1 Fl_Grid()

```
Fl_Grid::Fl_Grid (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create a new [Fl_Grid](#) widget.

Todo More documentation of [Fl_Grid](#) constructor?

12.56.3 Member Function Documentation

12.56.3.1 cell() [1/2]

```
Fl_Grid::Cell * Fl_Grid::cell (
    Fl_Widget * widget ) const
```

Get the grid cell of widget *widget*.

The pointer to the cell can be used for further assignment of properties like alignment etc.

Hint: If you know the row and column index of the cell you should use `Fl_Grid::cell(int row, int col)` instead because it is **much** faster.

Please see `Fl_Grid::cell(int row, int col)` for details and the validity of cell pointers.

Parameters

in	<i>widget</i>	widget whose cell is requested
----	---------------	--------------------------------

Return values

<code>NULL</code>	if widget is not assigned to a cell
-------------------	-------------------------------------

12.56.3.2 cell() [2/2]

```
Fl_Grid::Cell * Fl_Grid::cell (
    int row,
    int col ) const
```

Get the grid cell of row `row` and column `col`.

Widgets and other attributes are organized in cells ([Fl_Grid::Cell](#)).

This cell is an opaque structure (class) with some public methods. **Don't** assume anything about grid cell sizes and ordering in memory. These are implementation details that can be changed without notice.

The validity of an [Fl_Grid::Cell](#) pointer is limited. It will definitely be invalidated when the overall grid layout is changed, for instance by calling `layout(int, int)`.

Adding new cells beyond the current layout limits will also invalidate cell pointers but this is not (yet) implemented. Attempts to assign widgets to out-of-bounds cells are currently ignored.

The only well-defined usage of cell pointers is to set one or more properties like widget alignment of a cell after retrieving the cell pointer. Don't store cell pointers in your program for later reference.

Parameters

in	<i>row</i>	row index
in	<i>col</i>	column index

Returns

pointer to cell

Return values

<code>NULL</code>	if <code>row</code> or <code>col</code> is out of bounds or no widget was assigned
-------------------	--

12.56.3.3 clear_layout()

```
void Fl_Grid::clear_layout ( ) [virtual]
```

Reset the layout w/o removing widgets.

Removes all cells and sets rows and cols to zero. Existing widgets are kept as children of the [Fl_Group](#) (base class) but are hidden.

This method should be rarely used. You may want to call [Fl_Grid::clear\(\)](#) to remove all widgets and reset the layout to zero rows and columns.

You must call `layout(int rows, int cols, ...)` to set a new layout, allocate new cells, and assign widgets to new cells.

Todo [Fl_Grid::clear\(\)](#) needs to be implemented as documented above!

12.56.3.4 col_gap() [1/2]

```
void Fl_Grid::col_gap (
    const int * value,
    size_t size )
```

Set more than one column gaps at once.

See also

[Fl_Grid::col_weight\(const int *value, size_t size\)](#) for handling of the value array and `size`.

12.56.3.5 col_gap() [2/2]

```
void Fl_Grid::col_gap (
    int col,
    int value )
```

Set the gap of column `col`.

Note that the gap is right of each column except the last one which is ignored. Use [margin\(\)](#) for the right most column.

Parameters

in	<i>col</i>	column
in	<i>value</i>	gap size after the column

12.56.3.6 col_weight() [1/2]

```
void Fl_Grid::col_weight (
    const int * value,
    size_t size )
```

Set the weight of more than one column.

The values are taken from the array `value` and assigned sequentially to columns, starting from column 0. If the array `size` is too large extraneous values are ignored.

Negative values in the array are not assigned to their columns, i.e. the existing value for the corresponding column is not changed.

Example:

```
int val[] = { 0, 0, 50, -1, -1, 50, 0 };
grid->col_weight(val, sizeof(val)/sizeof(val[0]));
```

Parameters

in	<i>value</i>	an array of column weights
in	<i>size</i>	the size of the array (number of values)

12.56.3.7 col_weight() [2/2]

```
void Fl_Grid::col_weight (
    int col,
    int value )
```

Set the weight of a column.

Column and row weights are used to distribute additional space when the grid is resized beyond its defined (minimal) size. All weight values are relative and can be chosen freely. Suggested weights are in the range {0 .. 100}, 0 (zero) disables resizing of the column.

How does it work?

Whenever additional space (say: `SPACE` in pixels) is to be distributed to a set of columns the weights of all columns are added to a value `SUM`, then every single column width is increased by the value (in pseudo code):

```
col.width += SPACE * col.weight / SUM
```

Resulting pixel values are rounded to the next integer and rounding differences are added to or subtracted from the column with the highest weight. If more columns have the same weight one of them is chosen.

Note

If none of the columns considered for resizing have weights > 0 then [Fl_Grid](#) assigns the remaining space to an arbitrary column or to all considered columns evenly. This is implementation defined and can be changed without notice. You can avoid this situation by designing your grid with sensible sizes and weights.

Parameters

in	<i>col</i>	column number (counting from 0)
in	<i>value</i>	weight, must be ≥ 0

12.56.3.8 col_width() [1/2]

```
void Fl_Grid::col_width (
    const int * value,
    size_t size )
```

Set minimal widths of more than one column.

The values are taken from the array `value` and assigned sequentially to columns, starting from column 0. If the array `size` is too large extraneous values are ignored.

Negative values in the array are not assigned to their columns, i.e. the existing value for the corresponding column is not changed.

Example:

```
int widths[] = { 0, 0, 50, -1, -1, 50, 0 };
grid->col_width(widths, sizeof(width)/sizeof(width[0]));
```

Parameters

in	<i>value</i>	an array of column widths
in	<i>size</i>	the size of the array (number of values)

12.56.3.9 col_width() [2/2]

```
void Fl_Grid::col_width (
    int col,
    int value )
```

Set the minimal width of a column.

Column widths are calculated by using the maximum of all widget widths in that column and the given column width.

After calculating the width additional space is added when resizing according to the `weight` of the column.

You can set one or more column widths in one call by using `Fl_Grid::col_width(const int *value, size_t size)`.

Parameters

in	<i>col</i>	column number (counting from 0)
in	<i>value</i>	minimal column width, must be ≥ 0

See also

[Fl_Grid::col_width\(const int *value, size_t size\)](#)

12.56.3.10 debug()

```
void Fl_Grid::debug (
    int level = 127 )
```

Output layout information of this `Fl_Grid` to `stderr`.

Parameter `level` will be used to define the amount of output.

- 0 = nothing
- 127 = everything
- other values not yet defined

Note

It is not yet defined which kind of values `level` will have, either a numerical value (127 = maximum, 0 = nothing) or a bit mask that determines what to output.

Todo Add more information about cells and children.

Control output by using `level`.

Parameters

in	<i>level</i>	not yet used (0-127, default = 127)
----	--------------	-------------------------------------

12.56.3.11 draw()

```
void Fl_Grid::draw (
    void ) [protected], [virtual]
```

Draws the [Fl_Grid](#) widget and all children.

If the layout has been changed [layout\(\)](#) is called before the widget is drawn so all children are arranged as designed.

See also

[layout\(\)](#)

[need_layout\(\)](#)

Implements [Fl_Widget](#).

12.56.3.12 draw_grid()

```
void Fl_Grid::draw_grid ( ) [protected], [virtual]
```

Draws the grid helper lines for design and debugging purposes.

This method is protected so it can be modified in subclasses.

12.56.3.13 gap() [1/2]

```
void Fl_Grid::gap (
    int * row_gap,
    int * col_gap ) const
```

Get the default gaps for rows and columns.

Parameters

out	<i>row_gap</i>	pointer to int to receive column gap, may be NULL
out	<i>col_gap</i>	pointer to int to receive column gap, may be NULL

12.56.3.14 gap() [2/2]

```
void Fl_Grid::gap (
    int row_gap,
    int col_gap = -1 ) [virtual]
```

Set default gaps for rows and columns.

All gaps are positioned below the rows and right of their columns.

The bottom row and the right-most column don't have a gap, i.e. the gap sizes of these columns and rows are ignored. You can use a right or bottom margin instead.

You have to specify at least one argument, `col_gap` is optional. If you don't specify an argument or use a negative value (e.g. -1) then that margin is not affected.

You can also initialize the default gaps with [layout\(int, int, int, int\)](#).

Parameters

in	<i>row_gap</i>	default gap for all rows
in	<i>col_gap</i>	default gap for all columns

See also

[Fl_Grid::layout\(int rows, int cols, int margin, int gap\)](#)

12.56.3.15 layout() [1/2]

```
void Fl_Grid::layout ( ) [virtual]
```

Calculate the grid layout and resize and position all widgets.

This is called automatically when the [Fl_Grid](#) is resized. You need to call it once after you added widgets or moved widgets between cells.

Calling it once after all modifications are completed is enough.

Todo Document when and why to call [layout\(\)](#) w/o args. See [Fl_Flex::layout\(\)](#)

See also

[Fl_Grid::layout\(int rows, int cols, int margin, int gap\)](#)

12.56.3.16 layout() [2/2]

```
void Fl_Grid::layout (
    int rows,
    int cols,
    int margin = -1,
    int gap = -1 ) [virtual]
```

Set the basic layout parameters of the [Fl_Grid](#) widget.

You need to specify at least `rows` and `cols` to define a layout before you can add widgets to the grid.

Parameters `margin` and `gap` are optional.

You can call [layout\(int rows, int cols, int margin, int gap\)](#) again to change the layout but this is inefficient since all cells are reallocated if the layout changed.

Calling this with the same values of `rows` and `cols` is fast and can be used to change `margin` and `gap` w/o reallocating the cells.

`margin` sets all margins (left, top, right, bottom) to the same value. Negative values (e.g. -1) don't change the established margins. The default value set by the constructor is 0.

`gap` sets row and column gaps to the same value. Negative values (e.g. -1) do not affect the established gaps. The default value set by the constructor is 0.

After you added all widgets you must call [layout\(\)](#) once without arguments to calculate the actual layout and to position and resize all widgets.

Todo Document when and why to call [layout\(\)](#) w/o args. See [Fl_Flex::layout\(\)](#)

Parameters

in	<i>rows</i>	number of rows
in	<i>cols</i>	number of columns
in	<i>margin</i>	margin size inside the Fl_Grid 's border
in	<i>gap</i>	gap size between cells

See also

[Fl_Grid::layout\(\)](#)

12.56.3.17 margin() [1/2]

```
int Fl_Grid::margin (
    int * left,
```



```
int * top,
int * right,
int * bottom ) const
```

Returns all outside margin sizes of the grid.

All margin sizes are returned in the given arguments. If any argument is `NULL` the respective value is not returned.

Parameters

out	<i>left</i>	returns left margin if not <code>NULL</code>
out	<i>top</i>	returns top margin if not <code>NULL</code>
out	<i>right</i>	returns right margin if not <code>NULL</code>
out	<i>bottom</i>	returns bottom margin if not <code>NULL</code>

Returns

whether all margins are equal

Return values

1	all margins have the same size
0	at least one margin has a different size

12.56.3.18 margin() [2/2]

```
void Fl_Grid::margin (
    int left,
    int top = -1,
    int right = -1,
    int bottom = -1 ) [virtual]
```

Set all margins (left, top, right, bottom).

All margins are measured in pixels inside the box borders. You need to specify at least one argument, all other arguments are optional. If you don't specify an argument or use a negative value (e.g. -1) then that particular margin is not affected.

Parameters

in	<i>left</i>	left margin
in	<i>top</i>	top margin
in	<i>right</i>	right margin
in	<i>bottom</i>	bottom margin

12.56.3.19 need_layout()

```
void Fl_Grid::need_layout (
    int set ) [inline]
```

Request or reset the request to calculate the layout of children.

If called with `true` (1) this calls `redraw()` to schedule a full `draw()`. When draw is eventually called, the layout is (re)calculated before actually drawing the widget.

Parameters

in	<i>set</i>	1 to request layout calculation, 0 to reset the request
----	------------	--

12.56.3.20 on_remove()

```
void Fl_Grid::on_remove (
    int index ) [protected], [virtual]
```

[Fl_Group](#) calls this method when a child widget is about to be removed. Make sure that the widget is also removed from our internal list of children. Reimplemented from [Fl_Group](#).

12.56.3.21 resize()

```
void Fl_Grid::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Recalculate the layout and position and resize all widgets. This method overrides [Fl_Group::resize\(\)](#) and calculates all positions and sizes of its children according to its own rules.

Parameters

in	<i>X,Y</i>	new widget position
in	<i>W,H</i>	new widget size

Reimplemented from [Fl_Widget](#).

12.56.3.22 row_gap() [1/2]

```
void Fl_Grid::row_gap (
    const int * value,
    size_t size )
```

Set more than one row gaps at once.

See also

[Fl_Grid::col_weight\(const int *value, size_t size\)](#) for handling of the value [array](#) and [size](#).

12.56.3.23 row_gap() [2/2]

```
void Fl_Grid::row_gap (
    int row,
    int value )
```

Set the gap of row `row`.

Note that the gap is below each row except the last one which is ignored. Use [margin\(\)](#) for the bottom row.

Parameters

in	<i>row</i>	row
in	<i>value</i>	gap size below the row

12.56.3.24 row_height() [1/2]

```
void Fl_Grid::row_height (
    const int * value,
    size_t size )
```

Set the minimal row height of more than one row.

Parameters

in	<i>value</i>	array of height values
in	<i>size</i>	size of array <i>value</i>

See also

[Fl_Grid::col_weight\(const int *value, size_t size\)](#) for handling of the *value* [array](#) and *size*.

12.56.3.25 row_height() [2/2]

```
void Fl_Grid::row_height (
    int row,
    int value )
```

Set the minimal row height of row *row*.

Parameters

in	<i>row</i>	<i>row</i>
in	<i>value</i>	minimal height of the row

12.56.3.26 row_weight() [1/2]

```
void Fl_Grid::row_weight (
    const int * value,
    size_t size )
```

Set the weight of more than one row.

Parameters

in	<i>value</i>	array of height values
in	<i>size</i>	size of array <i>value</i>

See also

[Fl_Grid::col_weight\(const int *value, size_t size\)](#) for handling of the *value* [array](#) and *size*.

12.56.3.27 row_weight() [2/2]

```
void Fl_Grid::row_weight (
    int row,
    int value )
```

Set the row weight of row *row*.

Parameters

in	<i>row</i>	<i>row</i>
in	<i>value</i>	weight of the row

12.56.3.28 show_grid() [1/2]

```
void Fl_Grid::show_grid (
    int set ) [inline]
```

Enable or disable drawing of the grid helper lines for visualization.

Use this method during the design stage of your `Fl_Grid` widget or for debugging if widgets are not positioned as intended.

The default is a light green color but you can change it for better contrast if needed, see [show_grid\(int set, Fl_Color col\)](#).

Note

You can define the environment variable `FLTK_GRID_DEBUG=1` to set `show_grid(1)` for all `Fl_Grid` widgets at construction time. This enables you to debug the grid layout w/o changing code.

Parameters

in	<i>set</i>	1 (true) = draw, 0 = don't draw the grid
----	------------	--

See also

[show_grid\(int set, Fl_Color col\)](#)

12.56.3.29 show_grid() [2/2]

```
void Fl_Grid::show_grid (
    int set,
    Fl_Color col ) [inline]
```

Enable or disable drawing of the grid helper lines for visualization.

This method also sets the color used for the helper lines.

The default is a light green color but you can change it to any color for better contrast if needed.

Parameters

in	<i>set</i>	1 (true) = draw, 0 = don't draw the grid
in	<i>col</i>	color to use for the grid helper lines

See also

[show_grid\(int set\)](#)

12.56.3.30 widget() [1/2]

```
Fl_Grid::Cell * Fl_Grid::widget (
    Fl_Widget * wi,
    int row,
    int col,
    Fl_Grid_Align align = FL_GRID_FILL )
```

Assign a widget to a grid cell and set its alignment.

This short form sets row and column spanning attributes to (1, 1).

For more information see [Fl_Grid::widget\(Fl_Widget *wi, int row, int col, int rowspan, int colspan, Fl_Grid_Align align\)](#)

Parameters

in	<i>wi</i>	widget to be assigned to the cell
in	<i>row</i>	row
in	<i>col</i>	column
in	<i>align</i>	widget alignment inside the cell

Returns

assigned cell

Return values

<i>NULL</i>	if <code>row</code> or <code>col</code> is out of bounds
-------------	--

See also

[Fl_Grid::widget\(Fl_Widget *wi, int row, int col, int rowspan, int colspan, Fl_Grid_Align align\)](#)

12.56.3.31 widget() [2/2]

```
Fl_Grid::Cell * Fl_Grid::widget (
    Fl_Widget * wi,
    int row,
    int col,
    int rowspan,
    int colspan,
    Fl_Grid_Align align = FL_GRID_FILL )
```

Assign a widget to a grid cell and set cell spanning and alignment.

Default alignment is `FL_GRID_FILL` which stretches the widget in horizontal and vertical directions to fill the whole cell(s) given by `colspan` and `rowspan`.

You can use this method to move a widget from one cell to another; it is automatically removed from its old cell. If the new cell is already assigned to another widget that widget is deassigned but kept as a child of the group.

Before you can assign a widget to a cell it must have been created as a child of the [Fl_Grid](#) widget (i.e. its [Fl_Group](#)).

Parameters

in	<i>wi</i>	widget to be assigned to the cell
in	<i>row</i>	row
in	<i>col</i>	column
in	<i>rowspan</i>	vertical span in cells, default 1
in	<i>colspan</i>	horizontal span in cells, default 1
in	<i>align</i>	widget alignment inside the cell

Returns

assigned cell

Return values

<i>NULL</i>	if <code>row</code> or <code>col</code> is out of bounds or <code>wi</code> is not a child
-------------	--

The documentation for this class was generated from the following files:

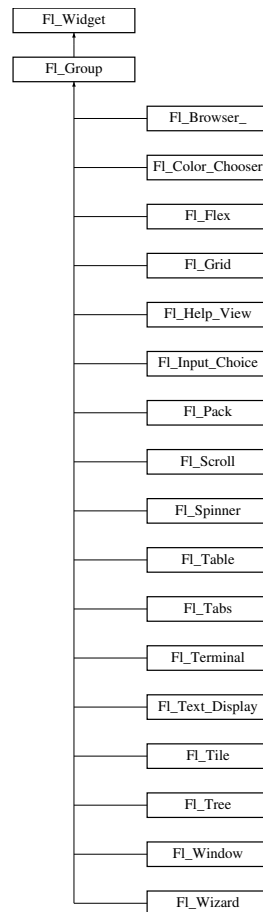
- [Fl_Grid.H](#)
- [Fl_Grid.cxx](#)

12.57 Fl_Group Class Reference

The [Fl_Group](#) class is the FLTK container widget.

```
#include <Fl_Group.H>
```

Inheritance diagram for [Fl_Group](#):



Public Member Functions

- [FL_Widget](#) *[& _ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FL_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FL_Widget](#) *o)
See void [FL_Group::add\(FL_Widget &w\)](#)
- void [add_resizable](#) ([FL_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FL_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FL_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FL_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FL_Group](#) pointer if this widget is an [FL_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FL_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.

- void `clip_children` (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int `delete_child` (int n)
Removes the widget at `index` from the group and deletes it.
- void `end` ()
Exactly the same as `current(this->parent())`.
- int `find` (const `FL_Widget` &o) const
*See int `FL_Group::find(const FL_Widget *w)` const.*
- int `find` (const `FL_Widget` *) const
Searches the child array for the widget and returns the index.
- `FL_Group` (int, int, int, int, const char *s=0)
Creates a new `FL_Group` widget using the given position, size, and label string.
- void `focus` (`FL_Widget` *W)
- void `forms_end` ()
This is for forms compatibility only.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.
- void `init_sizes` ()
Resets the internal array of widget sizes and positions.
- void `insert` (`FL_Widget` &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void `insert` (`FL_Widget` &o, `FL_Widget` *before)
This does `insert(w, find(before))`.
- void `remove` (`FL_Widget` &)
Removes a widget from the group but does not delete it.
- void `remove` (`FL_Widget` *o)
Removes the widget `o` from the group.
- void `remove` (int index)
Removes the widget at `index` from the group but does not delete it.
- `FL_Widget` * `resizable` () const
Returns the group's resizable widget.
- void `resizable` (`FL_Widget` &o)
Sets the group's resizable widget.
- void `resizable` (`FL_Widget` *o)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- void `resize` (int, int, int, int) `FL_OVERRIDE`
Resizes the `FL_Group` widget and all of its children.
- virtual `~FL_Group` ()
The destructor also deletes all the children.

Public Member Functions inherited from `FL_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- `FL_Align` `align` () const

- Gets the label alignment.*

 - void `align` (`FI_Align` alignment)

Sets the label alignment.

 - long `argument` () const

Gets the current user data (long) argument that is passed to the callback function.

 - void `argument` (long v)

Sets the current user data (long) argument that is passed to the callback function.

 - virtual class `FI_Gl_Window` * `as_gl_window` ()

Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.

 - virtual class `FI_Gl_Window` const * `as_gl_window` () const
 - virtual `FI_Window` * `as_window` ()

Returns an `FI_Window` pointer if this widget is an `FI_Window`.

 - virtual `FI_Window` const * `as_window` () const
 - void `bind_deimage` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.

 - void `bind_deimage` (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

 - void `bind_image` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the active state.

 - void `bind_image` (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.

 - `FI_Boxtype` `box` () const

Gets the box type of the widget.

 - void `box` (`FI_Boxtype` new_box)

Sets the box type for the widget.

 - `FI_Callback_p` `callback` () const

Gets the current callback function for the widget.

 - void `callback` (`FI_Callback` *cb)

Sets the current callback function for the widget.

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)

Sets the current callback function and managed user data for the widget.

 - void `callback` (`FI_Callback` *cb, void *p)

Sets the current callback function and data for the widget.

 - void `callback` (`FI_Callback0` *cb)

Sets the current callback function for the widget.

 - void `callback` (`FI_Callback1` *cb, long p=0)

Sets the current callback function for the widget.

 - unsigned int `changed` () const

Checks if the widget value changed since the last callback.

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.

 - void `clear_changed` ()

Marks the value of the widget as unchanged.

 - void `clear_damage` (uchar c=0)

Clears or sets the damage flags.

 - void `clear_output` ()

Sets a widget to accept input.

 - void `clear_visible` ()

Hides the widget.

 - void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.

- `FI_Color color () const`
Gets the background color of the widget.
- `void color (FI_Color bg)`
Sets the background color of the widget.
- `void color (FI_Color bg, FI_Color sel)`
Sets the background and selection color of the widget.
- `FI_Color color2 () const`
For back compatibility only.
- `void color2 (unsigned a)`
For back compatibility only.
- `int contains (const FI_Widget *w) const`
Checks if w is a child of this widget.
- `void copy_label (const char *new_label)`
Sets the current label.
- `void copy_tooltip (const char *text)`
Sets the current tooltip text.
- `uchar damage () const`
Returns non-zero if `draw()` needs to be called.
- `void damage (uchar c)`
Sets the damage bits for the widget.
- `void damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- `int damage_resize (int, int, int, int)`
Internal use only.
- `void deactivate ()`
Deactivates the widget.
- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h () const`
Gets the widget height.
- `virtual void hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`

- Gets the image that is used as part of the widget label when in the active state.*

 - void `image` (`FI_Image` &img)
- Sets the image to use as part of the widget label when in the active state.*

 - void `image` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound` () const
- Returns whether the image is managed by the widget.*

 - int `inside` (const `FI_Widget` *wgt) const
- Checks if this widget is a child of wgt.*

 - int `is_label_copied` () const
- Returns whether the current label was assigned with `copy_label()`.*

 - const char * `label` () const
- Gets the current label text.*

 - void `label` (const char *text)
- Sets the current label pointer.*

 - void `label` (`FI_Labeltype` a, const char *b)
- Shortcut to set the label text and type in one call.*

 - `FI_Color` `labelcolor` () const
- Gets the label color.*

 - void `labelcolor` (`FI_Color` c)
- Sets the label color.*

 - `FI_Font` `labelfont` () const
- Gets the font to use.*

 - void `labelfont` (`FI_Font` f)
- Sets the font to use.*

 - `FI_Fontsize` `labelsize` () const
- Gets the font size in pixels.*

 - void `labelsize` (`FI_Fontsize` pix)
- Sets the font size in pixels.*

 - `FI_Labeltype` `labeltype` () const
- Gets the label type.*

 - void `labeltype` (`FI_Labeltype` a)
- Sets the label type.*

 - void `measure_label` (int &ww, int &hh) const
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard` (bool needs)
- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group` * `parent` () const
- Returns a pointer to the parent widget.*

 - void `parent` (`FI_Group` *p)
- Internal use only - "for hacks only".*

 - void `position` (int X, int Y)
- Repositions the window or widget.*

 - void `redraw` ()
- Schedules the drawing of the widget.*

 - void `redraw_label` ()
- Schedules the drawing of the label.*

- `FI_Color selection_color () const`
Gets the selection color.
- `void selection_color (FI_Color a)`
Sets the selection color.
- `void set_active ()`
Marks the widget as active without sending events or changing focus.
- `void set_changed ()`
Marks the value of the widget as changed.
- `void set_output ()`
Sets a widget to output only.
- `void set_visible ()`
Makes the widget visible.
- `void set_visible_focus ()`
Enables keyboard focus navigation with this widget.
- `int shortcut_label () const`
Returns whether the widget's label uses '&' to indicate shortcuts.
- `void shortcut_label (int value)`
Sets whether the widget's label uses '&' to indicate shortcuts.
- `virtual void show ()`
Makes a widget visible.
- `void size (int W, int H)`
Changes the size of the widget.
- `int take_focus ()`
Gives the widget the keyboard focus.
- `unsigned int takeevents () const`
Returns if the widget is able to take events.
- `int test_shortcut ()`
Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip () const`
Gets the current tooltip text.
- `void tooltip (const char *text)`
Sets the current tooltip text.
- `FI_Window * top_window () const`
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset (int &xoff, int &yoff) const`
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.
- `int use_accents_menu ()`
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- `void * user_data () const`
Gets the user data for this widget.
- `void user_data (FI_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- `void user_data (void *v)`
Sets the user data for this widget.
- `unsigned int visible () const`
Returns whether a widget is visible.
- `unsigned int visible_focus () const`

- Checks whether this widget has a visible focus.*

 - void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const
- Returns whether a widget and all its parents are visible.*
- int `w` () const
- Gets the widget width.*
- `FL_When` `when` () const
- Returns the conditions under which the callback is called.*
- void `when` (uchar i)
- Sets the flags used to decide when a callback is called.*
- `FL_Window` * `window` () const
- Returns a pointer to the nearest parent window up the widget hierarchy.*
- int `x` () const
- Gets the widget position in its window.*
- int `y` () const
- Gets the widget position in its window.*
- virtual `~FL_Widget` ()
- Destroys the widget.*

Static Public Member Functions

- static `FL_Group` * `current` ()
- Returns the currently active group.*
- static void `current` (`FL_Group` *g)
- Sets the current group.*

Static Public Member Functions inherited from `FL_Widget`

- static void `default_callback` (`FL_Widget` *widget, void *data)
- The default callback for all widgets that don't set a callback.*
- static unsigned int `label_shortcut` (const char *t)
- Returns the Unicode value of the '&x' shortcut in a given text.*
- static int `test_shortcut` (const char *, const bool require_alt=false)
- Returns true if the given text t contains the entered '&x' shortcut.*

Protected Member Functions

- `FL_Rect` * `bounds` ()
- Returns the internal array of widget sizes and positions.*
- void `draw` () `FL_OVERRIDE`
- Draws the widget.*
- void `draw_child` (`FL_Widget` &widget) const
- Forces a child to redraw.*
- void `draw_children` ()
- Draws all children of the group.*
- void `draw_outside_label` (const `FL_Widget` &widget) const
- Parents normally call this to draw outside labels of child widgets.*
- virtual int `on_insert` (`FL_Widget` *, int)
- Allow derived groups to act when a widget is added as a child.*
- virtual int `on_move` (int, int)
- Allow derived groups to act when a widget is moved within the group.*

- virtual void **on_remove** (int)
 - Allow derived groups to act when a child widget is removed from the group.*
- int * **sizes** ()
 - Returns the internal array of widget sizes and positions.*
- void **update_child** (FI_Widget &widget) const
 - Draws a child only if it needs it.*

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
 - Clears a flag in the flags mask.*
- void **draw_backdrop** () const
 - If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.*
- void **draw_box** () const
 - Draws the widget box according its box style.*
- void **draw_box** (FI_Boxtype t, FI_Color c) const
 - Draws a box of type t, of color c at the widget's position and size.*
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
 - Draws a box of type t, of color c at the position X,Y and size W,H.*
- void **draw_focus** () const
 - Draws a focus rectangle around the widget.*
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
 - Draws a focus rectangle around the widget.*
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
 - Draws a focus box for the widget at the given position and size.*
- void **draw_label** () const
 - Draws the widget's label at the defined label position.*
- void **draw_label** (int, int, int, int) const
 - Draws the label in an arbitrary bounding box.*
- FI_Widget (int x, int y, int w, int h, const char *label=0L)
 - Creates a widget at the given position and size.*
- unsigned int **flags** () const
 - Gets the widget flags mask.*
- void **h** (int v)
 - Internal use only.*
- void **set_flag** (unsigned int c)
 - Sets a flag in the flags mask.*
- void **w** (int v)
 - Internal use only.*
- void **x** (int v)
 - Internal use only.*
- void **y** (int v)
 - Internal use only.*

Additional Inherited Members

Protected Types inherited from `Fl_Widget`

- enum {
 - `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
 - `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 - ,
 - `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 - ,
 - `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 - ,
 - `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU` = 1<<19 ,
 - `NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
 - `AUTO_DELETE_USER_DATA` = 1<<23 ,
 - `MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
 - `USERFLAG1` = 1<<31 }

flags possible values enumeration.

12.57.1 Detailed Description

The `Fl_Group` class is the FLTK container widget.

It maintains an array of child widgets. These children can themselves be any widget including `Fl_Group`. The most important subclass of `Fl_Group` is `Fl_Window`, however groups can also be used to control radio buttons or to enforce resize behavior.

The tab and arrow keys are used to move the focus between widgets of this group, and to other groups. The only modifier grabbed is shift (for shift-tab), so that ctrl-tab, alt-up, and such are free for the app to use as shortcuts.

To remove a widget from the group and destroy it, in 1.3.x (and up) you can simply use:

```
delete some_widget;
```

..and this will trigger proper scheduling of the widget's removal from its parent group.

If used as a child of `Fl_Tabs`, setting `when (FL_WHEN_CLOSED)` will enable the Close button in the corresponding tab. If the user clicks the Close button, the callback of this group will be called with the callback reason `FL_REASON_CLOSED`.

12.57.2 Constructor & Destructor Documentation

12.57.2.1 `Fl_Group()`

```
Fl_Group::Fl_Group (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Group` widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

12.57.2.2 `~Fl_Group()`

```
Fl_Group::~Fl_Group ( ) [virtual]
```

The destructor *also deletes all the children*.

This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. It is allowed that the `Fl_Group` and all of its children are automatic (local) variables, but you must declare the `Fl_Group` *first*, so that it is destroyed last.

If you add static or automatic (local) variables to an `Fl_Group`, then it is your responsibility to remove (or delete) all such static or automatic child widgets **before destroying** the group - otherwise the group will attempt to call delete operator on them leading to undefined behavior!

12.57.3 Member Function Documentation

12.57.3.1 array()

```
Fl_Widget *const * Fl_Group::array ( ) const
```

Returns a pointer to the array of children.

Note

This pointer is only valid until the next time a child is added or removed.

12.57.3.2 as_group() [1/2]

```
Fl_Group const * Fl_Group::as_group ( ) const [inline], [virtual]
```

Reimplemented from [Fl_Widget](#).

12.57.3.3 as_group() [2/2]

```
Fl_Group * Fl_Group::as_group ( ) [inline], [virtual]
```

Returns an [Fl_Group](#) pointer if this widget is an [Fl_Group](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [Fl_Group](#). If it returns non-NULL, then the widget in question is derived from [Fl_Group](#), and you can use the returned pointer to access its children or other [Fl_Group](#)-specific methods.

Example:

```
void my_callback (Fl_Widget *w, void *) {
    Fl_Group *g = w->as_group();
    if (g)
        printf ("This group has %d children\n", g->children());
    else
        printf ("This widget is not a group!\n");
}
```

Return values

NULL	if this widget is not derived from Fl_Group .
------	---

Note

This method is provided to avoid `dynamic_cast`.

See also

[Fl_Widget::as_window\(\)](#), [Fl_Widget::as_gl_window\(\)](#)

Reimplemented from [Fl_Widget](#).

12.57.3.4 begin()

```
void Fl_Group::begin ( )
```

Sets the current group so you can build the widget tree by just constructing the widgets.

`begin()` is automatically called by the constructor for [Fl_Group](#) (and thus for [Fl_Window](#) as well). `begin()` is exactly the same as `current(this)`. *Don't forget to `end()` the group or window!*

12.57.3.5 bounds()

```
Fl_Rect * Fl_Group::bounds ( ) [protected]
```

Returns the internal array of widget sizes and positions.

If the `bounds()` array does not exist, it will be allocated and filled with the current widget sizes and positions.

The `bounds()` array stores the initial positions of widgets as [Fl_Rect](#)'s. The size of the array is `children() + 2`.

- The first [Fl_Rect](#) is the group,
- the second is the resizable (clipped to the group),

- the rest are the children.

This is a convenient order for the resize algorithm.

If the group and/or the [resizable\(\)](#) is a [Fl_Window](#) (or subclass) then the [x\(\)](#) and [y\(\)](#) coordinates of their respective [Fl_Rect](#)'s are zero.

Note

You should never need to use this *protected* method directly, unless you have special needs to rearrange the children of a [Fl_Group](#). [Fl_Tile](#) uses this to rearrange its widget positions. The returned array should be considered read-only. Do not change its contents. If you need to rearrange children in a group, do so by resizing the children and call [init_sizes\(\)](#).

`#include <FL/Fl_Rect.H>` if you want to access the [bounds\(\)](#) array in your derived class. [Fl_Rect.H](#) is intentionally not included by [Fl_Group.H](#) to avoid unnecessary dependencies.

Returns

Array of [Fl_Rect](#)'s with widget positions and sizes. The returned array is only valid until [init_sizes\(\)](#) is called or widgets are added to or removed from the group.

See also

[init_sizes\(\)](#)

Since

FLTK 1.4.0

12.57.3.6 child()

```
Fl_Widget * Fl_Group::child (
    int n ) const [inline]
```

Returns [array\(\)\[n\]](#).

No range checking is done!

12.57.3.7 clear()

```
void Fl_Group::clear (
    void )
```

Deletes all child widgets from memory recursively.

This method differs from the [remove\(\)](#) method in that it affects all child widgets and deletes them from memory.

The [resizable\(\)](#) widget of the [Fl_Group](#) is set to the [Fl_Group](#) itself.

12.57.3.8 clip_children() [1/2]

```
unsigned int Fl_Group::clip_children ( ) [inline]
```

Returns the current clipping mode.

Returns

true, if clipping is enabled, false otherwise.

See also

void [Fl_Group::clip_children\(int c\)](#)

12.57.3.9 clip_children() [2/2]

```
void Fl_Group::clip_children (
    int c ) [inline]
```

Controls whether the group widget clips the drawing of child widgets to its bounding box.

Set `c` to 1 if you want to clip the child widgets to the bounding box.

The default is to not clip (0) the drawing of child widgets.

12.57.3.10 current() [1/2]

```
Fl_Group * Fl_Group::current ( ) [static]
```

Returns the currently active group.

The [Fl_Widget](#) constructor automatically does `current()->add(widget)` if this is not null. To prevent new widgets from being added to a group, call `Fl_Group::current(0)`.

12.57.3.11 current() [2/2]

```
void Fl_Group::current (
    Fl_Group * g ) [static]
```

Sets the current group.

See also

[Fl_Group::current\(\)](#)

12.57.3.12 delete_child()

```
int Fl_Group::delete_child (
    int index ) [virtual]
```

Removes the widget at `index` from the group and deletes it.

This method does nothing if `index` is out of bounds.

This method differs from the [remove\(\)](#) method in that it deletes the widget from memory. Since this method is virtual it can be reimplemented in subclasses with additional requirements and consequences. See the documentation of subclasses.

Many subclasses don't need to reimplement this method.

Note

This method **may** refuse to remove and delete the widget if it is an essential part of the [Fl_Group](#), for instance a scrollbar in an [Fl_Scroll](#) group. In this case the widget is neither removed nor deleted.

This method does not call [init_sizes\(\)](#) or [redraw\(\)](#). This is left to user code if necessary.

Returns 0 if the widget was removed and deleted. Return values > 0 are reserved for use by FLTK core widgets.

Return values < 0 are free to be used by user defined widgets.

Todo Reimplementation of [Fl_Group::delete_child\(int\)](#) in more FLTK subclasses. This is not yet complete.

Parameters

<code>in</code>	<code>index</code>	index of child to be removed
-----------------	--------------------	------------------------------

Returns

success (0) or error code

Return values

0	success
1	index out of range
2	widget not allowed to be removed (see note)
>2	reserved for FLTK use

Since

FLTK 1.4.0

Reimplemented in [Fl_Scroll](#).

12.57.3.13 draw()

```
void Fl_Group::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

Reimplemented in [Fl_Help_View](#), [Fl_Pack](#), [Fl_Scroll](#), [Fl_Spinner](#), [Fl_Table](#), [Fl_Tabs](#), [Fl_Text_Display](#), [Fl_Tree](#), [Fl_Window](#), [Fl_Wizard](#), and [Fl_Terminal](#).

12.57.3.14 draw_child()

```
void Fl_Group::draw_child (
    Fl_Widget & widget ) const [protected]
```

Forces a child to redraw.

This draws a child widget, if it is not clipped. The damage bits are cleared after drawing.

12.57.3.15 draw_children()

```
void Fl_Group::draw_children ( ) [protected]
```

Draws all children of the group.

This is useful, if you derived a widget from [Fl_Group](#) and want to draw a special border or background. You can call [draw_children\(\)](#) from the derived [draw\(\)](#) method after drawing the box, border, or background.

12.57.3.16 end()

```
void Fl_Group::end ( )
```

Exactly the same as [current\(this->parent\(\)\)](#).

Any new widgets added to the widget tree will be added to the parent of the group.

12.57.3.17 find()

```
int Fl_Group::find (
    const Fl_Widget * o ) const
```

Searches the child array for the widget and returns the index.

Returns [children\(\)](#) if the widget is NULL or not found.

12.57.3.18 focus()

```
void Fl_Group::focus (
    Fl_Widget * W ) [inline]
```

Deprecated This is for backwards compatibility only. You should use *W->take_focus()* instead.

See also

[Fl_Widget::take_focus\(\)](#);

12.57.3.19 handle()

```
int Fl_Group::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Table](#), [Fl_Terminal](#), [Fl_Text_Display](#), [Fl_Text_Editor](#), [Fl_Tree](#), [Fl_Spinner](#), [Fl_Table_Row](#), [Fl_Tile](#), [Fl_Help_View](#), [Fl_Scroll](#), [Fl_Tabs](#), and [Fl_Window](#).

12.57.3.20 [init_sizes\(\)](#)

```
void Fl_Group::init_sizes ( )
```

Resets the internal array of widget sizes and positions.

The [Fl_Group](#) widget keeps track of the original widget sizes and positions when resizing occurs so that if you resize a window back to its original size the widgets will be in the correct places. If you rearrange the widgets in your group, call this method to register the new arrangement with the [Fl_Group](#) that contains them.

If you add or remove widgets, this will be done automatically.

Note

The internal array of widget sizes and positions will be allocated and filled when the next [resize\(\)](#) occurs. For more information on the contents and structure of the [bounds\(\)](#) array see [bounds\(\)](#).

See also

[bounds\(\)](#)

[sizes\(\)](#) (deprecated)

12.57.3.21 [insert\(\)](#) [1/2]

```
void Fl_Group::insert (
    Fl_Widget & o,
    int index )
```

The widget is removed from its current group (if any) and then inserted into this group.

It is put at index `n` - or at the end, if `n >= children()`. This can also be used to rearrange the widgets inside a group.

12.57.3.22 insert() [2/2]

```
void Fl_Group::insert (
    Fl_Widget & o,
    Fl_Widget * before ) [inline]
```

This does `insert(w, find(before))`.

This will append the widget if `before` is not in the group.

12.57.3.23 on_insert()

```
int Fl_Group::on_insert (
    Fl_Widget * candidate,
    int index ) [protected], [virtual]
```

Allow derived groups to act when a widget is added as a child.

Widgets derived from [Fl_Group](#) may store additional data for their children. Overriding this method will allow derived classes to generate these data structures just before the child is added.

This method usually returns the same index that was given in the parameters. By setting a new index, the position of other widgets in the child pointer array can be preserved (e.g. [Fl_Scroll](#) keeps its scroll bars as the last two children).

By returning -1, [Fl_Group::insert](#) will not add the child to `array_`. This is not recommended, but [Fl_Table](#) does something similar to forward children to a hidden group.

Parameters

<i>candidate</i>	the candidate will be added to the child array_ after this method returns.
<i>index</i>	add the child at this position in the array_

Returns

index to position the child as planned

a new index to force the child to a different position

-1 to keep the group from adding the candidate

Reimplemented in [Fl_Scroll](#), [Fl_Tabs](#), and [Fl_Tile](#).

12.57.3.24 on_move()

```
int Fl_Group::on_move (
    int oldIndex,
    int newIndex ) [protected], [virtual]
```

Allow derived groups to act when a widget is moved within the group.

Widgets derived from [Fl_Group](#) may store additional data for their children. Overriding this method will allow derived classes to move these data structures just before the child itself is moved.

This method usually returns the new index that was given in the parameters. By setting a different destination index, the position of other widgets in the child pointer array can be preserved.

By returning -1, [Fl_Group::insert](#) will not move the child.

Parameters

<i>oldIndex</i>	the current index of the child that will be moved
<i>newIndex</i>	the new index of the child

Returns

`newIndex` to position the child as planned

a different index to force the child to a different position

-1 to keep the group from moving the child

Reimplemented in [Fl_Scroll](#), [Fl_Tabs](#), and [Fl_Tile](#).

12.57.3.25 on_remove()

```
void Fl_Group::on_remove (
    int index ) [protected], [virtual]
```

Allow derived groups to act when a child widget is removed from the group.

Widgets derived from [Fl_Group](#) may store additional data for their children. Overriding this method will allow derived classes to remove these data structures just before the child is removed.

Parameters

<i>index</i>	remove the child at this position in the array_
--------------	---

Reimplemented in [Fl_Flex](#), [Fl_Grid](#), [Fl_Tabs](#), and [Fl_Tile](#).

12.57.3.26 remove() [1/3]

```
void Fl_Group::remove (
    Fl_Widget & o )
```

Removes a widget from the group but does not delete it.

This method does nothing if the widget is not a child of the group.

This method differs from the [clear\(\)](#) method in that it only affects a single widget and does not delete it from memory.

Note

If you have the child's index anyway, use [remove\(int index\)](#) instead, because this doesn't need a child lookup in the group's table of children. This can be much faster, if there are lots of children.

12.57.3.27 remove() [2/3]

```
void Fl_Group::remove (
    Fl_Widget * o ) [inline]
```

Removes the widget *o* from the group.

See also

void [remove\(Fl_Widget&\)](#)

12.57.3.28 remove() [3/3]

```
void Fl_Group::remove (
    int index )
```

Removes the widget at *index* from the group but does not delete it.

This method does nothing if *index* is out of bounds.

This method differs from the [clear\(\)](#) method in that it only affects a single widget and does not delete it from memory.

Since

FLTK 1.3.0

12.57.3.29 resizable() [1/3]

```
Fl_Widget * Fl_Group::resizable ( ) const [inline]
```

Returns the group's resizable widget.

See void [Fl_Group::resizable\(Fl_Widget *o\)](#)

12.57.3.30 resizable() [2/3]

```
void Fl_Group::resizable (
    Fl_Widget & o ) [inline]
```

Sets the group's resizable widget.

See void [Fl_Group::resizable\(Fl_Widget *o\)](#)

12.57.3.31 resizable() [3/3]

```
void Fl_Group::resizable (
    Fl_Widget * o ) [inline]
```

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.

If the resizable is NULL the group's size is fixed and all of the widgets in the group remain a fixed size and distance from the top-left corner. This is the default for groups derived from [Fl_Window](#) and [Fl_Pack](#).

The resizable may be set to the group itself, in which case all of the widgets that are its direct children are resized proportionally. This is the default value for [Fl_Group](#).

The resizable widget defines the resizing box for the group, which could be the group itself or one of the group's direct children. When the group is resized it calculates a new size and position for all of its children. Widgets that are horizontally or vertically inside the dimensions of the box are scaled to the new size. Widgets outside the box are moved.

Note

The resizable of a group **must** be one of

- NULL
- the group itself
- a direct child of the group.

If you set any other widget that is not a direct child of the group as its resizable then the behavior is undefined. This is **not** checked by [Fl_Group](#) for historical reasons.

In these examples the gray area is the resizable:

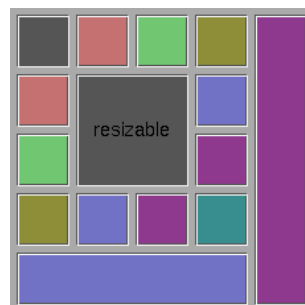


Figure 12.21 before resize

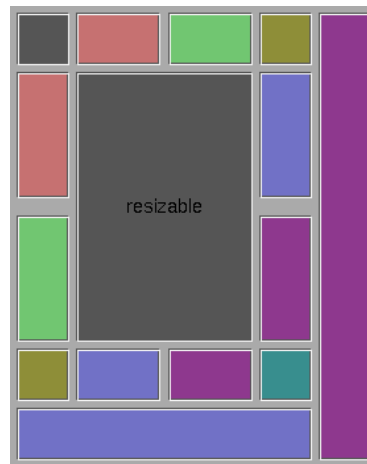


Figure 12.22 after resize

It is possible to achieve any type of resize behavior by using an invisible [FI_Box](#) as the resizable and/or by using a hierarchy of [FI_Group](#) widgets, each with their own resizing strategies.

See the [How Does Resizing Work?](#) chapter for more examples and detailed explanation.

Note

The [resizable\(\)](#) widget of a window can also affect the window's resizing behavior if [FI_Window::size_range\(\)](#) is not called. Please see [FI_Window::default_size_range\(\)](#) for more information on how the default size range is calculated.

See also

[FI_Window::size_range\(\)](#)

[FI_Window::default_size_range\(\)](#)

12.57.3.32 [resize\(\)](#)

```
void FI_Group::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the [FI_Group](#) widget and all of its children.

The [FI_Group](#) widget first resizes itself, and then it moves and resizes all its children according to the rules documented for [FI_Group::resizable\(FI_Widget*\)](#)

See also

[FI_Group::resizable\(FI_Widget*\)](#)

[FI_Group::resizable\(\)](#)

[FI_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [FI_Widget](#).

Reimplemented in [FI_Input_Choice](#), [FI_Pack](#), [FI_Scroll](#), [FI_Spinner](#), [FI_Table](#), [FI_Terminal](#), [FI_Text_Display](#), [FI_Tile](#), [FI_Window](#), [FI_Help_View](#), [FI_Overlay_Window](#), [FI_Tabs](#), and [FI_Tree](#).

12.57.3.33 [sizes\(\)](#)

```
int * FI_Group::sizes ( ) [protected]
```

Returns the internal array of widget sizes and positions.

For backward compatibility with FLTK versions before 1.4.

The [sizes\(\)](#) array stores the initial positions of widgets as (left, right, top, bottom) quads. The first quad is the group, the second is the resizable (clipped to the group), and the rest are the children. If the group and/or the [resizable\(\)](#) is a [FI_Window](#), then the first (left) and third (top) entries of their respective quads (x,y) are zero.

Deprecated Deprecated since 1.4.0. Please use [bounds\(\)](#) instead.

Note

This method will be removed in a future FLTK version (1.5.0 or higher).

Returns

Array of int's with widget positions and sizes. The returned array is only valid until [init_sizes\(\)](#) is called or widgets are added to or removed from the group.

Note

Since FLTK 1.4.0 the returned array is a **read-only** and re-ordered copy of the internal [bounds\(\)](#) array. Do not change its contents. If you need to rearrange children in a group, do so by resizing the children and call [init_sizes\(\)](#).

See also

[bounds\(\)](#)

12.57.3.34 update_child()

```
void Fl_Group::update_child (
    Fl_Widget & widget ) const [protected]
```

Draws a child only if it needs it.

This draws a child widget, if it is not clipped *and* if any [damage\(\)](#) bits are set. The damage bits are cleared after drawing.

See also

[Fl_Group::draw_child\(Fl_Widget& widget\) const](#)

The documentation for this class was generated from the following files:

- [Fl_Group.H](#)
- [Fl_Group.cxx](#)
- [forms_compatibility.cxx](#)

12.58 FI_Help_Block Struct Reference

Public Attributes

- [Fl_Color](#) **bgcolor**
- [uchar](#) **border**
- const char * **end**
- int **h**
- int **line** [32]
- int **ol**
- int **ol_num**
- const char * **start**
- int **w**
- int **x**
- int **y**

The documentation for this struct was generated from the following file:

- [Fl_Help_View.H](#)

12.59 FI_Help_Dialog Class Reference

The [FI_Help_Dialog](#) widget displays a standard help dialog window using the [FI_Help_View](#) widget.

Public Member Functions

- **FI_Help_Dialog** ()
The constructor creates the dialog pictured above.
- int **h** ()
Returns the position and size of the help dialog.
- void **hide** ()
Hides the [FI_Help_Dialog](#) window.
- int **load** (const char *f)
Loads the specified HTML file into the [FI_Help_View](#) widget.
- void **position** (int xx, int yy)
Set the screen position of the dialog.
- void **resize** (int xx, int yy, int ww, int hh)
Change the position and size of the dialog.
- void **show** ()
Shows the [FI_Help_Dialog](#) window.
- void **show** (int argc, char **argv)
*Shows the main Help Dialog Window Delegates call to encapsulated window_ void [FI_Window::show\(int argc, char **argv\)](#) instance method.*
- [FI_Fontsize](#) **textsize** ()
Sets or gets the default text size for the help view.
- void **textsize** ([FI_Fontsize](#) s)
Sets or gets the default text size for the help view.
- void **topline** (const char *n)
Sets the top line in the [FI_Help_View](#) widget to the named or numbered line.
- void **topline** (int n)
Sets the top line in the [FI_Help_View](#) widget to the named or numbered line.
- const char * **value** () const
The first form sets the current buffer to the string provided and reformats the text.
- void **value** (const char *f)
The first form sets the current buffer to the string provided and reformats the text.
- int **visible** ()
Returns 1 if the [FI_Help_Dialog](#) window is visible.
- int **w** ()
Returns the position and size of the help dialog.
- int **x** ()
Returns the position and size of the help dialog.
- int **y** ()
Returns the position and size of the help dialog.
- ~**FI_Help_Dialog** ()
The destructor destroys the widget and frees all memory that has been allocated for the current file.

12.59.1 Detailed Description

The [Fl_Help_Dialog](#) widget displays a standard help dialog window using the [Fl_Help_View](#) widget. The [Fl_Help_Dialog](#) class is not part of the FLTK core library, but instead of *fltk_images*. Use `--use-images` when compiling with `fltk-config`.
P

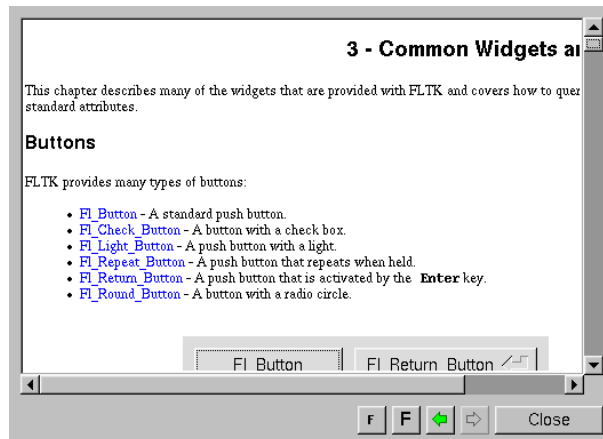


Figure 12.23 [Fl_Help_Dialog](#)

12.59.2 Member Function Documentation

12.59.2.1 load()

```
int Fl_Help_Dialog::load (
    const char * f )
```

Loads the specified HTML file into the [Fl_Help_View](#) widget.

The filename can also contain a target name ("filename.html#target"). Always use forward slashes as path delimiters, MSWindows-style backslashes are not supported here

Parameters

in	<i>f</i>	the name and path of an HTML file
----	----------	-----------------------------------

Returns

0 on success, -1 on error

See also

[Fl_Help_View::load\(\)](#), [fl_load_uri\(\)](#)

12.59.2.2 show()

```
void Fl_Help_Dialog::show ( )
```

Shows the [Fl_Help_Dialog](#) window.

Shows the main Help Dialog Window Delegates call to encapsulated window_ void [Fl_Window::show\(\)](#) method.

12.59.2.3 textsize()

```
void Fl_Help_Dialog::textsize (
    Fl_Fontsize s )
```

Sets or gets the default text size for the help view.

Sets the internal [Fl_Help_View](#) instance text size.

Delegates call to encapsulated view_ void [Fl_Help_View::textsize\(Fl_Fontsize s\)](#) instance method

12.59.2.4 value() [1/2]

```
const char * Fl_Help_Dialog::value ( ) const
```

The first form sets the current buffer to the string provided and reformats the text.

It also clears the history of the "back" and "forward" buttons. The second form returns the current buffer contents.

12.59.2.5 value() [2/2]

```
void Fl_Help_Dialog::value (
    const char * v )
```

The first form sets the current buffer to the string provided and reformats the text.

It also clears the history of the "back" and "forward" buttons. The second form returns the current buffer contents.

The documentation for this class was generated from the following files:

- Fl_Help_Dialog.H
- Fl_Help_Dialog.cxx
- Fl_Help_Dialog_Dox.cxx

12.60 Fl_Help_Font_Stack Struct Reference**Public Member Functions**

- **size_t count** () const
Gets the current count of font style elements in the stack.
- **Fl_Help_Font_Stack** ()
font stack construction, initialize attributes.
- void **init** (Fl_Font f, Fl_Fontsize s, Fl_Color c)
- void **pop** (Fl_Font &f, Fl_Fontsize &s, Fl_Color &c)
Pops from the stack the font style triplet and calls `fl_font()` & `fl_color()` adequately.
- void **push** (Fl_Font f, Fl_Fontsize s, Fl_Color c)
Pushes the font style triplet on the stack, also calls `fl_font()` & `fl_color()` adequately.
- void **top** (Fl_Font &f, Fl_Fontsize &s, Fl_Color &c)
Gets the top (current) element on the stack.

Protected Attributes

- **Fl_Help_Font_Style elts_** [MAX_FL_HELP_FS_ELTS]
font elements
- **size_t nfonts_**
current number of fonts in stack

The documentation for this struct was generated from the following file:

- Fl_Help_View.H

12.61 Fl_Help_Font_Style Struct Reference

[Fl_Help_View](#) font stack element definition.

```
#include <Fl_Help_View.H>
```

Public Member Functions

- **Fl_Help_Font_Style** (Fl_Font afont, Fl_Fontsize asize, Fl_Color acolor)
- void **get** (Fl_Font &afont, Fl_Fontsize &asize, Fl_Color &acolor)
Gets current font attributes.
- void **set** (Fl_Font afont, Fl_Fontsize asize, Fl_Color acolor)
Sets current font attributes.

Public Attributes

- [FI_Color](#) **c**
Font Color.
- [FI_Font](#) **f**
Font.
- [FI_Fontsize](#) **s**
Font Size.

12.61.1 Detailed Description

[FI_Help_View](#) font stack element definition.

The documentation for this struct was generated from the following file:

- [FI_Help_View.H](#)

12.62 FI_Help_Link Struct Reference

Definition of a link for the html viewer.

```
#include <FI_Help_View.H>
```

Public Attributes

- char **filename** [192]
Reference filename.
- int **h**
Height of link text.
- char **name** [32]
Link target (blank if none)
- int **w**
Width of link text.
- int **x**
X offset of link text.
- int **y**
Y offset of link text.

12.62.1 Detailed Description

Definition of a link for the html viewer.

The documentation for this struct was generated from the following file:

- [FI_Help_View.H](#)

12.63 FI_Help_Target Struct Reference

[FI_Help_Target](#) structure.

```
#include <FI_Help_View.H>
```

Public Attributes

- char **name** [32]
Target name.
- int **y**
Y offset of target.

12.63.1 Detailed Description

[Fl_Help_Target](#) structure.

The documentation for this struct was generated from the following file:

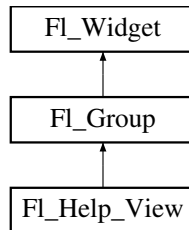
- [Fl_Help_View.H](#)

12.64 Fl_Help_View Class Reference

The [Fl_Help_View](#) widget displays HTML text.

```
#include <Fl_Help_View.H>
```

Inheritance diagram for [Fl_Help_View](#):



Public Member Functions

- void **clear_selection** ()
Removes the current text selection.
- const char * **directory** () const
Returns the current directory for the text in the buffer.
- const char * **filename** () const
Returns the current filename for the text in the buffer.
- int **find** (const char *s, int p=0)
Finds the specified string s at starting position p.
- **Fl_Help_View** (int xx, int yy, int ww, int hh, const char *l=0)
The constructor creates the [Fl_Help_View](#) widget at the specified position and size.
- int **handle** (int) [FL_OVERRIDE](#)
Handles events in the widget.
- int **leftline** () const
Gets the left position in pixels.
- void **leftline** (int)
Scrolls the text to the indicated position, given a pixel column.
- void **link** (Fl_Help_Func *fn)
This method assigns a callback function to use when a link is followed or a file is loaded (via [Fl_Help_View::load\(\)](#)) that requires a different file or path.
- int **load** (const char *f)
Loads the specified file.
- void **resize** (int, int, int, int) [FL_OVERRIDE](#)
Resizes the help widget.
- int **scrollbar_size** () const
Gets the current size of the scrollbars' troughs, in pixels.
- void **scrollbar_size** (int newSize)
Sets the pixel size of the scrollbars' troughs to newSize, in pixels.
- void **select_all** ()
Selects all the text in the view.
- int **size** () const

- Gets the size of the help view.*
- void **size** (int W, int H)
- [FI_Color](#) **textcolor** () const
Returns the current default text color.
- void **textcolor** ([FI_Color](#) c)
Sets the default text color.
- [FI_Font](#) **textfont** () const
Returns the current default text font.
- void **textfont** ([FI_Font](#) f)
Sets the default text font.
- [FI_Fontsize](#) **textsize** () const
Gets the default text size.
- void **textsize** ([FI_Fontsize](#) s)
Sets the default text size.
- const char * **title** ()
Returns the current document title, or NULL if there is no title.
- int **topline** () const
Returns the current top line in pixels.
- void **topline** (const char *n)
Scrolls the text to the indicated position, given a named destination.
- void **topline** (int)
Scrolls the text to the indicated position, given a pixel line.
- const char * **value** () const
Returns the current buffer contents.
- void **value** (const char *val)
Sets the current help text buffer to the string provided and reformats the text.
- [~FI_Help_View](#) ()
Destroys the [FI_Help_View](#) widget.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *& **_ddfdesign_kludge** ()
This is for forms compatibility only.
- void **add** ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void **add** ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void **add_resizable** ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * **array** () const
Returns a pointer to the array of children.
- [FI_Group](#) const * **as_group** () const [FL_OVERRIDE](#)
- [FI_Group](#) * **as_group** () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void **begin** ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * **child** (int n) const
Returns [array\(\)\[n\]](#).
- int **children** () const
Returns how many child widgets the group has.
- void **clear** ()

- Deletes all child widgets from memory recursively.*

 - unsigned int `clip_children` ()

Returns the current clipping mode.
- void `clip_children` (int c)

Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int `delete_child` (int n)

Removes the widget at `index` from the group and deletes it.
- void `end` ()

Exactly the same as `current(this->parent())`.
- int `find` (const `FL_Widget` &o) const

*See int `FL_Group::find(const FL_Widget *w)` const.*
- int `find` (const `FL_Widget` *) const

Searches the child array for the widget and returns the index.
- `FL_Group` (int, int, int, int, const char *s=0)

Creates a new `FL_Group` widget using the given position, size, and label string.
- void `focus` (`FL_Widget` *W)
- void `forms_end` ()

This is for forms compatibility only.
- void `init_sizes` ()

Resets the internal array of widget sizes and positions.
- void `insert` (`FL_Widget` &, int i)

The widget is removed from its current group (if any) and then inserted into this group.
- void `insert` (`FL_Widget` &o, `FL_Widget` *before)

This does `insert(w, find(before))`.
- void `remove` (`FL_Widget` &)

Removes a widget from the group but does not delete it.
- void `remove` (`FL_Widget` *o)

Removes the widget `o` from the group.
- void `remove` (int index)

Removes the widget at `index` from the group but does not delete it.
- `FL_Widget` * `resizable` () const

Returns the group's resizable widget.
- void `resizable` (`FL_Widget` &o)

Sets the group's resizable widget.
- void `resizable` (`FL_Widget` *o)

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- virtual `~FL_Group` ()

The destructor also deletes all the children.

Public Member Functions inherited from `FL_Widget`

- void `_clear_fullscreen` ()
 - void `_set_fullscreen` ()
 - void `activate` ()
- Activates the widget.*
- unsigned int `active` () const
- Returns whether the widget is active.*
- int `active_r` () const
- Returns whether the widget and all of its parents are active.*
- `FL_Align` `align` () const
- Gets the label alignment.*

- void [align](#) ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long [argument](#) () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void [argument](#) (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype](#) [box](#) () const
 - Gets the box type of the widget.*
- void [box](#) ([FI_Boxtype](#) new_box)
 - Sets the box type for the widget.*
- [FI_Callback_p](#) [callback](#) () const
 - Gets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void [callback](#) ([FI_Callback0](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int [changed](#) () const
 - Checks if the widget value changed since the last callback.*
- void [clear_active](#) ()
 - Marks the widget as inactive without sending events or changing focus.*
- void [clear_changed](#) ()
 - Marks the value of the widget as unchanged.*
- void [clear_damage](#) (uchar c=0)
 - Clears or sets the damage flags.*
- void [clear_output](#) ()
 - Sets a widget to accept input.*
- void [clear_visible](#) ()
 - Hides the widget.*
- void [clear_visible_focus](#) ()
 - Disables keyboard focus navigation with this widget.*
- [FI_Color](#) [color](#) () const

- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `draw_label` (int, int, int, int, `FI_Align`) const
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int `h` () const
- Gets the widget height.*

 - virtual void `hide` ()
- Makes a widget invisible.*

 - `FI_Image` * `image` ()
- Gets the image that is used as part of the widget label when in the active state.*

 - const `FI_Image` * `image` () const
- Gets the image that is used as part of the widget label when in the active state.*

- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group * parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group *p`)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color selection_color` () const

- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)

Sets the selection color.

 - void `set_active` ()

Marks the widget as active without sending events or changing focus.

 - void `set_changed` ()

Marks the value of the widget as changed.

 - void `set_output` ()

Sets a widget to output only.

 - void `set_visible` ()

Makes the widget visible.

 - void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.

 - int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.

 - void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.

 - virtual void `show` ()

Makes a widget visible.

 - void `size` (int W, int H)

Changes the size of the widget.

 - int `take_focus` ()

Gives the widget the keyboard focus.

 - unsigned int `takeevents` () const

Returns if the widget is able to take events.

 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.

 - const char * `tooltip` () const

Gets the current tooltip text.

 - void `tooltip` (const char *text)

Sets the current tooltip text.

 - `FI_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.

 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.

 - `uchar` `type` () const

Gets the widget type.

 - void `type` (`uchar` t)

Sets the widget type.

 - int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.

 - void * `user_data` () const

Gets the user data for this widget.

 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.

 - void `user_data` (void *v)

Sets the user data for this widget.

 - unsigned int `visible` () const

Returns whether a widget is visible.

 - unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.

- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FL_When when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FL_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FL_Widget` ()
Destroys the widget.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draws the `FL_Help_View` widget.

Protected Member Functions inherited from `FL_Group`

- `FL_Rect * bounds` ()
Returns the internal array of widget sizes and positions.
- void `draw_child` (`FL_Widget &widget`) const
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (const `FL_Widget &widget`) const
Parents normally call this to draw outside labels of child widgets.
- virtual int `on_insert` (`FL_Widget *`, int)
Allow derived groups to act when a widget is added as a child.
- virtual int `on_move` (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void `on_remove` (int)
Allow derived groups to act when a child widget is removed from the group.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`FL_Widget &widget`) const
Draws a child only if it needs it.

Protected Member Functions inherited from [Fl_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([Fl_Boxtype](#) t, [Fl_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([Fl_Boxtype](#) t, int x, int y, int w, int h, [Fl_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([Fl_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([Fl_Boxtype](#) t, int x, int y, int w, int h, [Fl_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [Fl_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [Fl_Group](#)

- static [Fl_Group](#) * **current** ()
Returns the currently active group.
- static void **current** ([Fl_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [Fl_Widget](#)

- static void **default_callback** ([Fl_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.64.1 Detailed Description

The [FI_Help_View](#) widget displays HTML text.

Most HTML 2.0 elements are supported, as well as a primitive implementation of tables. GIF, JPEG, and PNG images are displayed inline.

Supported HTML tags:

- A: HREF/NAME
- B
- BODY: BGCOLOR/TEXT/LINK
- BR
- CENTER
- CODE
- DD
- DL
- DT
- EM
- FONT: COLOR/SIZE/FACE=(helvetica/arial/sans/times/serif/symbol/courier)
- H1/H2/H3/H4/H5/H6
- HEAD
- HR
- I
- IMG: SRC/WIDTH/HEIGHT/ALT
- KBD
- LI
- OL
- P
- PRE

- STRONG
- TABLE: TH/TD/TR/BORDER/BGCOLOR/COLSPAN/ALIGN=CENTER|RIGHT|LEFT
- TITLE
- TT
- U
- UL
- VAR

Supported color names:

- black,red,green,yellow,blue,magenta,fuchsia,cyan,aqua,white,gray,grey,lime,maroon,navy,olive,purple,silver,teal.

Supported urls:

- Internal: file:
- External: http: ftp: https: ipp: mailto: news:

Quoted char names:

- Aacute aacute Acirc acirc acute AElig aelig Agrave agrave amp Aring aring Atilde atilde Auml auml
- brvbar bull
- Ccedil ccedil cedil cent copy curren
- dagger deg divide
- Eacute eacute Ecirc ecirc Egrave egrave ETH eth Euml euml euro
- frac12 frac14 frac34
- gt
- Iacute iacute Icirc icirc iexcl Igrave igrave iquest Iuml iuml
- laquo lt
- macr micro middot
- nbsp not Ntilde ntilde
- Oacute oacute Ocirc ocirc Ograve ograve ordf ordm Oslash oslash Otilde otilde Ouml ouml
- para permil plusmn pound
- quot
- raquo reg
- sect shy sup1 sup2 sup3 szlig
- THORN thorn times trade
- Uacute uacute Ucirc ucirc Ugrave ugrave uml Uuml uuml
- Yacute yacute
- yen Yuml yuml

Note

You can't effectively set the `box()` to `FL_NO_BOX`, this would result in `FL_DOWN_BOX` being used as the `boxtype` of the widget. This is unexpected but can't be changed for backwards compatibility. If you don't want a frame around the widget you can use `FL_FLAT_BOX` instead.

12.64.2 Constructor & Destructor Documentation

12.64.2.1 ~Fl_Help_View()

```
Fl_Help_View::~Fl_Help_View ( )
```

Destroys the [Fl_Help_View](#) widget.

The destructor destroys the widget and frees all memory that has been allocated for the current document.

12.64.3 Member Function Documentation

12.64.3.1 draw()

```
void Fl_Help_View::draw (
    void ) [protected], [virtual]
```

Draws the [Fl_Help_View](#) widget.

Reimplemented from [Fl_Group](#).

12.64.3.2 find()

```
int Fl_Help_View::find (
    const char * s,
    int p = 0 )
```

Finds the specified string *s* at starting position *p*.

The argument *p* and the return value are offsets in [Fl_Help_View::value\(\)](#), counting from 0. If *p* is out of range, 0 is used.

The string comparison is simple but honors some special cases:

- the specified string *s* must be in UTF-8 encoding
- HTML tags in [value\(\)](#) are filtered (not compared as such, they never match)
- HTML entities like '<' or 'ac;' are converted to Unicode (UTF-8)
- ASCII characters (7-bit, < 0x80) are compared case insensitive
- every newline (LF, '\n') in [value\(\)](#) is treated like a single space
- all other strings are compared as-is (byte by byte)

Todo complex HTML entities for Unicode code points > 0x80 are currently treated like one byte (not character!) and do not (yet) match correctly ("*<*" matches "*<*" but "*€*" doesn't match "*€*", and "*ü*" doesn't match "*ü*")

Parameters

in	<i>s</i>	search string in UTF-8 encoding
in	<i>p</i>	starting position for search (0,...), Default = 0

Returns

the matching position or -1 if not found

12.64.3.3 handle()

```
int Fl_Help_View::handle (
    int event ) [virtual]
```

Handles events in the widget.

Reimplemented from [Fl_Group](#).

12.64.3.4 leftline()

```
void Fl_Help_View::leftline (
    int left )
```

Scrolls the text to the indicated position, given a pixel column.

If the given pixel value `left` is out of range, then the text is scrolled to the left or right side of the document, resp.

Parameters

in	<i>left</i>	left column number in pixels (0 = left side)
----	-------------	--

12.64.3.5 link()

```
void Fl_Help_View::link (
    Fl_Help_Func * fn ) [inline]
```

This method assigns a callback function to use when a link is followed or a file is loaded (via [Fl_Help_View::load\(\)](#)) that requires a different file or path.

The callback function receives a pointer to the [Fl_Help_View](#) widget and the URI or full pathname for the file in question. It must return a pathname that can be opened as a local file or NULL:

```
const char *fn(Fl_Widget *w, const char *uri);
```

The link function can be used to retrieve remote or virtual documents, returning a temporary file that contains the actual data. If the link function returns NULL, the value of the [Fl_Help_View](#) widget will remain unchanged.

If the link callback cannot handle the URI scheme, it should return the uri value unchanged or set the [value\(\)](#) of the widget before returning NULL.

12.64.3.6 load()

```
int Fl_Help_View::load (
    const char * f )
```

Loads the specified file.

This method loads the specified file or URL. The filename may end in a `#name` style target.

If the URL starts with *ftp*, *http*, *https*, *ipp*, *mailto*, or *news*, followed by a colon, FLTK will use [fl_open_uri\(\)](#) to show the requested page in an external browser.

In all other cases, the URL is interpreted as a filename. The file is read and displayed in this browser. Note that MSWindows style backslashes are not supported in the file name.

Parameters

in	<i>f</i>	filename or URL
----	----------	-----------------

Returns

0 on success, -1 on error

See also

[fl_open_uri\(\)](#)

12.64.3.7 resize()

```
void Fl_Help_View::resize (
    int xx,
    int yy,
    int ww,
    int hh ) [virtual]
```

Resizes the help widget.

Reimplemented from [Fl_Group](#).

12.64.3.8 scrollbar_size() [1/2]

```
int Fl_Help_View::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

12.64.3.9 scrollbar_size() [2/2]

```
void Fl_Help_View::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting *newSize* to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

12.64.3.10 topline() [1/2]

```
void Fl_Help_View::topline (
    const char * n )
```

Scrolls the text to the indicated position, given a named destination.

Parameters

in	<i>n</i>	target name
----	----------	-------------

12.64.3.11 topline() [2/2]

```
void Fl_Help_View::topline (
    int top )
```

Scrolls the text to the indicated position, given a pixel line.

If the given pixel value *top* is out of range, then the text is scrolled to the top or bottom of the document, resp.

Parameters

in	<i>top</i>	top line number in pixels (0 = start of document)
----	------------	---

12.64.3.12 value()

```
void Fl_Help_View::value (
    const char * val )
```

Sets the current help text buffer to the string provided and reformats the text.

The provided character string `val` is copied internally and will be freed when `value()` is called again, or when the widget is destroyed.

If `val` is NULL, then the widget is cleared.

The documentation for this class was generated from the following files:

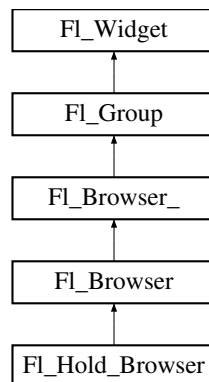
- Fl_Help_View.H
- Fl_Help_View.cxx

12.65 Fl_Hold_Browser Class Reference

The `Fl_Hold_Browser` is a subclass of `Fl_Browser` which lets the user select a single item, or no items by clicking on the empty space.

```
#include <Fl_Hold_Browser.H>
```

Inheritance diagram for `Fl_Hold_Browser`:



Public Member Functions

- `Fl_Hold_Browser` (int X, int Y, int W, int H, const char *L=0)
Creates a new `Fl_Hold_Browser` widget using the given position, size, and label string.

Public Member Functions inherited from `Fl_Browser`

- void `add` (const char *newtext, void *d=0)
Adds a new line to the end of the browser.
- void `bottomline` (int line)
Scrolls the browser so the bottom item in the browser is showing the specified `line`.
- void `clear` ()
Removes all the lines in the browser.
- char `column_char` () const
Gets the current column separator character.
- void `column_char` (char c)
Sets the column separator to `c`.
- const int * `column_widths` () const
Gets the current column width array.
- void `column_widths` (const int *arr)
Sets the current array to `arr`.
- void * `data` (int line) const

- Returns the user `data()` for specified `line`.*

 - void `data` (int `line`, void `*d`)

Sets the user data for specified `line` to `d`.
- void `display` (int `line`, int `val=1`)

For back compatibility.
- int `displayed` (int `line`) const

Returns non-zero if `line` has been scrolled to a position where it is being displayed.
- `FL_Browser` (int `X`, int `Y`, int `W`, int `H`, const char `*L=0`)

The constructor makes an empty browser.
- char `format_char` () const

Gets the current format code prefix character, which by default is '@'.
- void `format_char` (char `c`)

Sets the current format code prefix character to `c`.
- void `hide` () `FL_OVERRIDE`

Hides the entire `FL_Browser` widget – opposite of `show()`.
- void `hide` (int `line`)

Makes `line` invisible, preventing selection by the user.
- `FL_Image` `* icon` (int `line`) const

Returns the icon currently defined for `line`.
- void `icon` (int `line`, `FL_Image` `*icon`)

Set the image icon for `line` to the value `icon`.
- void `insert` (int `line`, const char `*newtext`, void `*d=0`)

Insert a new entry whose label is `newtext` above given `line`, optional data `d`.
- void `lineposition` (int `line`, `FL_Line_Position` `pos`)

Updates the browser so that `line` is shown at position `pos`.
- int `load` (const char `*filename`)

Clears the browser and reads the file, adding each line from the file to the browser.
- void `make_visible` (int `line`)

Make the item at the specified `line` `visible()`.
- void `middleline` (int `line`)

Scrolls the browser so the middle item in the browser is showing the specified `line`.
- void `move` (int `to`, int `from`)

Line `from` is removed and reinserted at `to`.
- void `remove` (int `line`)

Remove entry for given `line` number, making the browser one line shorter.
- void `remove_icon` (int `line`)

Removes the icon for `line`.
- void `replace` (int `a`, const char `*b`)

For back compatibility only.
- int `select` (int `line`, int `val=1`)

Sets the selection state of the item at `line` to the value `val`.
- int `selected` (int `line`) const

Returns 1 if specified `line` is selected, 0 if not.
- void `show` () `FL_OVERRIDE`

Shows the entire `FL_Browser` widget – opposite of `hide()`.
- void `show` (int `line`)

Makes `line` visible, and available for selection by user.
- int `size` () const

Returns how many lines are in the browser.
- void `size` (int `W`, int `H`)
- void `swap` (int `a`, int `b`)

- Swaps two browser lines *a* and *b*.
- `const char * text` (int line) const
 - Returns the label text for the specified *line*.
- `void text` (int line, const char *newtext)
 - Sets the text for the specified *line* to *newtext*.
- `FI_Fontsize textsize` () const
 - Gets the default text size (in pixels) for the lines in the browser.
- `void textsize` (FI_Fontsize newSize)
 - Sets the default text size (in pixels) for the lines in the browser to *newSize*.
- `int topline` () const
 - Returns the line that is currently visible at the top of the browser.
- `void topline` (int line)
 - Scrolls the browser so the top item in the browser is showing the specified *line*.
- `int value` () const
 - Returns the line number of the currently selected line, or 0 if none selected.
- `void value` (int line)
 - Sets the browser's *value()*, which selects the specified *line*.
- `int visible` (int line) const
 - Returns non-zero if the specified *line* is visible, 0 if hidden.
- `~FI_Browser` ()
 - The destructor deletes all list items and destroys the browser.

Public Member Functions inherited from FI_Browser_

- `int deselect` (int docallbacks=0)
 - Deselects all items in the list and returns 1 if the state changed or 0 if it did not.
- `void display` (void *item)
 - Displays the *item*, scrolling the list as necessary.
- `int handle` (int event) FL_OVERRIDE
 - Handles the *event* within the normal widget bounding box.
- `uchar has_scrollbar` () const
 - Returns the current scrollbar mode, see `FI_Browser_::has_scrollbar(uchar)`
- `void has_scrollbar` (uchar mode)
 - Sets whether the widget should have scrollbars or not (default `FI_Browser_::BOTH`).
- `int hposition` () const
 - Gets the horizontal scroll position of the list as a pixel position *pos*.
- `void hposition` (int)
 - Sets the horizontal scroll position of the list to pixel position *pos*.
- `int linespacing` () const
 - Return the height of additional spacing between browser lines.
- `void linespacing` (int pixels)
 - Add some space between browser lines.
- `int position` () const
- `void position` (int pos)
- `void position` (int x, int y)
- `void resize` (int X, int Y, int W, int H) FL_OVERRIDE
 - Repositions and/or resizes the browser.
- `void scrollbar_left` ()
 - Moves the vertical scrollbar to the lefthand side of the list.
- `void scrollbar_right` ()
 - Moves the vertical scrollbar to the righthand side of the list.

- `int scrollbar_size () const`
Gets the current size of the scrollbars' troughs, in pixels.
- `void scrollbar_size (int newSize)`
Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.
- `int scrollbar_width () const`
Returns the global value `Fl::scrollbar_size()`.
- `void scrollbar_width (int width)`
Sets the global `Fl::scrollbar_size()`, and forces this instance of the widget to use it.
- `int select (void *item, int val=1, int docallbacks=0)`
Sets the selection state of `item` to `val`, and returns 1 if the state changed or 0 if it did not.
- `int select_only (void *item, int docallbacks=0)`
Selects `item` and returns 1 if the state changed or 0 if it did not.
- `void sort (int flags=0)`
Sort the items in the browser based on `flags`.
- `Fl_Color textcolor () const`
Gets the default text color for the lines in the browser.
- `void textcolor (Fl_Color col)`
Sets the default text color for the lines in the browser to color `col`.
- `Fl_Font textfont () const`
Gets the default text font for the lines in the browser.
- `void textfont (Fl_Font font)`
Sets the default text font for the lines in the browser to `font`.
- `Fl_Fontsize textsize () const`
Gets the default text size (in pixels) for the lines in the browser.
- `void textsize (Fl_Fontsize newSize)`
Sets the default text size (in pixels) for the lines in the browser to `size`.
- `int vposition () const`
Gets the vertical scroll position of the list as a pixel position `pos`.
- `void vposition (int pos)`
Sets the vertical scroll position of the list to pixel position `pos`.

Public Member Functions inherited from `Fl_Group`

- `Fl_Widget *& _ddfdesign_kludge ()`
This is for forms compatibility only.
- `void add (Fl_Widget &)`
The widget is removed from its current group (if any) and then added to the end of this group.
- `void add (Fl_Widget *o)`
See void `Fl_Group::add(Fl_Widget &w)`
- `void add_resizable (Fl_Widget &o)`
Adds a widget to the group and makes it the resizable widget.
- `Fl_Widget *const * array () const`
Returns a pointer to the array of children.
- `Fl_Group const * as_group () const FL_OVERRIDE`
- `Fl_Group * as_group () FL_OVERRIDE`
Returns an `Fl_Group` pointer if this widget is an `Fl_Group`.
- `void begin ()`
Sets the current group so you can build the widget tree by just constructing the widgets.
- `Fl_Widget * child (int n) const`
Returns `array()[n]`.
- `int children () const`

- Returns how many child widgets the group has.*

 - void `clear` ()
- Deletes all child widgets from memory recursively.*

 - unsigned int `clip_children` ()
- Returns the current clipping mode.*

 - void `clip_children` (int c)
- Controls whether the group widget clips the drawing of child widgets to its bounding box.*

 - virtual int `delete_child` (int n)
- Removes the widget at `index` from the group and deletes it.*

 - void `end` ()
- Exactly the same as `current(this->parent())`.*

 - int `find` (const `FL_Widget` &o) const
- See int `FL_Group::find(const FL_Widget *w)` const.*

 - int `find` (const `FL_Widget` *) const
- Searches the child array for the widget and returns the index.*

 - `FL_Group` (int, int, int, int, const char *==0)
- Creates a new `FL_Group` widget using the given position, size, and label string.*

 - void `focus` (`FL_Widget` *W)
- This is for forms compatibility only.*

 - void `forms_end` ()
- Handles the specified event.*

 - int `handle` (int) `FL_OVERRIDE`
- Resets the internal array of widget sizes and positions.*

 - void `init_sizes` ()
- The widget is removed from its current group (if any) and then inserted into this group.*

 - void `insert` (`FL_Widget` &, int i)
- This does `insert(w, find(before))`.*

 - void `insert` (`FL_Widget` &o, `FL_Widget` *before)
- Removes a widget from the group but does not delete it.*

 - void `remove` (`FL_Widget` &)
- Removes the widget `o` from the group.*

 - void `remove` (`FL_Widget` *o)
- Removes the widget at `index` from the group but does not delete it.*

 - void `remove` (int index)
- Returns the group's resizable widget.*

 - `FL_Widget` * `resizable` () const
- Sets the group's resizable widget.*

 - void `resizable` (`FL_Widget` &o)
- The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*

 - void `resizable` (`FL_Widget` *o)
- Resizes the `FL_Group` widget and all of its children.*

 - void `resize` (int, int, int, int) `FL_OVERRIDE`
- The destructor also deletes all the children.*

 - virtual `~FL_Group` ()

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#), [FI_Callback_User_Data *p](#), bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback *cb](#), void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0 *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1 *cb](#), long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (uchar c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (uchar c)
- Sets the damage bits for the widget.*

 - void `damage` (uchar c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype` a, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group * parent` () const

- Returns a pointer to the parent widget.*

 - void [parent](#) ([FI_Group](#) *p)

Internal use only - "for hacks only".
- void [position](#) (int X, int Y)

Repositions the window or widget.
- void [redraw](#) ()

Schedules the drawing of the widget.
- void [redraw_label](#) ()

Schedules the drawing of the label.
- [FI_Color selection_color](#) () const

Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)

Sets the selection color.
- void [set_active](#) ()

Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()

Marks the value of the widget as changed.
- void [set_output](#) ()

Sets a widget to output only.
- void [set_visible](#) ()

Makes the widget visible.
- void [set_visible_focus](#) ()

Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- void [size](#) (int W, int H)

Changes the size of the widget.
- int [take_focus](#) ()

Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

Returns if the widget is able to take events.
- int [test_shortcut](#) ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const

Gets the current tooltip text.
- void [tooltip](#) (const char *text)

Sets the current tooltip text.
- [FI_Window * top_window](#) () const

Returns a pointer to the top-level window for the widget.
- [FI_Window * top_window_offset](#) (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- [uchar type](#) () const

Gets the widget type.
- void [type](#) ([uchar](#) t)

Sets the widget type.
- int [use_accents_menu](#) ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const

Gets the user data for this widget.

- void **user_data** ([FI_Callback_User_Data](#) *v, bool auto_free)
 - Sets the user data for this widget.*
- void **user_data** (void *v)
 - Sets the user data for this widget.*
- unsigned int **visible** () const
 - Returns whether a widget is visible.*
- unsigned int **visible_focus** () const
 - Checks whether this widget has a visible focus.*
- void **visible_focus** (int v)
 - Modifies keyboard focus navigation.*
- int **visible_r** () const
 - Returns whether a widget and all its parents are visible.*
- int **w** () const
 - Gets the widget width.*
- [FI_When](#) **when** () const
 - Returns the conditions under which the callback is called.*
- void **when** (uchar i)
 - Sets the flags used to decide when a callback is called.*
- [FI_Window](#) * **window** () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int **x** () const
 - Gets the widget position in its window.*
- int **y** () const
 - Gets the widget position in its window.*
- virtual [~FI_Widget](#) ()
 - Destroys the widget.*

Additional Inherited Members

Public Types inherited from [FI_Browser](#)

- enum [FI_Line_Position](#) { **TOP** , **BOTTOM** , **MIDDLE** }
 - For internal use only?*

Public Types inherited from [FI_Browser_](#)

- enum {
 - [HORIZONTAL](#) = 1 , [VERTICAL](#) = 2 , [BOTH](#) = 3 , [ALWAYS_ON](#) = 4 ,
 - [HORIZONTAL_ALWAYS](#) = 5 , [VERTICAL_ALWAYS](#) = 6 , [BOTH_ALWAYS](#) = 7 }
 - Values for [has_scrollbar\(\)](#).*

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * **current** ()
 - Returns the currently active group.*
- static void **current** ([FI_Group](#) *g)
 - Sets the current group.*

Static Public Member Functions inherited from FI_Widget

- static void [default_callback](#) (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Public Attributes inherited from FI_Browser_

- [FI_Scrollbar hscrollbar](#)
Horizontal scrollbar.
- [FI_Scrollbar scrollbar](#)
Vertical scrollbar.

Protected Types inherited from FI_Widget

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from FI_Browser

- [FL_BLINE * _remove](#) (int line)
Removes the item at the specified line.
- [FL_BLINE * find_line](#) (int line) const
Returns the item for specified line.
- int [full_height](#) () const [FL_OVERRIDE](#)
The height of the entire list of all [visible\(\)](#) items in pixels.
- int [incr_height](#) () const [FL_OVERRIDE](#)
The default 'average' item height (including inter-item spacing) in pixels.
- void [insert](#) (int line, [FL_BLINE *item](#))
Insert specified item above line.
- void * [item_at](#) (int line) const [FL_OVERRIDE](#)
Return the item at specified line.
- void [item_draw](#) (void *item, int X, int Y, int W, int H) const [FL_OVERRIDE](#)
Draws item at the position specified by X Y W H.
- void * [item_first](#) () const [FL_OVERRIDE](#)
Returns the very first item in the list.
- int [item_height](#) (void *item) const [FL_OVERRIDE](#)
Returns height of item in pixels.

- void * [item_last](#) () const [FL_OVERRIDE](#)
Returns the very last item in the list.
- void * [item_next](#) (void *item) const [FL_OVERRIDE](#)
*Returns the next item after *item*.*
- void * [item_prev](#) (void *item) const [FL_OVERRIDE](#)
*Returns the previous item before *item*.*
- void [item_select](#) (void *item, int val) [FL_OVERRIDE](#)
*Change the selection state of *item* to the value *val*.*
- int [item_selected](#) (void *item) const [FL_OVERRIDE](#)
*See if *item* is selected.*
- void [item_swap](#) (void *a, void *b) [FL_OVERRIDE](#)
*Swap the items *a* and *b*.*
- const char * [item_text](#) (void *item) const [FL_OVERRIDE](#)
*Returns the label text for *item*.*
- int [item_width](#) (void *item) const [FL_OVERRIDE](#)
*Returns width of *item* in pixels.*
- int [lineno](#) (void *item) const
*Returns line number corresponding to *item*, or zero if not found.*
- void [swap](#) (FL_BLINE *a, FL_BLINE *b)
*Swap the two items *a* and *b*.*

Protected Member Functions inherited from [FI_Browser_](#)

- void [bbox](#) (int &X, int &Y, int &W, int &H) const
Returns the bounding box for the interior of the list's display window, inside the scrollbars.
- void [deleting](#) (void *item)
*This method should be used when *item* is being deleted from the list.*
- int [displayed](#) (void *item) const
*Returns non-zero if *item* has been scrolled to a position where it is being displayed.*
- void [draw](#) () [FL_OVERRIDE](#)
Draws the list within the normal widget bounding box.
- void * [find_item](#) (int ypos)
*This method returns the item under mouse *y* position *ypos*.*
- [FI_Browser_](#) (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- virtual int [full_width](#) () const
This method may be provided by the subclass to indicate the full width of the item list, in pixels.
- void [inserting](#) (void *a, void *b)
This method should be used when an item is in the process of being inserted into the list.
- virtual int [item_quick_height](#) (void *item) const
*This method may be provided by the subclass to return the height of the *item*, in pixels.*
- int [leftedge](#) () const
*This method returns the *X* position of the left edge of the list area after adjusting for the scrollbar and border, if any.*
- void [new_list](#) ()
This method should be called when the list data is completely replaced or cleared.
- void [redraw_line](#) (void *item)
*This method should be called when the contents of *item* has changed, but not its height.*
- void [redraw_lines](#) ()
This method will cause the entire list to be redrawn.
- void [replacing](#) (void *a, void *b)
*This method should be used when item *a* is being replaced by item *b*.*

- void * [selection](#) () const
Returns the item currently selected, or NULL if there is no selection.
- void [swapping](#) (void *a, void *b)
This method should be used when two items a and b are being swapped.
- void * [top](#) () const
Returns the item that appears at the top of the list.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * [bounds](#) ()
Returns the internal array of widget sizes and positions.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- void [draw_child](#) ([FI_Widget](#) &widget) const
Forces a child to redraw.
- void [draw_children](#) ()
Draws all children of the group.
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int [on_insert](#) ([FI_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int [on_move](#) (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void [on_remove](#) (int)
Allow derived groups to act when a child widget is removed from the group.
- int * [sizes](#) ()
Returns the internal array of widget sizes and positions.
- void [update_child](#) ([FI_Widget](#) &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const

- Draws the label in an arbitrary bounding box.*

 - [Fl_Widget](#) (int *x*, int *y*, int *w*, int *h*, const char **label*=0L)

Creates a widget at the given position and size.
- unsigned int **flags** () const
- Gets the widget flags mask.*
- void **h** (int *v*)
- Internal use only.*
- void **set_flag** (unsigned int *c*)
- Sets a flag in the flags mask.*
- void **w** (int *v*)
- Internal use only.*
- void **x** (int *v*)
- Internal use only.*
- void **y** (int *v*)
- Internal use only.*

12.65.1 Detailed Description

The [Fl_Hold_Browser](#) is a subclass of [Fl_Browser](#) which lets the user select a single item, or no items by clicking on the empty space.



Figure 12.24 [Fl_Hold_Browser](#)

As long as the mouse button is held down the item pointed to by it is highlighted, and this highlighting remains on when the mouse button is released. Normally the callback is done when the user releases the mouse, but you can change this with [when\(\)](#).

See [Fl_Browser](#) for methods to add and remove lines from the browser.

12.65.2 Constructor & Destructor Documentation

12.65.2.1 [Fl_Hold_Browser\(\)](#)

```
Fl_Hold_Browser::Fl_Hold_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Hold_Browser](#) widget using the given position, size, and label string.

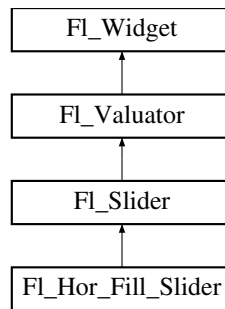
The default boxtype is `FL_DOWN_BOX`. The constructor specializes [Fl_Browser\(\)](#) by setting the type to `FL_HOLD_BROWSER`. The destructor destroys the widget and frees all memory that has been allocated.

The documentation for this class was generated from the following files:

- [Fl_Hold_Browser.H](#)
- [Fl_Browser.cxx](#)

12.66 [Fl_Hor_Fill_Slider](#) Class Reference

Inheritance diagram for [Fl_Hor_Fill_Slider](#):



Public Member Functions

- **FI_Hor_Fill_Slider** (int X, int Y, int W, int H, const char *L=0)

Public Member Functions inherited from [FI_Slider](#)

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- **FI_Slider** (int X, int Y, int W, int H, const char *L=0)
Creates a new [FI_Slider](#) widget using the given position, size, and label string.
- **FI_Slider** (uchar t, int X, int Y, int W, int H, const char *L)
Creates a new [FI_Slider](#) widget using the given type, position, size, and label string.
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.
- int **scrollvalue** (int pos, int **size**, int first, int total)
Sets the size and position of the sliding knob in the box.
- **FI_Boxtype slider** () const
Gets the slider box type.
- void **slider** (**FI_Boxtype** c)
Sets the slider box type.
- float **slider_size** () const
Get the dimensions of the moving piece of slider.
- void **slider_size** (double v)
Set the dimensions of the moving piece of slider.

Public Member Functions inherited from [FI_Valuator](#)

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)

- Sets the minimum value for the valuator.*
- void **precision** (int digits)
 - Sets the step value to $1.0 / 10^{\text{digits}}$.*
- void **range** (double a, double b)
 - Sets the minimum and maximum values for the valuator.*
- double **round** (double)
 - Round the passed value to the nearest step increment.*
- double **step** () const
 - Gets or sets the step value.*
- void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
- void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
- void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double **value** () const
 - Gets the floating point(double) value.*
- int **value** (double)
 - Sets the current value.*

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) **align** () const
 - Gets the label alignment.*
- void **align** ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)

- Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*

 - void `bind_image` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box` () const

Gets the box type of the widget.
- void `box` (`FI_Boxtype new_box`)

Sets the box type for the widget.
- `FI_Callback_p callback` () const

Gets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool auto_free)

Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback *cb`, void *p)

Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0 *cb`)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback1 *cb`, long p=0)

Sets the current callback function for the widget.
- unsigned int `changed` () const

Checks if the widget value changed since the last callback.
- void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar c=0`)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (`FI_Color bg`)

Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget *w`) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.

- `uchar damage ()` const
Returns non-zero if `draw()` needs to be called.
- `void damage (uchar c)`
Sets the damage bits for the widget.
- `void damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- `int damage_resize (int, int, int, int)`
Internal use only.
- `void deactivate ()`
Deactivates the widget.
- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage ()` const
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound ()` const
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align)` const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h ()` const
Gets the widget height.
- `virtual void hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image ()` const
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound ()` const
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt)` const
Checks if this widget is a child of `wgt`.
- `int is_label_copied ()` const
Returns whether the current label was assigned with `copy_label()`.
- `const char * label ()` const
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`

- Shortcut to set the label text and type in one call.*
- `FI_Color labelcolor ()` const
Gets the label color.
 - `void labelcolor (FI_Color c)`
Sets the label color.
 - `FI_Font labelfont ()` const
Gets the font to use.
 - `void labelfont (FI_Font f)`
Sets the font to use.
 - `FI_Fontsize labelsize ()` const
Gets the font size in pixels.
 - `void labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
 - `FI_Labeltype labeltype ()` const
Gets the label type.
 - `void labeltype (FI_Labeltype a)`
Sets the label type.
 - `void measure_label (int &ww, int &hh)` const
Sets width ww and height hh accordingly with the label size.
 - `bool needs_keyboard ()` const
Returns whether this widget needs a keyboard.
 - `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
 - `unsigned int output ()` const
Returns if a widget is used for output only.
 - `FI_Group * parent ()` const
Returns a pointer to the parent widget.
 - `void parent (FI_Group *p)`
Internal use only - "for hacks only".
 - `void position (int X, int Y)`
Repositions the window or widget.
 - `void redraw ()`
Schedules the drawing of the widget.
 - `void redraw_label ()`
Schedules the drawing of the label.
 - `virtual void resize (int x, int y, int w, int h)`
Changes the size or position of the widget.
 - `FI_Color selection_color ()` const
Gets the selection color.
 - `void selection_color (FI_Color a)`
Sets the selection color.
 - `void set_active ()`
Marks the widget as active without sending events or changing focus.
 - `void set_changed ()`
Marks the value of the widget as changed.
 - `void set_output ()`
Sets a widget to output only.
 - `void set_visible ()`
Makes the widget visible.
 - `void set_visible_focus ()`
Enables keyboard focus navigation with this widget.

- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()
Makes a widget visible.
- void [size](#) (int W, int H)
Changes the size of the widget.
- int [take_focus](#) ()
Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const
Returns if the widget is able to take events.
- int [test_shortcut](#) ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const
Gets the current tooltip text.
- void [tooltip](#) (const char *text)
Sets the current tooltip text.
- [Fl_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [Fl_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
Gets the widget type.
- void [type](#) ([uchar](#) t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([Fl_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [Fl_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [Fl_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const

- *Gets the widget position in its window.*
- int **y** () const
Gets the widget position in its window.
- virtual **~FI_Widget** ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
 ,
OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
 ,
MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
 ,
GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
 = 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPOP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from FI_Slider

- void **draw** () **FL_OVERRIDE**
Draws the widget.
- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int, int)

Protected Member Functions inherited from FI_Valuator

- **FI_Valuator** (int X, int Y, int W, int H, const char *L)
Creates a new FI_Valuator widget using the given position, size, and label string.
- void **handle_drag** (double newvalue)
Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.
- void **handle_push** ()
Stores the current value in the previous value.
- void **handle_release** ()
Called after an FL_WHEN_RELEASE event is received and before the callback.
- int **horizontal** () const
Tells if the valuator is an FL_HORIZONTAL one.
- double **previous_value** () const

- Gets the previous floating point value before an event changed it.*

 - void **set_value** (double v)

Sets the current floating point value.
- double **softclamp** (double)
- Clamps the value, but accepts v if the previous value is not already out of range.*
- virtual void **value_damage** ()
- Asks for partial redraw.*

Protected Member Functions inherited from **FI_Widget**

- void **clear_flag** (unsigned int c)
- Clears a flag in the flags mask.*
- void **draw_backdrop** () const
- If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.*
- void **draw_box** () const
- Draws the widget box according its box style.*
- void **draw_box** (FI_Boxtype t, FI_Color c) const
- Draws a box of type t, of color c at the widget's position and size.*
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
- Draws a box of type t, of color c at the position X,Y and size W,H.*
- void **draw_focus** () const
- Draws a focus rectangle around the widget.*
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
- Draws a focus rectangle around the widget.*
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
- Draws a focus box for the widget at the given position and size.*
- void **draw_label** () const
- Draws the widget's label at the defined label position.*
- void **draw_label** (int, int, int, int) const
- Draws the label in an arbitrary bounding box.*
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
- Creates a widget at the given position and size.*
- unsigned int **flags** () const
- Gets the widget flags mask.*
- void **h** (int v)
- Internal use only.*
- void **set_flag** (unsigned int c)
- Sets a flag in the flags mask.*
- void **w** (int v)
- Internal use only.*
- void **x** (int v)
- Internal use only.*
- void **y** (int v)
- Internal use only.*

The documentation for this class was generated from the following files:

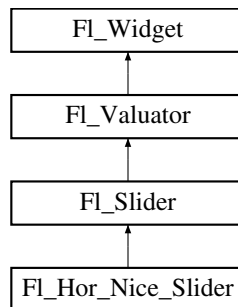
- FI_Hor_Fill_Slider.H
- FI_Slider.cxx

12.67 Fl_Hor_Nice_Slider Class Reference

Single thumb tab slider.

```
#include <Fl_Hor_Nice_Slider.H>
```

Inheritance diagram for Fl_Hor_Nice_Slider:



Public Member Functions

- **Fl_Hor_Nice_Slider** (int X, int Y, int W, int H, const char *L=0)

Public Member Functions inherited from [Fl_Slider](#)

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- **Fl_Slider** (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Slider](#) widget using the given position, size, and label string.
- **Fl_Slider** (uchar t, int X, int Y, int W, int H, const char *L)
Creates a new [Fl_Slider](#) widget using the given type, position, size, and label string.
- int **handle** (int) [FL_OVERRIDE](#)
Handles the specified event.
- int **scrollvalue** (int pos, int [size](#), int first, int total)
Sets the size and position of the sliding knob in the box.
- **Fl_Boxtype slider** () const
Gets the slider box type.
- void **slider** ([Fl_Boxtype](#) c)
Sets the slider box type.
- float **slider_size** () const
Get the dimensions of the moving piece of slider.
- void **slider_size** (double v)
Set the dimensions of the moving piece of slider.

Public Member Functions inherited from [Fl_Valuator](#)

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.

- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.
- double **step** () const
Gets or sets the step value.
- void **step** (double a, int b)
See double [FI_Valuator::step\(\)](#) const
- void **step** (double s)
See double [FI_Valuator::step\(\)](#) const.
- void **step** (int a)
See double [FI_Valuator::step\(\)](#) const
- double **value** () const
Gets the floating point(double) value.
- int **value** (double)
Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()

- Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * **as_window** () const
- void [bind_deimage](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype](#) **box** () const
 - Gets the box type of the widget.*
- void [box](#) ([FI_Boxtype](#) new_box)
 - Sets the box type for the widget.*
- [FI_Callback_p](#) **callback** () const
 - Gets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void [callback](#) ([FI_Callback0](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int [changed](#) () const
 - Checks if the widget value changed since the last callback.*
- void [clear_active](#) ()
 - Marks the widget as inactive without sending events or changing focus.*
- void [clear_changed](#) ()
 - Marks the value of the widget as unchanged.*
- void [clear_damage](#) ([uchar](#) c=0)
 - Clears or sets the damage flags.*
- void [clear_output](#) ()
 - Sets a widget to accept input.*
- void [clear_visible](#) ()
 - Hides the widget.*
- void [clear_visible_focus](#) ()
 - Disables keyboard focus navigation with this widget.*
- [FI_Color](#) **color** () const
 - Gets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg)
 - Sets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
 - Sets the background and selection color of the widget.*
- [FI_Color](#) **color2** () const
 - For back compatibility only.*
- void [color2](#) (unsigned a)
 - For back compatibility only.*
- int [contains](#) (const [FI_Widget](#) *w) const

- Checks if `w` is a child of this widget.*

 - void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int **`damage_resize`** (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FL_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FL_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image` &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.
- void `do_callback` (`FL_Widget` *widget, long arg, `FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FL_Widget` *widget, void *arg=0, `FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FL_Align`) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- virtual void `hide` ()

Makes a widget invisible.
- `FL_Image * image` ()

Gets the image that is used as part of the widget label when in the active state.
- const `FL_Image * image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FL_Image` &img)

Sets the image to use as part of the widget label when in the active state.
- void `image` (`FL_Image` *img)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const `FL_Widget` *wgt) const

Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.

- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsz () const`
Gets the font size in pixels.
- `void labelsz (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- `void labeltype (FI_Labeltype a)`
Sets the label type.
- `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
- `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- `unsigned int output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`
Schedules the drawing of the widget.
- `void redraw_label ()`
Schedules the drawing of the label.
- `virtual void resize (int x, int y, int w, int h)`
Changes the size or position of the widget.
- `FI_Color selection_color () const`
Gets the selection color.
- `void selection_color (FI_Color a)`
Sets the selection color.
- `void set_active ()`
Marks the widget as active without sending events or changing focus.
- `void set_changed ()`
Marks the value of the widget as changed.
- `void set_output ()`

- Sets a widget to output only.*

 - void `set_visible ()`

Makes the widget visible.
- void `set_visible_focus ()`

Enables keyboard focus navigation with this widget.
- int `shortcut_label ()` const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label (int value)`

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show ()`

Makes a widget visible.
- void `size (int W, int H)`

Changes the size of the widget.
- int `take_focus ()`

Gives the widget the keyboard focus.
- unsigned int `takeevents ()` const

Returns if the widget is able to take events.
- int `test_shortcut ()`

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip ()` const

Gets the current tooltip text.
- void `tooltip (const char *text)`

Sets the current tooltip text.
- `Fl_Window *` `top_window ()` const

Returns a pointer to the top-level window for the widget.
- `Fl_Window *` `top_window_offset (int &xoff, int &yoff)` const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type ()` const

Gets the widget type.
- void `type (uchar t)`

Sets the widget type.
- int `use_accents_menu ()`

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data ()` const

Gets the user data for this widget.
- void `user_data (Fl_Callback_User_Data *v, bool auto_free)`

Sets the user data for this widget.
- void `user_data (void *v)`

Sets the user data for this widget.
- unsigned int `visible ()` const

Returns whether a widget is visible.
- unsigned int `visible_focus ()` const

Checks whether this widget has a visible focus.
- void `visible_focus (int v)`

Modifies keyboard focus navigation.
- int `visible_r ()` const

Returns whether a widget and all its parents are visible.
- int `w ()` const

Gets the widget width.
- `Fl_When` `when ()` const

Returns the conditions under which the callback is called.

- void `when` (`uchar i`)
Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget *widget`, `void *data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (`const char *t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (`const char *`, `const bool require_alt=false`)
Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
, `OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
, `MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
, `GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,
`AUTO_DELETE_USER_DATA = 1<<23` ,
`MAXIMIZED = 1<<24` , `POPUP = 1<<25` , `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` ,
`USERFLAG1 = 1<<31` }

flags possible values enumeration.

Protected Member Functions inherited from `FI_Slider`

- void `draw` () `FL_OVERRIDE`
Draws the widget.
- void `draw` (`int`, `int`, `int`, `int`)
- int `handle` (`int`, `int`, `int`, `int`, `int`)

Protected Member Functions inherited from `FI_Valuator`

- `FI_Valuator` (`int X`, `int Y`, `int W`, `int H`, `const char *L`)
Creates a new `FI_Valuator` widget using the given position, size, and label string.
- void `handle_drag` (`double newvalue`)
Called during a drag operation, after an `FL_WHEN_CHANGED` event is received and before the callback.
- void `handle_push` ()
Stores the current value in the previous value.

- void **handle_release** ()
Called after an FL_WHEN_RELEASE event is received and before the callback.
- int **horizontal** () const
Tells if the valuator is an FL_HORIZONTAL one.
- double **previous_value** () const
Gets the previous floating point value before an event changed it.
- void **set_value** (double v)
Sets the current floating point value.
- double **softclamp** (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void **value_damage** ()
Asks for partial redraw.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.67.1 Detailed Description

Single thumb tab slider.



Figure 12.25 FI_Hor_Nice_Slider with various FI::scheme() values

The documentation for this class was generated from the following files:

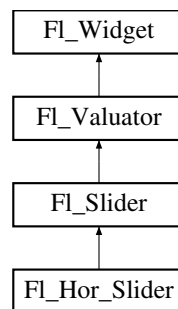
- FI_Hor_Nice_Slider.H
- FI_Slider.cxx

12.68 FI_Hor_Slider Class Reference

Horizontal Slider class.

```
#include <FI_Hor_Slider.H>
```

Inheritance diagram for FI_Hor_Slider:



Public Member Functions

- **FI_Hor_Slider** (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Hor_Slider](#) widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Slider](#)

- void [bounds](#) (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- [FI_Slider](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Slider](#) widget using the given position, size, and label string.
- **FI_Slider** (uchar t, int X, int Y, int W, int H, const char *l)
Creates a new [FI_Slider](#) widget using the given type, position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- int [scrollvalue](#) (int pos, int [size](#), int first, int total)
Sets the size and position of the sliding knob in the box.
- [FI_Boxtype slider](#) () const
Gets the slider box type.
- void [slider](#) ([FI_Boxtype](#) c)

- Sets the slider box type.*
- float **slider_size** () const
 - Get the dimensions of the moving piece of slider.*
- void **slider_size** (double v)
 - Set the dimensions of the moving piece of slider.*

Public Member Functions inherited from [FI_Valuator](#)

- void **bounds** (double a, double b)
 - Sets the minimum (a) and maximum (b) values for the valuator widget.*
- double **clamp** (double)
 - Clamps the passed value to the valuator range.*
- virtual int **format** (char *)
 - Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.*
- double **increment** (double, int)
 - Adds n times the step value to the passed value.*
- double **maximum** () const
 - Gets the maximum value for the valuator.*
- void **maximum** (double a)
 - Sets the maximum value for the valuator.*
- double **minimum** () const
 - Gets the minimum value for the valuator.*
- void **minimum** (double a)
 - Sets the minimum value for the valuator.*
- void **precision** (int digits)
 - Sets the step value to $1.0 / 10^{\text{digits}}$.*
- void **range** (double a, double b)
 - Sets the minimum and maximum values for the valuator.*
- double **round** (double)
 - Round the passed value to the nearest step increment.*
- double **step** () const
 - Gets or sets the step value.*
- void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
- void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
- void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double **value** () const
 - Gets the floating point(double) value.*
- int **value** (double)
 - Sets the current value.*

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (FI_Align alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window * as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window const * as_gl_window** () const
- virtual **FI_Group * as_group** ()
Returns an FI_Group pointer if this widget is an FI_Group.
- virtual **FI_Group const * as_group** () const
- virtual **FI_Window * as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window const * as_window** () const
- void **bind_deimage** (FI_Image *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (FI_Boxtype new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (FI_Callback *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const

Gets the background color of the widget.
- void `color` (`FI_Color` bg)

Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)

Sets the background and selection color of the widget.
- `FI_Color` `color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget` *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar` `damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image` * `deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image` * `deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*
- unsigned int `output` () const

Returns if a widget is used for output only.
- `FI_Group * parent` () const

Returns a pointer to the parent widget.
- void `parent` (`FI_Group *p`)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
- `FI_Color selection_color` () const

Gets the selection color.
- void `selection_color` (`FI_Color a`)

Sets the selection color.
- void `set_active` ()

Marks the widget as active without sending events or changing focus.
- void `set_changed` ()

Marks the value of the widget as changed.
- void `set_output` ()

Sets a widget to output only.
- void `set_visible` ()

Makes the widget visible.
- void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()

Makes a widget visible.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window * top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.

- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.
- `int use_accents_menu ()`
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- `void * user_data () const`
Gets the user data for this widget.
- `void user_data (FI_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- `void user_data (void *v)`
Sets the user data for this widget.
- `unsigned int visible () const`
Returns whether a widget is visible.
- `unsigned int visible_focus () const`
Checks whether this widget has a visible focus.
- `void visible_focus (int v)`
Modifies keyboard focus navigation.
- `int visible_r () const`
Returns whether a widget and all its parents are visible.
- `int w () const`
Gets the widget width.
- `FI_When when () const`
Returns the conditions under which the callback is called.
- `void when (uchar i)`
Sets the flags used to decide when a callback is called.
- `FI_Window * window () const`
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~FI_Widget ()`
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- `static void default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- `static unsigned int label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- `static int test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from [FI_Slider](#)

- void [draw](#) () [FL_OVERRIDE](#)
 - Draws the widget.*
- void [draw](#) (int, int, int, int)
- int [handle](#) (int, int, int, int, int)

Protected Member Functions inherited from [FI_Valuator](#)

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
 - Creates a new [FI_Valuator](#) widget using the given position, size, and label string.*
- void [handle_drag](#) (double newvalue)
 - Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.*
- void [handle_push](#) ()
 - Stores the current value in the previous value.*
- void [handle_release](#) ()
 - Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.*
- int [horizontal](#) () const
 - Tells if the valuator is an [FL_HORIZONTAL](#) one.*
- double [previous_value](#) () const
 - Gets the previous floating point value before an event changed it.*
- void [set_value](#) (double v)
 - Sets the current floating point value.*
- double [softclamp](#) (double)
 - Clamps the value, but accepts v if the previous value is not already out of range.*
- virtual void [value_damage](#) ()
 - Asks for partial redraw.*

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
 - Clears a flag in the flags mask.*
- void [draw_backdrop](#) () const
 - If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.*
- void [draw_box](#) () const
 - Draws the widget box according its box style.*

- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.68.1 Detailed Description

Horizontal Slider class.

See also

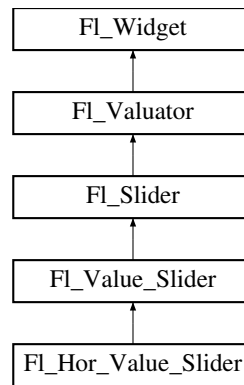
class [FI_Slider](#).

The documentation for this class was generated from the following files:

- FI_Hor_Slider.H
- FI_Slider.cxx

12.69 FI_Hor_Value_Slider Class Reference

Inheritance diagram for FI_Hor_Value_Slider:



Public Member Functions

- **FI_Hor_Value_Slider** (int X, int Y, int W, int H, const char *l=0)

Public Member Functions inherited from **FI_Value_Slider**

- **FI_Value_Slider** (int x, int y, int w, int h, const char *l=0)
*Creates a new **FI_Value_Slider** widget using the given position, size, and label string.*
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.
- **FI_Color** **textcolor** () const
Gets the color of the text in the value box.
- void **textcolor** (**FI_Color** s)
Sets the color of the text in the value box.
- **FI_Font** **textfont** () const
Gets the typeface of the text in the value box.
- void **textfont** (**FI_Font** s)
Sets the typeface of the text in the value box.
- **FI_Fontsize** **textsize** () const
Gets the size of the text in the value box.
- void **textsize** (**FI_Fontsize** s)
Sets the size of the text in the value box.
- int **value_height** () const
Gets the height of the value box in pixels (vertical mode only).
- void **value_height** (int s)
Sets the height of the value box in pixels (vertical mode only).
- int **value_width** () const
Gets the width of the value box in pixels (horizontal mode only).
- void **value_width** (int s)
Sets the width of the value box in pixels (horizontal mode only).

Public Member Functions inherited from **FI_Slider**

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- **FI_Slider** (int X, int Y, int W, int H, const char *L=0)
*Creates a new **FI_Slider** widget using the given position, size, and label string.*
- **FI_Slider** (**uchar** t, int X, int Y, int W, int H, const char *L)
*Creates a new **FI_Slider** widget using the given type, position, size, and label string.*
- int **scrollvalue** (int pos, int **size**, int first, int total)

- Sets the size and position of the sliding knob in the box.*
- [FI_Boxtype slider](#) () const
 - Gets the slider box type.*
- void [slider](#) ([FI_Boxtype](#) c)
 - Sets the slider box type.*
- float [slider_size](#) () const
 - Get the dimensions of the moving piece of slider.*
- void [slider_size](#) (double v)
 - Set the dimensions of the moving piece of slider.*

Public Member Functions inherited from [FI_Valuator](#)

- void [bounds](#) (double a, double b)
 - Sets the minimum (a) and maximum (b) values for the valuator widget.*
- double [clamp](#) (double)
 - Clamps the passed value to the valuator range.*
- virtual int [format](#) (char *)
 - Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.*
- double [increment](#) (double, int)
 - Adds n times the step value to the passed value.*
- double [maximum](#) () const
 - Gets the maximum value for the valuator.*
- void [maximum](#) (double a)
 - Sets the maximum value for the valuator.*
- double [minimum](#) () const
 - Gets the minimum value for the valuator.*
- void [minimum](#) (double a)
 - Sets the minimum value for the valuator.*
- void [precision](#) (int digits)
 - Sets the step value to $1.0 / 10^{\text{digits}}$.*
- void [range](#) (double a, double b)
 - Sets the minimum and maximum values for the valuator.*
- double [round](#) (double)
 - Round the passed value to the nearest step increment.*
- double [step](#) () const
 - Gets or sets the step value.*
- void [step](#) (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
- void [step](#) (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
- void [step](#) (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double [value](#) () const
 - Gets the floating point(double) value.*
- int [value](#) (double)
 - Sets the current value.*

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_GI_Window](#) * [as_gi_window](#) ()
Returns an [FI_GI_Window](#) pointer if this widget is an [FI_GI_Window](#).
- virtual class [FI_GI_Window](#) const * [as_gi_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (FI_Color bg)

Sets the background color of the widget.
- void `color` (FI_Color bg, FI_Color sel)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const FI_Widget *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (FI_Image &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (FI_Image *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
 - Returns if a widget is used for output only.*
 - `FI_Group * parent` () const
 - Returns a pointer to the parent widget.*
 - void `parent` (`FI_Group *p`)
 - Internal use only - "for hacks only".*
 - void `position` (int X, int Y)
 - Repositions the window or widget.*
 - void `redraw` ()
 - Schedules the drawing of the widget.*
 - void `redraw_label` ()
 - Schedules the drawing of the label.*
 - virtual void `resize` (int x, int y, int w, int h)
 - Changes the size or position of the widget.*
 - `FI_Color selection_color` () const
 - Gets the selection color.*
 - void `selection_color` (`FI_Color a`)
 - Sets the selection color.*
 - void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
 - void `set_changed` ()
 - Marks the value of the widget as changed.*
 - void `set_output` ()
 - Sets a widget to output only.*
 - void `set_visible` ()
 - Makes the widget visible.*
 - void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
 - int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
 - void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
 - virtual void `show` ()
 - Makes a widget visible.*
 - void `size` (int W, int H)
 - Changes the size of the widget.*
 - int `take_focus` ()
 - Gives the widget the keyboard focus.*
 - unsigned int `takeevents` () const
 - Returns if the widget is able to take events.*
 - int `test_shortcut` ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
 - const char * `tooltip` () const
 - Gets the current tooltip text.*
 - void `tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `FI_Window * top_window` () const
 - Returns a pointer to the top-level window for the widget.*
 - `FI_Window * top_window_offset` (int &xoff, int &yoff) const
 - Finds the x/y offset of the current widget relative to the top-level window.*

- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.
- `int use_accents_menu ()`
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- `void * user_data () const`
Gets the user data for this widget.
- `void user_data (FI_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- `void user_data (void *v)`
Sets the user data for this widget.
- `unsigned int visible () const`
Returns whether a widget is visible.
- `unsigned int visible_focus () const`
Checks whether this widget has a visible focus.
- `void visible_focus (int v)`
Modifies keyboard focus navigation.
- `int visible_r () const`
Returns whether a widget and all its parents are visible.
- `int w () const`
Gets the widget width.
- `FI_When when () const`
Returns the conditions under which the callback is called.
- `void when (uchar i)`
Sets the flags used to decide when a callback is called.
- `FI_Window * window () const`
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~FI_Widget ()`
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- `static void default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- `static unsigned int label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- `static int test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
 - INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,
 - FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7
 - ,
 - OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11
 - ,
 - MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15
 - ,
 - GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU = 1<<19 ,
 - NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
 - AUTO_DELETE_USER_DATA = 1<<23 ,
 - MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
 - USERFLAG1 = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from FI_Value_Slider

- void **draw** () **FL_OVERRIDE**

Draws the widget.

Protected Member Functions inherited from FI_Slider

- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int, int)

Protected Member Functions inherited from FI_Valuator

- FI_Valuator** (int X, int Y, int W, int H, const char *L)
 - Creates a new FI_Valuator widget using the given position, size, and label string.*
- void **handle_drag** (double newvalue)
 - Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.*
- void **handle_push** ()
 - Stores the current value in the previous value.*
- void **handle_release** ()
 - Called after an FL_WHEN_RELEASE event is received and before the callback.*
- int **horizontal** () const
 - Tells if the valuator is an FL_HORIZONTAL one.*
- double **previous_value** () const
 - Gets the previous floating point value before an event changed it.*
- void **set_value** (double v)
 - Sets the current floating point value.*
- double **softclamp** (double)
 - Clamps the value, but accepts v if the previous value is not already out of range.*
- virtual void **value_damage** ()
 - Asks for partial redraw.*

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
 - Clears a flag in the flags mask.*
- void **draw_backdrop** () const
 - If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.*

- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

The documentation for this class was generated from the following files:

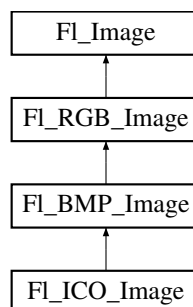
- FI_Hor_Value_Slider.H
- FI_Value_Slider.cxx

12.70 FI_ICO_Image Class Reference

The [FI_ICO_Image](#) class supports loading, caching, and drawing of Windows icon (.ico) files.

```
#include <FI_ICO_Image.H>
```

Inheritance diagram for FI_ICO_Image:



Classes

- struct [IconDirEntry](#)
Windows ICONDIRENTRY structure

Public Member Functions

- [FI_ICO_Image](#) (const char *filename, int id=-1, const unsigned char *data=NULL, const size_t datasize=0)
Loads the named icon image from the given .ico filename or from memory.
- const [IconDirEntry](#) * [icondirentry](#) () const
Returns the array of [idcount\(\)](#) loaded [IconDirEntry](#) structures.
- int [idcount](#) () const
Returns the number of icons of various resolutions present in the ICO object.
- ~[FI_ICO_Image](#) ()
Destructor.

Public Member Functions inherited from [FI_BMP_Image](#)

- [FI_BMP_Image](#) (const char *filename)
This constructor loads the named BMP image from the given BMP filename.
- [FI_BMP_Image](#) (const char *imagename, const unsigned char *data, const long length=-1)
This constructor loads a BMP image from memory.

Public Member Functions inherited from [FI_RGB_Image](#)

- virtual [FI_SVG_Image](#) * [as_svg_image](#) ()
Returns whether an image is an [FI_SVG_Image](#) or not.
- int [cache_h](#) ()
- int [cache_w](#) ()
- void [color_average](#) ([FI_Color](#) c, float i) [FL_OVERRIDE](#)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [FI_Image](#) * [copy](#) () const
- [FI_Image](#) * [copy](#) (int W, int H) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void [desaturate](#) () [FL_OVERRIDE](#)
The [desaturate\(\)](#) method converts an image to grayscale.
- void [draw](#) (int X, int Y)
- void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0) [FL_OVERRIDE](#)
Draws the image to the current drawing surface with a bounding box.
- [FI_RGB_Image](#) (const [FI_Pixmap](#) *pxm, [FI_Color](#) bg=FL_GRAY)
The constructor creates a new RGBA image from the specified [FI_Pixmap](#).
- [FI_RGB_Image](#) (const uchar *bits, int bits_length, int W, int H, int D, int LD)
The constructor creates a new image from the specified data.
- [FI_RGB_Image](#) (const uchar *bits, int W, int H, int D=3, int LD=0)
The constructor creates a new image from the specified data.
- void [label](#) ([FI_Menu_Item](#) *m) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a menu item.
- void [label](#) ([FI_Widget](#) *w) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a widget or menu item.
- virtual void [normalize](#) ()
Makes sure the object is fully initialized.
- void [uncache](#) () [FL_OVERRIDE](#)
If the image has been cached for display, delete the cache data.
- ~[FI_RGB_Image](#) () [FL_OVERRIDE](#)
The destructor frees all memory and server resources that are used by the image.

Public Member Functions inherited from [FI_Image](#)

- virtual class [FI_Shared_Image](#) * [as_shared_image](#) ()
Returns whether an image is an [FI_Shared_Image](#) or not.
- [FI_Image](#) * [copy](#) () const
Creates a copy of the image in the same size.
- int [count](#) () const
Returns the number of data values associated with the image.
- int [d](#) () const
Returns the image depth.
- const char *const * [data](#) () const
Returns a pointer to the current image data array.
- int [data_h](#) () const
Returns the height of the image data.
- int [data_w](#) () const
Returns the width of the image data.
- void [draw](#) (int X, int Y)
Draws the image to the current drawing surface.
- int [fail](#) () const
Returns a value that is not 0 if there is currently no image available.
- [FI_Image](#) (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int [h](#) () const
Returns the current image drawing height in FLTK units.
- void [inactive](#) ()
The [inactive\(\)](#) method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- int [ld](#) () const
Returns the current line data size in bytes.
- virtual void [release](#) ()
Releases an [FI_Image](#) - the same as 'delete this'.
- virtual void [scale](#) (int width, int height, int proportional=1, int can_expand=0)
Sets the drawing size of the image.
- int [w](#) () const
Returns the current image drawing width in FLTK units.
- virtual ~[FI_Image](#) ()
The destructor is a virtual method that frees all memory used by the image.

Additional Inherited Members

Static Public Member Functions inherited from [FI_RGB_Image](#)

- static size_t [max_size](#) ()
Returns the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.
- static void [max_size](#) (size_t size)
Sets the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.

Static Public Member Functions inherited from FI_Image

- static [FI_Labeltype](#) **define_FL_IMAGE_LABEL** ()
- static [FI_RGB_Scaling](#) **RGB_scaling** ()
Returns the currently used RGB image scaling method.
- static void **RGB_scaling** ([FI_RGB_Scaling](#))
Sets the RGB image scaling method used for copy(int, int).
- static [FI_RGB_Scaling](#) **scaling_algorithm** ()
Gets what algorithm is used when resizing a source image to draw it.
- static void **scaling_algorithm** ([FI_RGB_Scaling](#) algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Public Attributes inherited from FI_RGB_Image

- int **alloc_array**
If non-zero, the object's data array is delete[]'d when deleting the object.
- const [uchar](#) * **array**
Points to the start of the object's data array.

Static Public Attributes inherited from FI_Image

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
True after [fl_register_images\(\)](#) was called, false before.

Protected Member Functions inherited from FI_BMP_Image

- void **load_bmp_** (class [FI_Image_Reader](#) &rdr, int ico_height=0, int ico_width=0)

Protected Member Functions inherited from FI_Image

- void **d** (int D)
Sets the current image depth.
- void **data** (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void **draw_empty** (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int **draw_scaled** (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void **h** (int H)
Sets the height of the image data.
- void **ld** (int LD)
Sets the current line data size in bytes.
- void **w** (int W)
Sets the width of the image data.

Static Protected Member Functions inherited from FI_Image

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

12.70.1 Detailed Description

The [Fl_ICO_Image](#) class supports loading, caching, and drawing of Windows icon (.ico) files.

12.70.2 Constructor & Destructor Documentation

12.70.2.1 Fl_ICO_Image()

```
Fl_ICO_Image::Fl_ICO_Image (
    const char * filename,
    int id = -1,
    const unsigned char * data = NULL,
    const size_t datasize = 0 )
```

Loads the named icon image from the given .ico filename or from memory.

Parameters

<i>filename</i>	Name of a .ico file, or of the in-memory image
<i>id</i>	When id is -1 (default), the highest-resolution icon is loaded; when id 0, load the icon with this ID; when id = -2, load all IconDirEntry structures but no image.
<i>data</i>	NULL, or in-memory icon data
<i>datasize</i>	Size in bytes of the <i>data</i> byte array (used when <i>data</i> is not NULL)

The documentation for this class was generated from the following files:

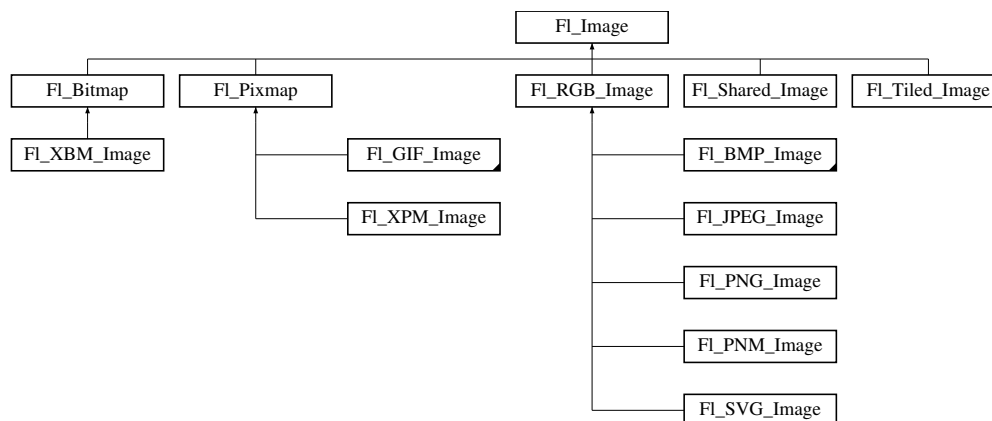
- Fl_ICO_Image.H
- Fl_ICO_Image.cxx

12.71 Fl_Image Class Reference

Base class for image caching, scaling and drawing.

```
#include <Fl_Image.H>
```

Inheritance diagram for Fl_Image:



Public Member Functions

- virtual class [Fl_Shared_Image](#) * [as_shared_image](#) ()
Returns whether an image is an [Fl_Shared_Image](#) or not.
- virtual void [color_average](#) ([Fl_Color](#) c, float i)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [Fl_Image](#) * [copy](#) () const
Creates a copy of the image in the same size.

- virtual `Fl_Image * copy (int W, int H) const`
Creates a resized copy of the image.
- int `count () const`
Returns the number of data values associated with the image.
- int `d () const`
Returns the image depth.
- const char *const * `data () const`
Returns a pointer to the current image data array.
- int `data_h () const`
Returns the height of the image data.
- int `data_w () const`
Returns the width of the image data.
- virtual void `desaturate ()`
The `desaturate()` method converts an image to grayscale.
- void `draw (int X, int Y)`
Draws the image to the current drawing surface.
- virtual void `draw (int X, int Y, int W, int H, int cx=0, int cy=0)`
Draws the image to the current drawing surface with a bounding box.
- int `fail () const`
Returns a value that is not 0 if there is currently no image available.
- `Fl_Image (int W, int H, int D)`
The constructor creates an empty image with the specified width, height, and depth.
- int `h () const`
Returns the current image drawing height in FLTK units.
- void `inactive ()`
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- virtual void `label (Fl_Menu_Item *m)`
This method is an obsolete way to set the image attribute of a menu item.
- virtual void `label (Fl_Widget *w)`
This method is an obsolete way to set the image attribute of a widget or menu item.
- int `ld () const`
Returns the current line data size in bytes.
- virtual void `release ()`
Releases an `Fl_Image` - the same as 'delete this'.
- virtual void `scale (int width, int height, int proportional=1, int can_expand=0)`
Sets the drawing size of the image.
- virtual void `uncache ()`
If the image has been cached for display, delete the cache data.
- int `w () const`
Returns the current image drawing width in FLTK units.
- virtual `~Fl_Image ()`
The destructor is a virtual method that frees all memory used by the image.

Static Public Member Functions

- static [FI_Labeltype](#) **define_FL_IMAGE_LABEL** ()
- static [FI_RGB_Scaling](#) **RGB_scaling** ()
Returns the currently used RGB image scaling method.
- static void **RGB_scaling** ([FI_RGB_Scaling](#))
Sets the RGB image scaling method used for copy(int, int).
- static [FI_RGB_Scaling](#) **scaling_algorithm** ()
Gets what algorithm is used when resizing a source image to draw it.
- static void **scaling_algorithm** ([FI_RGB_Scaling](#) algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Static Public Attributes

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
True after [fl_register_images\(\)](#) was called, false before.

Protected Member Functions

- void **d** (int D)
Sets the current image depth.
- void **data** (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void **draw_empty** (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int **draw_scaled** (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void **h** (int H)
Sets the height of the image data.
- void **ld** (int LD)
Sets the current line data size in bytes.
- void **w** (int W)
Sets the width of the image data.

Static Protected Member Functions

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

Friends

- class [FI_Graphics_Driver](#)

12.71.1 Detailed Description

Base class for image caching, scaling and drawing.

[FI_Image](#) is the base class used for caching, scaling and drawing all kinds of images in FLTK. This class keeps track of common image data such as the pixels, colormap, width, height, and depth. Virtual methods are used to provide type-specific image handling.

Each image possesses two (width, height) pairs:

1. The width and height of the raw image data are returned by `data_w()` and `data_h()`. These values are set when the image is created and remain unchanged.
2. The width and height of the area filled by the image when it gets drawn are returned by `w()` and `h()`. These values are equal to `data_w()` and `data_h()` when the image is created and can be changed by the `scale()` member function.

Since the `Fl_Image` class does not support image drawing by itself, calling the `Fl_Image::draw()` method results in a box with an X in it being drawn instead.

12.71.2 Constructor & Destructor Documentation

12.71.2.1 Fl_Image()

```
Fl_Image::Fl_Image (
    int W,
    int H,
    int D )
```

The constructor creates an empty image with the specified width, height, and depth.

The width and height are in pixels. The depth is 0 for bitmaps, 1 for pixmap (colormap) images, and 1 to 4 for color images.

12.71.3 Member Function Documentation

12.71.3.1 as_shared_image()

```
virtual class Fl_Shared_Image * Fl_Image::as_shared_image ( ) [inline], [virtual]
```

Returns whether an image is an `Fl_Shared_Image` or not.

This virtual method returns a pointer to an `Fl_Shared_Image` if this object is an instance of `Fl_Shared_Image` or NULL if not. This can be used to detect if a given `Fl_Image` object is a shared image, i.e. derived from `Fl_Shared_Image`.

Since

1.4.0

Reimplemented in `Fl_Shared_Image`.

12.71.3.2 color_average()

```
void Fl_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The `color_average()` method averages the colors in the image with the provided FLTK color value.

The first argument specifies the FLTK color to be used.

The second argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented in `Fl_Anim_GIF_Image`, `Fl_RGB_Image`, `Fl_Pixmap`, `Fl_Shared_Image`, `Fl_SVG_Image`, and `Fl_Tiled_Image`.

12.71.3.3 copy() [1/2]

```
Fl_Image * Fl_Image::copy ( ) const [inline]
```

Creates a copy of the image in the same size.

The new image should be released when you are done with it.

This does exactly the same as '`Fl_Image::copy(int W, int H) const`' where W and H are the width and height of the source image, respectively. This applies also to all subclasses of `Fl_Image` in the FLTK library.

The following two `copy()` calls are equivalent:

```
Fl_Image *img1 = new Fl_Image(...);
// ...
```

```
Fl_Image *img2 = img1->copy();
Fl_Image *img3 = img1->copy(img1->w(), img1->h());
```

For details see '[Fl_Image::copy\(int w, int h\) const](#)'.

See also

[Fl_Image::release\(\)](#)

Note

Since FLTK 1.4.0 this method is 'const'. If you derive your own class from [Fl_Image](#) or any subclass your overridden methods of '[Fl_Image::copy\(\) const](#)' and '[Fl_Image::copy\(int, int\) const](#)' **must** also be 'const' for inheritance to work properly. This is different than in FLTK 1.3.x and earlier where these methods have not been 'const'.

12.71.3.4 copy() [2/2]

```
Fl_Image * Fl_Image::copy (
    int W,
    int H ) const [virtual]
```

Creates a resized copy of the image.

The new image should be released when you are done with it.

Note: since FLTK 1.4.0 you can use [Fl_Image::release\(\)](#) for all types of images (i.e. all subclasses of [Fl_Image](#)) instead of operator *delete* for [Fl_Image](#)'s and [Fl_Image::release\(\)](#) for [Fl_Shared_Image](#)'s.

The new image data will be converted to the requested size. RGB images are resized using the algorithm set by [Fl_Image::RGB_scaling\(\)](#).

For the new image the following equations are true:

- $w() == data_w() == \bar{W}$
- $h() == data_h() == \bar{H}$

Parameters

in	W, H	Requested width and height of the new image
----	--------	---

Note

The returned image can be safely cast to the same image type as that of the source image provided this type is one of [Fl_RGB_Image](#), [Fl_SVG_Image](#), [Fl_Pixmap](#), [Fl_Bitmap](#), [Fl_Tiled_Image](#), [Fl_Anim_GIF_Image](#) and [Fl_Shared_Image](#). Returned objects copied from images of other, derived, image classes belong to the parent class appearing in this list. For example, the copy of an [Fl_GIF_Image](#) is an object of class [Fl_Pixmap](#).

Since FLTK 1.4.0 this method is 'const'. If you derive your own class from [Fl_Image](#) or any subclass your overridden methods of '[Fl_Image::copy\(\) const](#)' and '[Fl_Image::copy\(int, int\) const](#)' **must** also be 'const' for inheritance to work properly. This is different than in FLTK 1.3.x and earlier where these methods have not been 'const'.

Reimplemented in [Fl_Anim_GIF_Image](#), [Fl_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), [Fl_SVG_Image](#), and [Fl_Tiled_Image](#).

12.71.3.5 count()

```
int Fl_Image::count ( ) const [inline]
```

Returns the number of data values associated with the image.

The value will be 0 for images with no associated data, 1 for bitmap and color images, and greater than 2 for pixmap images.

See also

[data\(\)](#)

12.71.3.6 d()

```
int Fl_Image::d ( ) const [inline]
```

Returns the image depth.

The return value will be 0 for bitmaps, 1 for pixmaps, and 1 to 4 for color images.

12.71.3.7 data() [1/2]

```
const char *const * Fl_Image::data ( ) const [inline]
```

Returns a pointer to the current image data array.

There can be 0, 1, or more pointers to actual image data in an image.

Use the [count\(\)](#) method to find the size of the data array. You must not dereference the [data\(\)](#) pointer if [count\(\)](#) equals zero.

Note

[data\(\)](#) may return NULL.

Example:

[Fl_RGB_Image](#) has exactly one pointer which points at the R, G, B [, A] data array of the image. The total size of this array depends on several attributes like [data_w\(\)](#), [data_h\(\)](#), [d\(\)](#) and [ld\(\)](#) and is basically [data_w\(\)](#) * [data_h\(\)](#) * [d\(\)](#) but there are exceptions if [ld\(\)](#) is non-zero: see description of [ld\(\)](#). Since FLTK 1.4.0 [w\(\)](#) and [h\(\)](#) are no longer significant for the image data size if [scale\(\)](#) has been called on the image to set a different display size.

Other image types have different numbers and types of data pointers which are implementation details and not documented here.

See also

[count\(\)](#), [w\(\)](#), [h\(\)](#), [data_w\(\)](#), [data_h\(\)](#), [d\(\)](#), [ld\(\)](#)

12.71.3.8 data() [2/2]

```
void Fl_Image::data (
    const char *const * p,
    int c ) [inline], [protected]
```

Sets the current data pointer and count of pointers in the array.

There can be 0, 1, or more pointers to actual image data in an image.

See also

const char* const* [data\(\)](#), [count\(\)](#), [w\(\)](#), [h\(\)](#), [data_w\(\)](#), [data_h\(\)](#), [d\(\)](#), [ld\(\)](#)

12.71.3.9 desaturate()

```
void Fl_Image::desaturate ( ) [virtual]
```

The [desaturate\(\)](#) method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented in [Fl_Anim_GIF_Image](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), [Fl_SVG_Image](#), and [Fl_Tiled_Image](#).

12.71.3.10 draw() [1/2]

```
void Fl_Image::draw (
    int X,
    int Y ) [inline]
```

Draws the image to the current drawing surface.

Parameters

<code>X,Y</code>	specify the upper-lefthand corner of the image.
------------------	---

12.71.3.11 draw() [2/2]

```
void Fl_Image::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image to the current drawing surface with a bounding box.

Arguments `X`, `Y`, `W`, `H` specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the `cx` and `cy` arguments.

In other words: `fl_push_clip(X,Y,W,H)` is applied, the image is drawn with its upper-left corner at `X-cx`, `Y-cy` and its own width and height, `fl_pop_clip()` is applied.

Reimplemented in [Fl_Anim_GIF_Image](#), [Fl_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), [Fl_SVG_Image](#), and [Fl_Tiled_Image](#).

12.71.3.12 draw_empty()

```
void Fl_Image::draw_empty (
    int X,
    int Y ) [protected]
```

The protected method `draw_empty()` draws a box with an X in it.

It can be used to draw any image that lacks image data.

12.71.3.13 draw_scaled()

```
int Fl_Image::draw_scaled (
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Draw the image to the current drawing surface rescaled to a given width and height.

Intended for internal use by the FLTK library.

Parameters

<code>X,Y</code>	position of the image's top-left
<code>W,H</code>	width and height for the drawn image

Returns

1

Deprecated Only for API compatibility with FLTK 1.3.4.

12.71.3.14 fail()

```
int Fl_Image::fail ( ) const
```

Returns a value that is not 0 if there is currently no image available.

Example use:

```
// [...]
Fl_Box box(X, Y, W, H);
Fl_JPEG_Image jpeg("/tmp/foo.jpg");
```

```

switch (jpg.fail()) {
case Fl_Image::ERR_NO_IMAGE:
case Fl_Image::ERR_FILE_ACCESS:
    fl_alert("/tmp/foo.jpg: %s", strerror(errno));    // shows actual os error to user
    exit(1);
case Fl_Image::ERR_FORMAT:
    fl_alert("/tmp/foo.jpg: couldn't decode image");
    exit(1);
}
box.image(jpg);

```

Returns

Image load failure if non-zero

Return values

<i>0</i>	the image was loaded successfully
<i>ERR_NO_IMAGE</i>	no image was found
<i>ERR_FILE_ACCESS</i>	there was a file access related error (errno should be set)
<i>ERR_FORMAT</i>	image decoding failed
<i>ERR_MEMORY_ACCESS</i>	image decoder tried to access memory outside of given memory block

12.71.3.15 h() [1/2]

```
int Fl_Image::h ( ) const [inline]
```

Returns the current image drawing height in FLTK units.

The values of [h\(\)](#) and [data_h\(\)](#) are identical unless [scale\(\)](#) has been called after which they may differ.

12.71.3.16 h() [2/2]

```
void Fl_Image::h (
    int H ) [inline], [protected]
```

Sets the height of the image data.

This protected function sets both image heights: the height of the image data returned by [data_h\(\)](#) and the image drawing height in FLTK units returned by [h\(\)](#).

12.71.3.17 inactive()

```
void Fl_Image::inactive ( ) [inline]
```

The [inactive\(\)](#) method calls [color_average\(FL_BACKGROUND_COLOR, 0.33f\)](#) to produce an image that appears grayed out.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Note

The RGB color of [FL_BACKGROUND_COLOR](#) may change when the connection to the display is made. See [fl_open_display\(\)](#).

12.71.3.18 label() [1/2]

```
void Fl_Image::label (
    Fl_Menu_Item * m ) [virtual]
```

This method is an obsolete way to set the image attribute of a menu item.

Deprecated Please use [Fl_Menu_Item::image\(\)](#) instead.

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), and [Fl_Pixmap](#).

12.71.3.19 label() [2/2]

```
void Fl_Image::label (
    Fl_Widget * widget ) [virtual]
```

This method is an obsolete way to set the image attribute of a widget or menu item.

Deprecated Please use [Fl_Widget::image\(\)](#) or [Fl_Widget::deimage\(\)](#) instead.

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), and [Fl_Pixmap](#).

12.71.3.20 ld() [1/2]

```
int Fl_Image::ld ( ) const [inline]
```

Returns the current line data size in bytes.

See also

[ld\(int\)](#)

12.71.3.21 ld() [2/2]

```
void Fl_Image::ld (
    int LD ) [inline], [protected]
```

Sets the current line data size in bytes.

Color images may contain extra data (padding) that is included after every line of color image data and is normally not present.

If LD is zero, then line data size is assumed to be [data_w\(\)](#) * [d\(\)](#) bytes.

If LD is non-zero, then it must be positive and larger than [data_w\(\)](#) * [d\(\)](#) to account for the extra data per line.

12.71.3.22 release()

```
virtual void Fl_Image::release ( ) [inline], [virtual]
```

Releases an [Fl_Image](#) - the same as 'delete this'.

This virtual method is for almost all image classes the same as calling `delete image;`

where image is an [Fl_Image](#) * pointer.

However, for subclass [Fl_Shared_Image](#) and its subclasses this virtual method is reimplemented and maintains shared images.

This virtual method makes it possible to destroy all image types in the same way by calling

```
image->release();
```

Reasoning: If you have an '[Fl_Image](#) *' base class pointer and don't know if the object is one of the class [Fl_Shared_Image](#) or any other subclass of [Fl_Image](#) (for instance [Fl_RGB_Image](#)) then you can't just use operator delete since this is not appropriate for [Fl_Shared_Image](#) objects.

The virtual method [release\(\)](#) handles this properly.

Since

1.4.0 in the base class [Fl_Image](#) and virtual in [Fl_Shared_Image](#)

Reimplemented in [Fl_Shared_Image](#).

12.71.3.23 RGB_scaling()

```
void Fl_Image::RGB_scaling (
    Fl_RGB_Scaling method ) [static]
```

Sets the RGB image scaling method used for copy(int, int).

Applies to all RGB images, defaults to [FL_RGB_SCALING_NEAREST](#).

12.71.3.24 scale()

```
void Fl_Image::scale (
    int width,
    int height,
    int proportional = 1,
    int can_expand = 0 ) [virtual]
```

Sets the drawing size of the image.

This function controls the values returned by member functions [w\(\)](#) and [h\(\)](#) which in turn control how the image is drawn: the full image data (whose size is given by [data_w\(\)](#) and [data_h\(\)](#)) are drawn scaled to an area of the drawing surface sized at [w\(\)](#) x [h\(\)](#) FLTK units. This can make a difference if the drawing surface has more than 1 pixel per FLTK unit because the image can be drawn at the full resolution of the drawing surface. Examples of such drawing surfaces: HiDPI displays, laser printers, PostScript files, PDF printers.

Parameters

<i>width,height</i>	maximum values, in FLTK units, that w() and h() should return
<i>proportional</i>	if not null, keep the values returned by w() and h() proportional to data_w() and data_h()
<i>can_expand</i>	if null, the values returned by w() and h() will not be larger than data_w() and data_h() , respectively

Note

This function generally changes the values returned by the [w\(\)](#) and [h\(\)](#) member functions. In contrast, the values returned by [data_w\(\)](#) and [data_h\(\)](#) remain unchanged.

Version

1.4 (1.3.4 and FL_ABI_VERSION for [Fl_Shared_Image](#) only)

Example code: scale an image to fit in a box

```
Fl_Box *b = ... // a box
Fl_Image *img = new Fl_PNG_Image("/path/to/picture.png"); // read a picture file
// set the drawing size of the image to the size of the box keeping its aspect ratio
img->scale(b->w(), b->h());
b->image(img); // use the image as the box image
```

12.71.3.25 scaling_algorithm()

```
static void Fl_Image::scaling_algorithm (
    Fl_RGB_Scaling algorithm ) [inline], [static]
```

Sets what algorithm is used when resizing a source image to draw it.

The default algorithm is FL_RGB_SCALING_BILINEAR. Drawing an [Fl_Image](#) is sometimes performed by first resizing the source image and then drawing the resized copy. This occurs, e.g., when drawing to screen under X11 without Xrender support after having called [scale\(\)](#). This function controls what method is used when the image to be resized is an [Fl_RGB_Image](#).

Version

1.4

12.71.3.26 uncache()

```
void Fl_Image::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented in [Fl_Anim_GIF_Image](#), [Fl_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), and [Fl_Shared_Image](#).

12.71.3.27 w() [1/2]

```
int Fl_Image::w ( ) const [inline]
```

Returns the current image drawing width in FLTK units.

The values of [w\(\)](#) and [data_w\(\)](#) are identical unless [scale\(\)](#) has been called after which they may differ.

12.71.3.28 w() [2/2]

```
void Fl_Image::w (
    int W ) [inline], [protected]
```

Sets the width of the image data.

This protected function sets both image widths: the width of the image data returned by [data_w\(\)](#) and the image drawing width in FLTK units returned by [w\(\)](#).

The documentation for this class was generated from the following files:

- [Fl_Image.H](#)
- [Fl_Image.cxx](#)

12.72 Fl_Image_Reader Class Reference

Public Member Functions

- int **error** () const
- const char * **name** () const
- int **open** (const char *filename)
- int **open** (const char *imagename, const unsigned char *data)
- int **open** (const char *imagename, const unsigned char *data, const size_t datasize)
- unsigned char **read_byte** ()
- unsigned int **read_dword** ()
- int **read_long** ()
- unsigned short **read_word** ()
- void **seek** (unsigned int n)
- void **skip** (unsigned int n)
- long **tell** () const

The documentation for this class was generated from the following files:

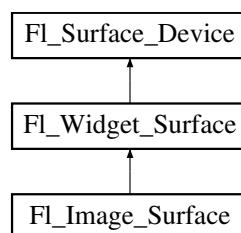
- [Fl_Image_Reader.h](#)
- [Fl_Image_Reader.cxx](#)

12.73 Fl_Image_Surface Class Reference

Directs all graphics requests to an [Fl_Image](#).

```
#include <Fl_Image_Surface.H>
```

Inheritance diagram for [Fl_Image_Surface](#):



Public Member Functions

- [Fl_Image_Surface](#) (int w, int h, int high_res=0, [Fl_Offscreen](#) off=0)
Constructor with optional high resolution.
- [Fl_Shared_Image](#) * **highres_image** ()
Returns a possibly high resolution image made of all drawings sent to the [Fl_Image_Surface](#) object.
- [Fl_RGB_Image](#) * **image** ()
Returns a depth-3 image made of all drawings sent to the [Fl_Image_Surface](#) object.

- bool `is_current` () **FL_OVERRIDE**
Is this surface the current drawing surface?
- void `mask` (const `FI_RGB_Image` *)
Defines a mask applied to drawings made after use of this function.
- `FI_Offscreen` `offscreen` ()
Returns the FI_Offscreen object associated to the image surface.
- void `origin` (int *x, int *y) **FL_OVERRIDE**
Computes the coordinates of the current origin of graphics functions.
- void `origin` (int x, int y) **FL_OVERRIDE**
Sets the position of the origin of graphics in the drawable part of the drawing surface.
- int `printable_rect` (int *w, int *h) **FL_OVERRIDE**
Computes the width and height of the drawable area of the drawing surface.
- void `rescale` ()
Adapts the FI_Image_Surface object to the new value of the GUI scale factor.
- void `set_current` () **FL_OVERRIDE**
Make this surface the current drawing surface.
- `~FI_Image_Surface` ()
The destructor.

Public Member Functions inherited from FI_Widget_Surface

- void `draw` (`FI_Widget` *widget, int delta_x=0, int delta_y=0)
Draws the widget on the drawing surface.
- void `draw_decorated_window` (`FI_Window` *win, int x_offset=0, int y_offset=0)
Draws a window with its title bar and frame if any.
- void `print_window_part` (`FI_Window` *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Draws a rectangular part of an on-screen window.

Public Member Functions inherited from FI_Surface_Device

- `FI_Graphics_Driver` * `driver` ()
Returns the graphics driver of this drawing surface.
- virtual `~FI_Surface_Device` ()
The destructor.

Protected Member Functions

- void `translate` (int x, int y) **FL_OVERRIDE**
Translates the current graphics origin accounting for the current rotation.
- void `untranslate` () **FL_OVERRIDE**
Undoes the effect of a previous `translate()` call.

Protected Member Functions inherited from FI_Widget_Surface

- `FI_Widget_Surface` (`FI_Graphics_Driver` *d)
The constructor.

Protected Member Functions inherited from FI_Surface_Device

- void `driver` (`FI_Graphics_Driver` *graphics_driver)
Sets the graphics driver of this drawing surface.
- virtual void `end_current` ()
FLTK calls this each time a surface ceases to be the current drawing surface.
- `FI_Surface_Device` (`FI_Graphics_Driver` *graphics_driver)
Constructor that sets the graphics driver to use for the created surface.

Friends

- class [Fl_Graphics_Driver](#)

Additional Inherited Members

Static Public Member Functions inherited from [Fl_Surface_Device](#)

- static [Fl_Surface_Device](#) * [pop_current](#) ()
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void [push_current](#) ([Fl_Surface_Device](#) *new_current)
Pushes new_current on top of the stack of current drawing surfaces, and makes it current.
- static [Fl_Surface_Device](#) * [surface](#) ()
The current drawing surface.

Protected Attributes inherited from [Fl_Widget_Surface](#)

- int [x_offset](#)
horizontal offset to the origin of graphics coordinates
- int [y_offset](#)
vertical offset to the origin of graphics coordinates

12.73.1 Detailed Description

Directs all graphics requests to an [Fl_Image](#).

After creation of an [Fl_Image_Surface](#) object, make it the current drawing surface calling [Fl_Surface_Device::push_current\(\)](#), and all subsequent graphics requests will be recorded in the image. It's possible to draw widgets (using [Fl_Image_Surface::draw\(\)](#)) or to use any of the [Drawing functions](#) or the [Color & Font functions](#). Finally, call [image\(\)](#) on the object to obtain a newly allocated [Fl_RGB_Image](#) object. [Fl_Gl_Window](#) objects can be drawn in the image as well.

Usage example:

```
// this is the widget that you want to draw into an image
Fl_Widget *g = ...;

// create an Fl_Image_Surface object
Fl_Image_Surface *image_surface = new Fl_Image_Surface(g->w(), g->h());

// direct all further graphics requests to the image
Fl_Surface_Device::push_current(image_surface);

// draw a white background
fl_color(FL_WHITE);
fl_rectf(0, 0, g->w(), g->h());

// draw the g widget in the image
image_surface->draw(g);

// get the resulting image
Fl_RGB_Image* image = image_surface->image();

// direct graphics requests back to their previous destination
Fl_Surface_Device::pop_current();

// delete the image_surface object, but not the image itself
delete image_surface;
```

12.73.2 Constructor & Destructor Documentation

12.73.2.1 [Fl_Image_Surface\(\)](#)

```
Fl_Image_Surface::Fl_Image_Surface (
    int w,
    int h,
    int high_res = 0,
    Fl_Offscreen off = 0 )
```

Constructor with optional high resolution.

Parameters

<i>w,h</i>	Width and height of the resulting image. The value of the <code>high_res</code> parameter controls whether <code>w</code> and <code>h</code> are interpreted as pixels or FLTK units.
<i>high_res</i>	If zero, the created image surface is sized at <code>w x h</code> pixels. If non-zero, the pixel size of the created image surface depends on the value of the display scale factor (see Fl::screen_scale(int)): the resulting image has the same number of pixels as an area of the display of size <code>w x h</code> expressed in FLTK units.
<i>off</i>	If not null, the image surface is constructed around a pre-existing <code>Fl_Offscreen</code> . The caller is responsible for both construction and destruction of this <code>Fl_Offscreen</code> object. Is mostly intended for internal use by FLTK.

Version

1.3.4 (1.3.3 without the `highres` parameter)

12.73.3 Member Function Documentation

12.73.3.1 `highres_image()`

```
Fl_Shared_Image * Fl_Image_Surface::highres_image ( )
```

Returns a possibly high resolution image made of all drawings sent to the `Fl_Image_Surface` object.

The `Fl_Image_Surface` object should have been constructed with `Fl_Image_Surface(W, H, 1)`. The returned `Fl_Shared_Image` object is scaled to a size of `WxH` FLTK units and may have a pixel size larger than these values. The returned object should be deallocated with `Fl_Shared_Image::release()` after use.

Deprecated Use `image()` instead.

Version

1.4 (1.3.4 for MacOS platform only)

12.73.3.2 `image()`

```
Fl_RGB_Image * Fl_Image_Surface::image ( )
```

Returns a depth-3 image made of all drawings sent to the `Fl_Image_Surface` object.

The returned object contains its own copy of the RGB data; the caller is responsible for deleting it.

See also

`Fl_Image_Surface::mask(Fl_RGB_Image*)`

12.73.3.3 `is_current()`

```
bool Fl_Image_Surface::is_current ( ) [virtual]
```

Is this surface the current drawing surface?

Reimplemented from [Fl_Surface_Device](#).

12.73.3.4 `mask()`

```
void Fl_Image_Surface::mask (
    const Fl_RGB_Image * mask )
```

Defines a mask applied to drawings made after use of this function.

The mask is an `Fl_RGB_Image` made of a white scene drawn on a solid black background; the drawable part of the image surface is reduced to the white areas of the mask after this member function gets called. If necessary, the `mask` image is internally replaced by a copy resized to the surface's pixel size. Overall, the image returned by `Fl_Image_Surface::image()` contains all drawings made until the `mask()` method assigned a mask, at which point subsequent drawing operations to the image surface were passed through the white areas of the mask. On some platforms, shades of gray in the mask image control the blending of foreground and background pixels; mask pixels

closer in color to white produce image pixels closer to the image surface pixel, those closer to black produce image pixels closer to what the image surface pixel was before the call to `mask()`.

The mask is easily constructed using an `Fl_Image_Surface` object, drawing white areas on a black background there, and calling `Fl_Image_Surface::image()`.

Parameters

<code>mask</code>	A depth-3 image determining the drawable areas of the image surface. The <code>mask</code> object is not used after return from this member function.
-------------------	---

Note

- The image surface must not be the current drawing surface when this function gets called.
- The mask can have any size but is best when it has the size of the image surface.
- It's possible to use several masks in succession on the same image surface provided member function `Fl_Image_Surface::image()` is called between successive calls to `Fl_Image_Surface::mask(const Fl_RGB_Image*)`.

Example of procedure to construct a masked image:

```
int W = ..., H = ...; // width and height of the image under construction
Fl_Image_Surface *surf = new Fl_Image_Surface(W, H, 1);
// first, construct the mask
Fl_Surface_Device::push_current(surf);
fl_color(FL_BLACK); // draw a black background
fl_rectf(0, 0, W, H);
fl_color(FL_WHITE); // next, draw in white what the mask should not filter out
fl_pie(0, 0, W, H, 0, 360); // here, an ellipse with axes lengths WxH
Fl_RGB_Image *mask = surf->image(); // get the mask
// second, draw the image background
fl_color(FL_YELLOW); // here, draw a yellow background
fl_rectf(0, 0, W, H);
// third, apply the mask
Fl_Surface_Device::pop_current();
surf->mask(mask);
delete mask; // the mask image can be safely deleted at this point
Fl_Surface_Device::push_current(surf);
// fourth, draw the image foreground, part of which will be filtered out by the mask
surf->draw(widget, 0, 0); // here the foreground is a drawn widget
// fifth, get the final result, masked_image, as a depth-3 Fl_RGB_Image
Fl_RGB_Image *masked_image = surf->image();
// Only the part of the foreground, here a drawn widget, that has not been
// filtered out by the mask, here the white ellipse, is in masked_image;
// the background, here solid yellow, shows up in the remaining areas of masked_image.
Fl_Surface_Device::pop_current();
delete surf;
```

Since

1.4.0

12.73.3.5 offscreen()

`Fl_Offscreen` `Fl_Image_Surface::offscreen ()`

Returns the `Fl_Offscreen` object associated to the image surface.

The returned `Fl_Offscreen` object is deleted when the `Fl_Image_Surface` object is deleted, unless the `Fl_Image_Surface` was constructed with non-null `Fl_Offscreen` argument.

12.73.3.6 origin() [1/2]

```
void Fl_Image_Surface::origin (
    int * x,
    int * y ) [virtual]
```

Computes the coordinates of the current origin of graphics functions.

Parameters

<code>out</code>	<code>x,y</code>	If non-null, <code>*x</code> and <code>*y</code> are set to the horizontal and vertical coordinates of the graphics origin.
------------------	------------------	---

Reimplemented from [Fl_Widget_Surface](#).

12.73.3.7 origin() [2/2]

```
void Fl_Image_Surface::origin (
    int x,
    int y ) [virtual]
```

Sets the position of the origin of graphics in the drawable part of the drawing surface.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the drawable area. Successive [origin\(\)](#) calls don't combine their effects. [Origin\(\)](#) calls are not affected by [rotate\(\)](#) calls (for classes derived from [Fl_Paged_Device](#)).

Parameters

in	x,y	Horizontal and vertical positions in the drawing surface of the desired origin of graphics.
----	-----	---

Reimplemented from [Fl_Widget_Surface](#).

12.73.3.8 printable_rect()

```
int Fl_Image_Surface::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the drawable area of the drawing surface.

Values are in the same unit as that used by FLTK drawing functions and are unchanged by calls to [origin\(\)](#). If the object is derived from class [Fl_Paged_Device](#), values account for the user-selected paper type and print orientation and are changed by [scale\(\)](#) calls.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Widget_Surface](#).

12.73.3.9 rescale()

```
void Fl_Image_Surface::rescale ( )
```

Adapts the [Fl_Image_Surface](#) object to the new value of the GUI scale factor.

The [Fl_Image_Surface](#) object must not be the current drawing surface. This function is useful only for an object constructed with non-zero `high_res` parameter.

Version

1.4

12.73.3.10 set_current()

```
void Fl_Image_Surface::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests. Starting from FLTK 1.4.0, the preferred API to change the current drawing surface is [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Note

It's recommended to use this function only as follows :

- The current drawing surface is the display;
- make current another surface, e.g., an [Fl_Printer](#) or an [Fl_Image_Surface](#) object, calling [set_current\(\)](#) on this object;

- draw to that surface;
- make the display current again with `Fl_Display_Device::display_device()->set_current()`; . Don't do any other call to `set_current()` before this one.

Other scenarios of drawing surface changes should be performed via `Fl_Surface_Device::push_current()` / `Fl_Surface_Device::pop_current()`.

Reimplemented from `Fl_Surface_Device`.

12.73.3.11 translate()

```
void Fl_Image_Surface::translate (
    int x,
    int y ) [protected], [virtual]
```

Translates the current graphics origin accounting for the current rotation.

Each `translate()` call must be matched by an `untranslate()` call. Successive `translate()` calls add up their effects.

Reimplemented from `Fl_Widget_Surface`.

12.73.3.12 untranslate()

```
void Fl_Image_Surface::untranslate (
    void ) [protected], [virtual]
```

Undoes the effect of a previous `translate()` call.

Reimplemented from `Fl_Widget_Surface`.

The documentation for this class was generated from the following files:

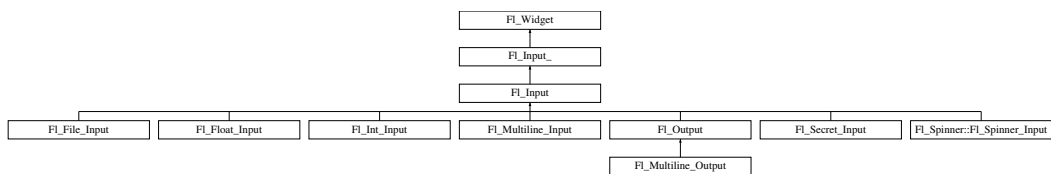
- `Fl_Image_Surface.H`
- `Fl_Image_Surface.cxx`

12.74 Fl_Input Class Reference

This is the FLTK text input widget.

```
#include <Fl_Input.H>
```

Inheritance diagram for `Fl_Input`:



Public Member Functions

- `Fl_Input` (int, int, int, int, const char *s=0)
Creates a new `Fl_Input` widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.

Public Member Functions inherited from `Fl_Input_`

- int `append` (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool `can_redo` () const
Check if there is a redo action available.
- bool `can_undo` () const
Check if the last operation can be undone.

- int `copy` (int clipboard)
Put the current selection into the clipboard.
- int `copy_cuts` ()
Copies the yank buffer to the clipboard.
- `FI_Color` `cursor_color` () const
Gets the color of the cursor.
- void `cursor_color` (`FI_Color` n)
Sets the color of the cursor.
- int `cut` ()
Deletes the current selection.
- int `cut` (int a, int b)
Deletes all characters between index a and b.
- int `cut` (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double `dvalue` () const
Returns the widget text interpreted as a floating point number.
- `FI_Input_` (int, int, int, const char *=0)
Creates a new `FI_Input_` widget.
- unsigned int `index` (int i) const
Returns the character at index i.
- int `input_type` () const
Gets the input field type.
- void `input_type` (int t)
Sets the input field type.
- int `insert` (const char *t, int l=0)
Inserts text at the cursor position.
- int `insert_position` () const
Gets the position of the text cursor.
- int `insert_position` (int p)
Sets the cursor position and mark.
- int `insert_position` (int p, int m)
Sets the index for the cursor and mark.
- int `ivalue` () const
Returns the widget text interpreted as a signed integer.
- int `mark` () const
Gets the current selection mark.
- int `mark` (int m)
Sets the current selection mark.
- int `maximum_size` () const
Gets the maximum length of the input field in characters.
- void `maximum_size` (int m)
Sets the maximum length of the input field in characters.
- int `position` () const
- int `position` (int p)
- int `position` (int p, int m)
- int `readonly` () const
Gets the read-only state of the input field.
- void `readonly` (int b)
Sets the read-only state of the input field.
- int `redo` ()
Redo previous undo operation.

- int [replace](#) (int b, int e, const char *text, int ilen=0)
Deletes text from b to e and inserts the new string text.
- void [resize](#) (int, int, int, int) [FL_OVERRIDE](#)
Changes the size of the widget.
- int [shortcut](#) () const
Return the shortcut key associated with this widget.
- void [shortcut](#) (int s)
Sets the shortcut key associated with this widget.
- int [size](#) () const
Returns the number of bytes in value().
- void [size](#) (int W, int H)
Sets the width and height of this widget.
- int [static_value](#) (const char *)
Changes the widget text.
- int [static_value](#) (const char *, int)
Changes the widget text.
- int [tab_nav](#) () const
Gets whether the Tab key causes focus navigation in multiline input fields or not.
- void [tab_nav](#) (int val)
Sets whether the Tab key does focus navigation, or inserts tab characters into [Fl_Multiline_Input](#).
- [Fl_Color](#) [textcolor](#) () const
Gets the color of the text in the input field.
- void [textcolor](#) ([Fl_Color](#) n)
Sets the color of the text in the input field.
- [Fl_Font](#) [textfont](#) () const
Gets the font of the text in the input field.
- void [textfont](#) ([Fl_Font](#) s)
Sets the font of the text in the input field.
- [Fl_Fontsize](#) [textsize](#) () const
Gets the size of the text in the input field.
- void [textsize](#) ([Fl_Fontsize](#) s)
Sets the size of the text in the input field.
- int [undo](#) ()
Undoes previous changes to the text buffer.
- const char * [value](#) () const
Returns the text displayed in the widget.
- int [value](#) (const char *)
Changes the widget text.
- int [value](#) (const char *, int)
Changes the widget text.
- int [value](#) (double value)
Changes the widget text to a floating point number ("%g").
- int [value](#) (int value)
Changes the widget text to a signed integer number.
- int [wrap](#) () const
Gets the word wrapping state of the input field.
- void [wrap](#) (int b)
Sets the word wrapping state of the input field.
- [~Fl_Input_](#) ()
Destroys the widget.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const

Gets the background color of the widget.
- void `color` (`FI_Color` bg)

Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)

Sets the background and selection color of the widget.
- `FI_Color` `color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget` *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar` `damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image` * `deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image` * `deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype` `a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` `c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` `f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` `pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` `a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
 - Returns if a widget is used for output only.*
 - `FI_Group * parent` () const
 - Returns a pointer to the parent widget.*
 - void `parent` (`FI_Group *p`)
 - Internal use only - "for hacks only".*
 - void `position` (int X, int Y)
 - Repositions the window or widget.*
 - void `redraw` ()
 - Schedules the drawing of the widget.*
 - void `redraw_label` ()
 - Schedules the drawing of the label.*
 - `FI_Color selection_color` () const
 - Gets the selection color.*
 - void `selection_color` (`FI_Color a`)
 - Sets the selection color.*
 - void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
 - void `set_changed` ()
 - Marks the value of the widget as changed.*
 - void `set_output` ()
 - Sets a widget to output only.*
 - void `set_visible` ()
 - Makes the widget visible.*
 - void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
 - int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
 - void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
 - virtual void `show` ()
 - Makes a widget visible.*
 - void `size` (int W, int H)
 - Changes the size of the widget.*
 - int `take_focus` ()
 - Gives the widget the keyboard focus.*
 - unsigned int `takeevents` () const
 - Returns if the widget is able to take events.*
 - int `test_shortcut` ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
 - const char * `tooltip` () const
 - Gets the current tooltip text.*
 - void `tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `FI_Window * top_window` () const
 - Returns a pointer to the top-level window for the widget.*
 - `FI_Window * top_window_offset` (int &xoff, int &yoff) const
 - Finds the x/y offset of the current widget relative to the top-level window.*
 - `uchar type` () const
 - Gets the widget type.*

- void `type` (uchar t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (Fl_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `Fl_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `Fl_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~Fl_Widget` ()
Destroys the widget.

Static Public Attributes

- static const char * `copy_menu_text` = "Copy"
[this text may be customized at run-time]
- static const char * `cut_menu_text` = "Cut"
[this text may be customized at run-time]
- static const char * `paste_menu_text` = "Paste"
[this text may be customized at run-time]

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draws the widget.
- int `handle_key` ()
Handles a keystroke.
- int `handle_rmb` ()
Handle right mouse button down events.

Protected Member Functions inherited from [FI_Input_](#)

- int [apply_undo](#) ()
Apply the current undo/redo operation.
- void [drawtext](#) (int, int, int, int)
Draws the text in the passed bounding box.
- void [drawtext](#) (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.
- void [handle_mouse](#) (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int [handletext](#) (int e, int, int, int, int)
Handles all kinds of text field related events.
- int [line_end](#) (int i) const
Finds the end of a line.
- int [line_start](#) (int i) const
Finds the start of a line.
- int [linesPerPage](#) ()
- void [maybe_do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- int [up_down_position](#) (int, int keepmark=0)
Moves the cursor to the column given by `up_down_pos`.
- int [word_end](#) (int i) const
Finds the end of a word.
- int [word_start](#) (int i) const
Finds the start of a word.
- int [xscroll](#) () const
- int [yscroll](#) () const
- void [yscroll](#) (int yOffset)

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.

- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Friends

- class **FI_Cocoa_Screen_Driver**
- class **FI_Screen_Driver**

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
 ,
OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
 ,
MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
 ,
GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
 = 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

12.74.1 Detailed Description

This is the FLTK text input widget.

It displays a single line of text and lets the user edit it. Normally it is drawn with an inset box and a white background. The text may contain any characters, and will correctly display any UTF text, using ^X notation for unprintable control characters. It assumes the font can draw any characters of the used scripts, which is true for standard fonts under Windows and Mac OS X. Characters can be input using the keyboard or the character palette/map. Character composition is done using dead keys and/or a compose key as defined by the operating system.

Table 12.296 Keyboard and mouse bindings.

Mouse button 1	Moves the cursor to this point. Drag selects characters. Double click selects words. Triple click selects all line. Shift+click extends the selection. When you select text it is automatically copied to the selection buffer.
Mouse button 2	Insert the selection buffer at the point clicked. You can also select a region and replace it with the selection buffer by selecting the region with mouse button 2.
Mouse button 3	Currently acts like button 1.
Backspace	Deletes one character to the left, or deletes the selected region.
Delete	Deletes one character to the right, or deletes the selected region. Combine with Shift for equivalent of <code>^X</code> (copy+cut).
Enter	May cause the callback, see when() .

Table 12.297 Platform specific keyboard bindings.

Windows/Linux	Mac	Function
^A	Command-A	Selects all text in the widget.
^C	Command-C	Copy the current selection to the clipboard.
^I	^I	Insert a tab.
^J	^J	Insert a Line Feed. (Similar to literal 'Enter' character)
^L	^L	Insert a Form Feed.
^M	^M	Insert a Carriage Return.
^V, Shift-Insert	Command-V	Paste the clipboard. (Macs keyboards don't have "Insert" keys, but if they did, Shift-Insert would work)
^X, Shift-Delete	Command-X, Shift-Delete	Cut. Copy the selection to the clipboard and delete it. (If there's no selection, Shift-Delete acts like Delete)
^Z	Command-Z	Undo. This is a single-level undo mechanism, but all adjacent deletions and insertions are concatenated into a single "undo". Often this will undo a lot more than you expected.
Shift-^Z	Shift-Command-Z	Redo. Currently same behavior as <code>^Z</code> . Reserved for future multilevel undo/redo.
Arrow Keys	Arrow Keys	Standard cursor movement. Can be combined with Shift to extend selection.
Home	Command-Up, Command-Left	Move to start of line. Can be combined with Shift to extend selection.
End	Command-Down, Command-Right	Move to end of line. Can be combined with Shift to extend selection.
Ctrl-Home	Command-Up, Command-PgUp, Ctrl-Left	Move to top of document/field. In single line input, moves to start of line. In multiline input, moves to start of top line. Can be combined with Shift to extend selection.

Ctrl-End	Command-End, Command-PgDn, Ctrl-Right	Move to bottom of document/field. In single line input, moves to end of line. In multiline input, moves to end of last line. Can be combined with Shift to extend selection.
Ctrl-Left	Alt-Left	Word left. Can be combined with Shift to extend selection.
Ctrl-Right	Alt-Right	Word right. Can be combined with Shift to extend selection.
Ctrl-Backspace	Alt-Backspace	Delete word left.
Ctrl-Delete	Alt-Delete	Delete word right.

12.74.2 Constructor & Destructor Documentation

12.74.2.1 Fl_Input()

```
Fl_Input::Fl_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

12.74.3 Member Function Documentation

12.74.3.1 draw()

```
void Fl_Input::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.74.3.2 handle()

```
int Fl_Input::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

Reimplemented in [FI_Spinner::FI_Spinner_Input](#), and [FI_Secret_Input](#).

12.74.3.3 handle_key()

```
int FI_Input::handle_key ( ) [protected]
```

Handles a keystroke.

This `protected` method handles a keystroke in an [FI_Input](#) or derived class. It handles compose key sequences and can also be used e.g. in [FI_Multiline_Input](#), [FI_Float_Input](#) and several more derived classes.

The details are way too complicated to be documented here and can be changed as required. If in doubt, please consult the source code.

Returns

1 if the keystroke is handled by us, 0 if not.

12.74.3.4 handle_rmb()

```
int FI_Input::handle_rmb ( ) [protected]
```

Handle right mouse button down events.

Returns

1

The documentation for this class was generated from the following files:

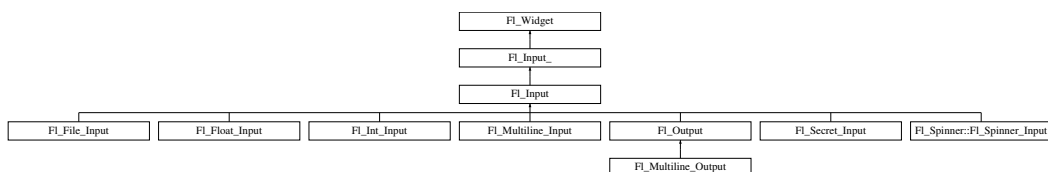
- [FI_Input.H](#)
- [FI_Input.cxx](#)

12.75 FI_Input_ Class Reference

This class provides a low-overhead text input field.

```
#include <FI_Input_.H>
```

Inheritance diagram for `FI_Input_`:



Public Member Functions

- int `append` (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool `can_redo` () const
Check if there is a redo action available.
- bool `can_undo` () const
Check if the last operation can be undone.
- int `copy` (int clipboard)
Put the current selection into the clipboard.
- int `copy_cuts` ()
Copies the yank buffer to the clipboard.
- `FI_Color` `cursor_color` () const
Gets the color of the cursor.
- void `cursor_color` (`FI_Color` n)
Sets the color of the cursor.
- int `cut` ()
Deletes the current selection.
- int `cut` (int a, int b)
Deletes all characters between index a and b.
- int `cut` (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double `dvalue` () const
Returns the widget text interpreted as a floating point number.
- `FI_Input_` (int, int, int, int, const char *s=0)
Creates a new FI_Input_ widget.
- unsigned int `index` (int i) const
Returns the character at index i.
- int `input_type` () const
Gets the input field type.
- void `input_type` (int t)
Sets the input field type.
- int `insert` (const char *t, int l=0)
Inserts text at the cursor position.
- int `insert_position` () const
Gets the position of the text cursor.
- int `insert_position` (int p)
Sets the cursor position and mark.
- int `insert_position` (int p, int m)
Sets the index for the cursor and mark.
- int `ivalue` () const
Returns the widget text interpreted as a signed integer.
- int `mark` () const
Gets the current selection mark.
- int `mark` (int m)
Sets the current selection mark.
- int `maximum_size` () const
Gets the maximum length of the input field in characters.
- void `maximum_size` (int m)
Sets the maximum length of the input field in characters.
- int `position` () const

- int [position](#) (int p)
- int [position](#) (int p, int m)
- int [readonly](#) () const
Gets the read-only state of the input field.
- void [readonly](#) (int b)
Sets the read-only state of the input field.
- int [redo](#) ()
Redo previous undo operation.
- int [replace](#) (int b, int e, const char *text, int ilen=0)
Deletes text from b to e and inserts the new string text.
- void [resize](#) (int, int, int, int) [FL_OVERRIDE](#)
Changes the size of the widget.
- int [shortcut](#) () const
Return the shortcut key associated with this widget.
- void [shortcut](#) (int s)
Sets the shortcut key associated with this widget.
- int [size](#) () const
Returns the number of bytes in value().
- void [size](#) (int W, int H)
Sets the width and height of this widget.
- int [static_value](#) (const char *)
Changes the widget text.
- int [static_value](#) (const char *, int)
Changes the widget text.
- int [tab_nav](#) () const
Gets whether the Tab key causes focus navigation in multiline input fields or not.
- void [tab_nav](#) (int val)
Sets whether the Tab key does focus navigation, or inserts tab characters into [Fl_Multiline_Input](#).
- [Fl_Color](#) [textcolor](#) () const
Gets the color of the text in the input field.
- void [textcolor](#) ([Fl_Color](#) n)
Sets the color of the text in the input field.
- [Fl_Font](#) [textfont](#) () const
Gets the font of the text in the input field.
- void [textfont](#) ([Fl_Font](#) s)
Sets the font of the text in the input field.
- [Fl_Fontsize](#) [textsize](#) () const
Gets the size of the text in the input field.
- void [textsize](#) ([Fl_Fontsize](#) s)
Sets the size of the text in the input field.
- int [undo](#) ()
Undoes previous changes to the text buffer.
- const char * [value](#) () const
Returns the text displayed in the widget.
- int [value](#) (const char *)
Changes the widget text.
- int [value](#) (const char *, int)
Changes the widget text.
- int [value](#) (double value)
Changes the widget text to a floating point number ("%g").
- int [value](#) (int value)

- Changes the widget text to a signed integer number.*
- int `wrap` () const
 - Gets the word wrapping state of the input field.*
- void `wrap` (int b)
 - Sets the word wrapping state of the input field.*
- `~FI_Input_` ()
 - Destroys the widget.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FI_Align align` () const
 - Gets the label alignment.*
- void `align` (`FI_Align` alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
 - Returns an `FI_Group` pointer if this widget is an `FI_Group`.*
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*

- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar` c)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar` c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (int, int, int, int)
 - Internal use only.*
- void `deactivate` ()
 - Deactivates the widget.*
- `FI_Image` * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
- const `FI_Image` * `deimage` () const

- Gets the image that is used as part of the widget label when in the inactive state.*

 - void [deimage](#) ([FI_Image](#) &img)

Sets the image to use as part of the widget label when in the inactive state.

 - void [deimage](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.

 - int [deimage_bound](#) () const

Returns whether the inactive image is managed by the widget.

 - void [do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with default arguments.

 - void [do_callback](#) ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with arbitrary arguments.

 - void [do_callback](#) ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with arbitrary arguments.

 - virtual void [draw](#) ()=0

Draws the widget.

 - void [draw_label](#) (int, int, int, int, [FI_Align](#)) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.

 - int [h](#) () const

Gets the widget height.

 - virtual int [handle](#) (int event)

Handles the specified event.

 - virtual void [hide](#) ()

Makes a widget invisible.

 - [FI_Image](#) * [image](#) ()

Gets the image that is used as part of the widget label when in the active state.

 - const [FI_Image](#) * [image](#) () const

Gets the image that is used as part of the widget label when in the active state.

 - void [image](#) ([FI_Image](#) &img)

Sets the image to use as part of the widget label when in the active state.

 - void [image](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.

 - int [image_bound](#) () const

Returns whether the image is managed by the widget.

 - int [inside](#) (const [FI_Widget](#) *wgt) const

Checks if this widget is a child of wgt.

 - int [is_label_copied](#) () const

Returns whether the current label was assigned with [copy_label\(\)](#).

 - const char * [label](#) () const

Gets the current label text.

 - void [label](#) (const char *text)

Sets the current label pointer.

 - void [label](#) ([FI_Labeltype](#) a, const char *b)

Shortcut to set the label text and type in one call.

 - [FI_Color](#) [labelcolor](#) () const

Gets the label color.

 - void [labelcolor](#) ([FI_Color](#) c)

Sets the label color.

 - [FI_Font](#) [labelfont](#) () const

Gets the font to use.

 - void [labelfont](#) ([FI_Font](#) f)

Sets the font to use.

- [FL_Fonsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FL_Fonsize](#) pix)
Sets the font size in pixels.
- [FL_Labeltype](#) [labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FL_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FL_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FL_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- [FL_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FL_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()
Makes a widget visible.
- void [size](#) (int W, int H)
Changes the size of the widget.
- int [take_focus](#) ()
Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)
- Sets the current tooltip text.*

 - `FI_Window` * `top_window` () const
- Returns a pointer to the top-level window for the widget.*

 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - `uchar` `type` () const
- Gets the widget type.*

 - void `type` (`uchar` t)
- Sets the widget type.*

 - int `use_accents_menu` ()
- Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.*

 - void * `user_data` () const
- Gets the user data for this widget.*

 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
- Sets the user data for this widget.*

 - void `user_data` (void *v)
- Sets the user data for this widget.*

 - unsigned int `visible` () const
- Returns whether a widget is visible.*

 - unsigned int `visible_focus` () const
- Checks whether this widget has a visible focus.*

 - void `visible_focus` (int v)
- Modifies keyboard focus navigation.*

 - int `visible_r` () const
- Returns whether a widget and all its parents are visible.*

 - int `w` () const
- Gets the widget width.*

 - `FI_When` `when` () const
- Returns the conditions under which the callback is called.*

 - void `when` (`uchar` i)
- Sets the flags used to decide when a callback is called.*

 - `FI_Window` * `window` () const
- Returns a pointer to the nearest parent window up the widget hierarchy.*

 - int `x` () const
- Gets the widget position in its window.*

 - int `y` () const
- Gets the widget position in its window.*

 - virtual `~FI_Widget` ()
- Destroys the widget.*

Protected Member Functions

- int [apply_undo](#) ()
Apply the current undo/redo operation.
- void [drawtext](#) (int, int, int, int)
Draws the text in the passed bounding box.
- void [drawtext](#) (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.
- void [handle_mouse](#) (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int [handletext](#) (int e, int, int, int, int)
Handles all kinds of text field related events.
- int [line_end](#) (int i) const
Finds the end of a line.
- int [line_start](#) (int i) const
Finds the start of a line.
- int [linesPerPage](#) ()
- void [maybe_do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- int [up_down_position](#) (int, int keepmark=0)
Moves the cursor to the column given by `up_down_pos`.
- int [word_end](#) (int i) const
Finds the end of a word.
- int [word_start](#) (int i) const
Finds the start of a word.
- int [xscroll](#) () const
- int [yscroll](#) () const
- void [yscroll](#) (int yOffset)

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.

- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
,
OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
,
MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
,
GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

12.75.1 Detailed Description

This class provides a low-overhead text input field.

This is a virtual base class below [FI_Input](#). It has all the same interfaces, but lacks the [handle\(\)](#) and [draw\(\)](#) method. You may want to subclass it if you are one of those people who likes to change how the editing keys work. It may also be useful for adding scrollbars to the input field.

This can act like any of the subclasses of [FI_Input](#), by setting [type\(\)](#) to one of the following values:

```
#define FL_NORMAL_INPUT      0
#define FL_FLOAT_INPUT      1
#define FL_INT_INPUT        2
#define FL_MULTILINE_INPUT  4
#define FL_SECRET_INPUT     5
#define FL_INPUT_TYPE       7
#define FL_INPUT_READONLY   8
#define FL_NORMAL_OUTPUT    (FL_NORMAL_INPUT | FL_INPUT_READONLY)
#define FL_MULTILINE_OUTPUT (FL_MULTILINE_INPUT | FL_INPUT_READONLY)
#define FL_INPUT_WRAP      16
```

```
#define FL_MULTILINE_INPUT_WRAP (FL_MULTILINE_INPUT | FL_INPUT_WRAP)
#define FL_MULTILINE_OUTPUT_WRAP (FL_MULTILINE_INPUT | FL_INPUT_READONLY | FL_INPUT_WRAP)
```

All variables that represent an index into a text buffer are byte-oriented, not character oriented, counting from 0 (at or before the first character) to `size()` (at the end of the buffer, after the last byte). Since UTF-8 characters can be up to six bytes long, simply incrementing such an index will not reliably advance to the next character in the text buffer. Indices and pointers into the text buffer should always point at a 7 bit ASCII character or the beginning of a UTF-8 character sequence. Behavior for false UTF-8 sequences and pointers into the middle of a sequence are undefined.

See also

[Fl_Text_Display](#), [Fl_Text_Editor](#) for more powerful text handling widgets

[Fl_Widget::shortcut_label\(int\)](#)

12.75.2 Constructor & Destructor Documentation

12.75.2.1 Fl_Input_()

```
Fl_Input_::Fl_Input_ (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Input_](#) widget.

This function creates a new [Fl_Input_](#) widget and adds it to the current [Fl_Group](#). The `value()` is set to `NULL`. The default boxtype is `FL_DOWN_BOX`.

Parameters

<code>X,Y,W,H</code>	the dimensions of the new widget
<code>l</code>	an optional label text

12.75.2.2 ~Fl_Input_()

```
Fl_Input_::~~Fl_Input_ ( )
```

Destroys the widget.

The destructor clears all allocated buffers and removes the widget from the parent [Fl_Group](#).

12.75.3 Member Function Documentation

12.75.3.1 append()

```
int Fl_Input_::append (
    const char * t,
    int l = 0,
    char keep_selection = 0 )
```

Append text at the end.

This function appends the string in `t` to the end of the text. It does not moves the new position or mark.

Parameters

in	<code>t</code>	text that will be appended
in	<code>l</code>	length of text, or 0 if the string is terminated by <code>nul</code> .
in	<code>keep_selection</code>	if this is 1, the current text selection will remain, if 0, the cursor will move to the end of the inserted text.

Returns

0 if no text was appended

12.75.3.2 apply_undo()

```
int Fl_Input_::apply_undo ( ) [protected]
```

Apply the current undo/redo operation.

It's up to [undo\(\)](#) and [redo\(\)](#) to push and pop actions to and from the lists.

Returns

1 if the current action changed any text.

See also

[undo\(\)](#), [redo\(\)](#)

12.75.3.3 can_redo()

```
bool Fl_Input_::can_redo ( ) const
```

Check if there is a redo action available.

Returns

true if the widget can redo the last undo action

12.75.3.4 can_undo()

```
bool Fl_Input_::can_undo ( ) const
```

Check if the last operation can be undone.

Returns

true if the widget can unod the last change

12.75.3.5 copy()

```
int Fl_Input_::copy (
    int clipboard )
```

Put the current selection into the clipboard.

This function copies the current selection between [mark\(\)](#) and [position\(\)](#) into the specified `clipboard`. This does not replace the old clipboard contents if [position\(\)](#) and [mark\(\)](#) are equal. Clipboard 0 maps to the current text selection and clipboard 1 maps to the cut/paste clipboard.

Parameters

<i>clipboard</i>	the clipboard destination 0 or 1
------------------	----------------------------------

Returns

0 if no text is selected, 1 if the selection was copied

See also

`Fl::copy(const char *, int, int)`

12.75.3.6 copy_cuts()

```
int Fl_Input_::copy_cuts ( )
```

Copies the *yank* buffer to the clipboard.

This method copies all the previous contiguous cuts from the undo information to the clipboard. This function implements the ^K shortcut key.

Returns

0 if the operation did not change the clipboard

See also

[copy\(int\)](#), [cut\(\)](#)

12.75.3.7 cursor_color() [1/2]

```
Fl_Color Fl_Input_::cursor_color ( ) const [inline]
```

Gets the color of the cursor.

Returns

the current cursor color

12.75.3.8 cursor_color() [2/2]

```
void Fl_Input_::cursor_color (
    Fl_Color n ) [inline]
```

Sets the color of the cursor.

The default color for the cursor is `FL_BLACK`.

Parameters

<i>in</i>	<i>n</i>	the new cursor color
-----------	----------	----------------------

12.75.3.9 cut() [1/3]

```
int Fl_Input_::cut ( ) [inline]
```

Deletes the current selection.

This function deletes the currently selected text *without* storing it in the clipboard. To use the clipboard, you may call [copy\(\)](#) first or [copy_cuts\(\)](#) after this call.

Returns

0 if no data was copied

12.75.3.10 cut() [2/3]

```
int Fl_Input_::cut (
    int a,
    int b ) [inline]
```

Deletes all characters between index *a* and *b*.

This function deletes the currently selected text *without* storing it in the clipboard. To use the clipboard, you may call [copy\(\)](#) first or [copy_cuts\(\)](#) after this call.

Parameters

<i>a,b</i>	range of bytes rounded to full characters and clamped to the buffer
------------	---

Returns

0 if no data was copied

12.75.3.11 cut() [3/3]

```
int Fl_Input_::cut (
    int n ) [inline]
```

Deletes the next *n* bytes rounded to characters before or after the cursor.

This function deletes the currently selected text *without* storing it in the clipboard. To use the clipboard, you may call [copy\(\)](#) first or [copy_cuts\(\)](#) after this call.

Parameters

<i>n</i>	number of bytes rounded to full characters and clamped to the buffer. A negative number will cut characters to the left of the cursor.
----------	--

Returns

0 if no data was copied

12.75.3.12 drawtext() [1/2]

```
void Fl_Input_::drawtext (
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Draws the text in the passed bounding box.

If [damage \(\)](#) & FL_DAMAGE_ALL is true, this assumes the area has already been erased to [color\(\)](#). Otherwise it does minimal update and erases the area itself.

Parameters

<i>X,Y,W,H</i>	area that must be redrawn
----------------	---------------------------

12.75.3.13 drawtext() [2/2]

```
void Fl_Input_::drawtext (
    int X,
    int Y,
    int W,
    int H,
    bool draw_active ) [protected]
```

Draws the text in the passed bounding box.

This version of `drawtext` allows the user to control whether the widget is drawn as active, i.e. with the text cursor, or inactive. This is useful for compound widgets where the input should be shown as active when actually the container widget is the active one.

A caller should not draw the widget with `active` set if another text widget may indeed be the active widget.

Parameters

<i>X,Y,W,H</i>	area that must be redrawn
<i>draw_active</i>	if set, the cursor will be drawn, even if the widget is not active

See also

[Fl_Input_::drawtext\(int X, int Y, int W, int H\)](#)

12.75.3.14 dvalue()

```
double Fl_Input_::dvalue ( ) const
```

Returns the widget text interpreted as a floating point number.

Returns

double precision floating point value

See also

[Fl_Input_::ivalue\(\)](#)

[Fl_Input_::value\(double\)](#)

12.75.3.15 handle_mouse()

```
void Fl_Input_::handle_mouse (
    int X,
    int Y,
    int ,
    int ,
    int drag = 0 ) [protected]
```

Handles mouse clicks and mouse moves.

Todo Add comment and parameters

12.75.3.16 handletext()

```
int Fl_Input_::handletext (
    int event,
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Handles all kinds of text field related events.

This is called by derived classes.

Todo Add comment and parameters

12.75.3.17 index()

```
unsigned int Fl_Input_::index (
    int i ) const
```

Returns the character at index *i*.

This function returns the UTF-8 character at *i* as a ucs4 character code.

Parameters

<i>i</i>	<i>i</i>	index into the value field
----------	----------	----------------------------

Returns

the character at index *i*

12.75.3.18 input_type() [1/2]

```
int Fl_Input_::input_type ( ) const [inline]
```

Gets the input field type.

Returns

the current input type

12.75.3.19 input_type() [2/2]

```
void Fl_Input_::input_type (
    int t ) [inline]
```

Sets the input field type.

A [redraw\(\)](#) is required to reformat the input field.

Parameters

in	t	new input type
----	---	----------------

12.75.3.20 insert()

```
int Fl_Input_::insert (
    const char * t,
    int l = 0 ) [inline]
```

Inserts text at the cursor position.

This function inserts the string in `t` at the cursor [position\(\)](#) and moves the new position and mark to the end of the inserted text.

Parameters

in	t	text that will be inserted
in	l	length of text, or 0 if the string is terminated by nul.

Returns

0 if no text was inserted

12.75.3.21 insert_position() [1/3]

```
int Fl_Input_::insert_position ( ) const [inline]
```

Gets the position of the text cursor.

Returns

the cursor position as an index in the range 0..[size\(\)](#)

See also

[insert_position\(int, int\)](#)

12.75.3.22 insert_position() [2/3]

```
int Fl_Input_::insert_position (
    int p ) [inline]
```

Sets the cursor position and mark.

`position(n)` is the same as `position(n, n)`.

Parameters

<i>p</i>	new index for cursor and mark
----------	-------------------------------

Returns

0 if no positions changed

See also

[insert_position\(int, int\)](#), [insert_position\(\)](#), [mark\(int\)](#)

12.75.3.23 insert_position() [3/3]

```
int Fl_Input_::insert_position (
    int p,
    int m )
```

Sets the index for the cursor and mark.

The input widget maintains two pointers into the string. The *position* (*p*) is where the cursor is. The *mark* (*m*) is the other end of the selected text. If they are equal then there is no selection. Changing this does not affect the clipboard (use [copy\(\)](#) to do that).

Changing these values causes a [redraw\(\)](#). The new values are bounds checked.

Parameters

<i>p</i>	index for the cursor position
<i>m</i>	index for the mark

Returns

0 if no positions changed

See also

[position\(int\)](#), [position\(\)](#), [mark\(int\)](#)

12.75.3.24 ivalue()

```
int Fl_Input_::ivalue ( ) const
```

Returns the widget text interpreted as a signed integer.

Returns

signed integer value

See also

[Fl_Input_::dvalue\(\)](#)

[Fl_Input_::value\(int\)](#)

12.75.3.25 line_end()

```
int Fl_Input_::line_end (
    int i ) const [protected]
```

Finds the end of a line.

This call calculates the end of a line based on the given index *i*.

Parameters

<code>in</code>	<code>i</code>	starting index for the search
-----------------	----------------	-------------------------------

Returns

end of the line

12.75.3.26 line_start()

```
int Fl_Input_::line_start (
    int i ) const [protected]
```

Finds the start of a line.

This call calculates the start of a line based on the given index `i`.

Parameters

<code>in</code>	<code>i</code>	starting index for the search
-----------------	----------------	-------------------------------

Returns

start of the line

12.75.3.27 mark() [1/2]

```
int Fl_Input_::mark ( ) const [inline]
```

Gets the current selection mark.

Returns

index into the text

12.75.3.28 mark() [2/2]

```
int Fl_Input_::mark (
    int m ) [inline]
```

Sets the current selection mark.

`mark(n)` is the same as `insert_position(insert_position(),n)`.

Parameters

<code>m</code>	new index of the mark
----------------	-----------------------

Returns

0 if the mark did not change

See also

[insert_position\(\)](#), [insert_position\(int, int\)](#)

12.75.3.29 maximum_size() [1/2]

```
int Fl_Input_::maximum_size ( ) const [inline]
```

Gets the maximum length of the input field in characters.

See also

[maximum_size\(int\)](#).

12.75.3.30 maximum_size() [2/2]

```
void Fl_Input_::maximum_size (
    int m ) [inline]
```

Sets the maximum length of the input field in characters.

This limits the number of **characters** that can be inserted in the widget.

Since FLTK 1.3 this is different than the buffer size, since one character can be more than one byte in UTF-8 encoding. In FLTK 1.1 this was the same (one byte = one character).

12.75.3.31 position() [1/3]

```
int Fl_Input_::position ( ) const [inline]
```

Deprecated "in 1.4.0 - use insert_position() instead"

12.75.3.32 position() [2/3]

```
int Fl_Input_::position (
    int p ) [inline]
```

Deprecated "in 1.4.0 - use insert_position(p) instead"

12.75.3.33 position() [3/3]

```
int Fl_Input_::position (
    int p,
    int m ) [inline]
```

Deprecated "in 1.4.0 - use insert_position(p, m) or Fl_Widget::position(x, y) instead"

12.75.3.34 readonly() [1/2]

```
int Fl_Input_::readonly ( ) const [inline]
```

Gets the read-only state of the input field.

Returns

non-zero if this widget is read-only

12.75.3.35 readonly() [2/2]

```
void Fl_Input_::readonly (
    int b ) [inline]
```

Sets the read-only state of the input field.

Parameters

in	<i>b</i>	if <i>b</i> is 0, the text in this widget can be edited by the user
----	----------	---

12.75.3.36 redo()

```
int Fl_Input_::redo ( )
```

Redo previous undo operation.

This call reapplies previously executed undo operations.

Returns

non-zero if any change was made.

12.75.3.37 replace()

```
int Fl_Input_::replace (
    int b,
    int e,
    const char * text,
    int ilen = 0 )
```

Deletes text from `b` to `e` and inserts the new string `text`.

All changes to the text buffer go through this function. It deletes the region between `b` and `e` (either one may be less or equal to the other), and then inserts the string `text` at that point and moves the `mark()` and `position()` to the end of the insertion. Does the callback if `when()` & `FL_WHEN_CHANGED` and there is a change.

Set `b` and `e` equal to not delete anything. Set `text` to `NULL` to not insert anything.

`ilen` can be zero or `strlen(text)`, which saves a tiny bit of time if you happen to already know the length of the insertion, or can be used to insert a portion of a string. If `ilen` is zero, `strlen(text)` is used instead.

`b` and `e` are clamped to the `0..size()` range, so it is safe to pass any values. `b`, `e`, and `ilen` are used as numbers of bytes (not characters), where `b` and `e` count from 0 to `size()` (end of buffer).

If `b` and/or `e` don't point to a valid UTF-8 character boundary, they are adjusted to the previous (`b`) or the next (`e`) valid UTF-8 character boundary, resp..

If the current number of characters in the buffer minus deleted characters plus inserted characters in `text` would overflow the number of allowed characters (`maximum_size()`), then only the first characters of the string are inserted, so that `maximum_size()` is not exceeded.

`cut()` and `insert()` are just inline functions that call `replace()`.

Parameters

in	<i>b</i>	beginning index of text to be deleted
in	<i>e</i>	ending index of text to be deleted and insertion position
in	<i>text</i>	string that will be inserted
in	<i>ilen</i>	length of <code>text</code> or 0 for nul terminated strings

Returns

0 if nothing changed

Note

If `text` does not point to a valid UTF-8 character or includes invalid UTF-8 sequences, the text is inserted nevertheless (counting invalid UTF-8 bytes as one character each).

12.75.3.38 resize()

```
void Fl_Input_::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Changes the size of the widget.

This call updates the text layout so that the cursor is visible.

Parameters

in	<i>X,Y,W,H</i>	new size of the widget
----	----------------	------------------------

See also

[Fl_Widget::resize\(int, int, int, int\)](#)

Reimplemented from [Fl_Widget](#).

12.75.3.39 shortcut() [1/2]

```
int Fl_Input_::shortcut ( ) const [inline]
```

Return the shortcut key associated with this widget.

Returns

shortcut keystroke

See also

[Fl_Button::shortcut\(\)](#)

12.75.3.40 shortcut() [2/2]

```
void Fl_Input_::shortcut (
    int s ) [inline]
```

Sets the shortcut key associated with this widget.
Pressing the shortcut key gives text editing focus to this widget.

Parameters

in	<i>s</i>	new shortcut keystroke
----	----------	------------------------

See also

[Fl_Button::shortcut\(\)](#)

12.75.3.41 size() [1/2]

```
int Fl_Input_::size ( ) const [inline]
```

Returns the number of bytes in [value\(\)](#).

This may be greater than `strlen(value())` if there are nul characters in the text.

Returns

number of bytes in the text

12.75.3.42 size() [2/2]

```
void Fl_Input_::size (
    int W,
    int H ) [inline]
```

Sets the width and height of this widget.

Parameters

in	<i>W,H</i>	new width and height
----	------------	----------------------

See also

[Fl_Widget::size\(int, int\)](#)

12.75.3.43 static_value() [1/2]

```
int Fl_Input_::static_value (
    const char * str )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is *not* copied. If the user edits the string it is copied to the internal buffer then. This can save a great deal of time and memory if your program is rapidly changing the values of text fields, but this will only work if the passed string remains unchanged until either the [Fl_Input](#) is destroyed or [value\(\)](#) is called again.

Parameters

in	<i>str</i>	the new text
----	------------	--------------

Returns

non-zero if the new value is different than the current one

12.75.3.44 static_value() [2/2]

```
int Fl_Input_::static_value (
    const char * str,
    int len )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is *not* copied. If the user edits the string it is copied to the internal buffer then. This can save a great deal of time and memory if your program is rapidly changing the values of text fields, but this will only work if the passed string remains unchanged until either the [Fl_Input](#) is destroyed or [value\(\)](#) is called again.

You can use the `len` parameter to directly set the length if you know it already or want to put `nul` characters in the text.

Parameters

in	<i>str</i>	the new text
in	<i>len</i>	the length of the new text

Returns

non-zero if the new value is different than the current one

12.75.3.45 tab_nav() [1/2]

```
int Fl_Input_::tab_nav ( ) const [inline]
```

Gets whether the Tab key causes focus navigation in multiline input fields or not.

If enabled (default), hitting Tab causes focus navigation to the next widget.

If disabled, hitting Tab inserts a tab character into the text field.

Returns

1 if Tab advances focus (default), 0 if Tab inserts tab characters.

See also

[tab_nav\(int\)](#), [Fl::OPTION_ARROW_FOCUS](#).

12.75.3.46 tab_nav() [2/2]

```
void Fl_Input_::tab_nav (
    int val ) [inline]
```

Sets whether the Tab key does focus navigation, or inserts tab characters into [Fl_Multiline_Input](#).

By default this flag is enabled to provide the 'normal' behavior most users expect; Tab navigates focus to the next widget. To inserting an actual Tab character, users can use Ctrl-I or copy/paste.

Disabling this flag gives the old FLTK behavior where Tab inserts a tab character into the text field, in which case only the mouse can be used to navigate to the next field.

History: This flag was provided for backwards support of FLTK's old 1.1.x behavior where Tab inserts a tab character instead of navigating focus to the next widget. This behavior was unique to [Fl_Multiline_Input](#). With the advent of [Fl_Text_Editor](#), this old behavior has been deprecated.

Parameters

in	<i>val</i>	If <i>val</i> is 1, Tab advances focus (default). If <i>val</i> is 0, Tab inserts a tab character (old FLTK behavior).
----	------------	---

See also

[tab_nav\(\)](#), [Fl::OPTION_ARROW_FOCUS](#).

12.75.3.47 textcolor() [1/2]

```
Fl_Color Fl_Input_::textcolor ( ) const [inline]
```

Gets the color of the text in the input field.

Returns

the text color

See also

[textcolor\(Fl_Color\)](#)

12.75.3.48 textcolor() [2/2]

```
void Fl_Input_::textcolor (
    Fl_Color n ) [inline]
```

Sets the color of the text in the input field.

The text color defaults to `FL_FOREGROUND_COLOR`.

Parameters

in	<i>n</i>	new text color
----	----------	----------------

See also

[textcolor\(\)](#)

12.75.3.49 textfont() [1/2]

```
Fl_Font Fl_Input_::textfont ( ) const [inline]
```

Gets the font of the text in the input field.

Returns

the current `Fl_Font` index

12.75.3.50 textfont() [2/2]

```
void Fl_Input_::textfont (
    Fl_Font s ) [inline]
```

Sets the font of the text in the input field.
The text font defaults to FL_HELVETICA.

Parameters

in	s	the new text font
----	---	-------------------

12.75.3.51 textsize() [1/2]

```
Fl_Fontsize Fl_Input_::textsize ( ) const [inline]
```

Gets the size of the text in the input field.

Returns

the text height in pixels

12.75.3.52 textsize() [2/2]

```
void Fl_Input_::textsize (
    Fl_Fontsize s ) [inline]
```

Sets the size of the text in the input field.
The text height defaults to FL_NORMAL_SIZE.

Parameters

in	s	the new font height in pixel units
----	---	------------------------------------

12.75.3.53 undo()

```
int Fl_Input_::undo ( )
```

Undoes previous changes to the text buffer.
This call undoes a number of previous calls to [replace\(\)](#).

Returns

non-zero if any change was made.

12.75.3.54 up_down_position()

```
int Fl_Input_::up_down_position (
    int i,
    int keepmark = 0 ) [protected]
```

Moves the cursor to the column given by `up_down_pos`.
This function is helpful when implementing up and down cursor movement. It moves the cursor from the beginning of a line to the column indicated by the global variable `up_down_pos` in pixel units.

Parameters

in	<i>i</i>	index into the beginning of a line of text
in	<i>keepmark</i>	if set, move only the cursor, but not the mark

Returns

index to new cursor position

12.75.3.55 value() [1/5]

```
const char * Fl_Input_::value ( ) const [inline]
```

Returns the text displayed in the widget.

This function returns the current value, which is a pointer to the internal buffer and is valid only until the next event is handled.

Returns

pointer to an internal buffer - do not free() this

See also

[Fl_Input_::value\(const char*\)](#)

12.75.3.56 value() [2/5]

```
int Fl_Input_::value (
    const char * str )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is copied to the internal buffer. Passing `NULL` is the same as `""`.

Parameters

in	<i>str</i>	the new text
----	------------	--------------

Returns

non-zero if the new value is different than the current one

See also

[Fl_Input_::value\(const char* str, int len\)](#), [Fl_Input_::value\(\)](#)

12.75.3.57 value() [3/5]

```
int Fl_Input_::value (
    const char * str,
    int len )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is copied to the internal buffer. Passing `NULL` is the same as `""`.

You can use the `length` parameter to directly set the length if you know it already or want to put `nul` characters in the text.

Parameters

in	<i>str</i>	the new text
in	<i>len</i>	the length of the new text

Returns

non-zero if the new value is different than the current one

See also

[Fl_Input_::value\(const char* str\)](#), [Fl_Input_::value\(\)](#)

12.75.3.58 value() [4/5]

```
int Fl_Input_::value (
    double v )
```

Changes the widget text to a floating point number ("%g").

Parameters

in	v	the new value
----	---	---------------

Returns

non-zero if the new value is different than the current one

See also

[Fl_Input_::value\(const char* str\)](#), [Fl_Input_::ivalue\(\)](#)

12.75.3.59 value() [5/5]

```
int Fl_Input_::value (
    int v )
```

Changes the widget text to a signed integer number.

Parameters

in	v	the new value
----	---	---------------

Returns

non-zero if the new value is different than the current one

See also

[Fl_Input_::value\(const char* str\)](#), [Fl_Input_::ivalue\(\)](#)

12.75.3.60 word_end()

```
int Fl_Input_::word_end (
    int i ) const [protected]
```

Finds the end of a word.

Returns the index after the last byte of a word. If the index is already at the end of a word, it will find the end of the following word, so if you call it repeatedly you will move forwards to the end of the text.

Note that this is inconsistent with [line_end\(\)](#).

Parameters

in	i	starting index for the search
----	---	-------------------------------

Returns

end of the word

12.75.3.61 word_start()

```
int Fl_Input_::word_start (
    int i ) const [protected]
```

Finds the start of a word.

Returns the index of the first byte of a word. If the index is already at the beginning of a word, it will find the beginning of the previous word, so if you call it repeatedly you will move backwards to the beginning of the text.

Note that this is inconsistent with [line_start\(\)](#).

Parameters

in	<i>i</i>	starting index for the search
----	----------	-------------------------------

Returns

start of the word, or previous word

12.75.3.62 wrap() [1/2]

```
int Fl_Input_::wrap ( ) const [inline]
```

Gets the word wrapping state of the input field.

Word wrap is only functional with multi-line input fields.

12.75.3.63 wrap() [2/2]

```
void Fl_Input_::wrap (
    int b ) [inline]
```

Sets the word wrapping state of the input field.

Word wrap is only functional with multi-line input fields.

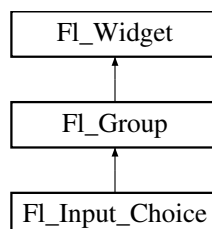
The documentation for this class was generated from the following files:

- `Fl_Input_.H`
- `Fl_Input_.cxx`

12.76 Fl_Input_Choice Class Reference

A combination of the input widget and a menu button.

Inheritance diagram for `Fl_Input_Choice`:

**Public Member Functions**

- void `add` (const char *s)
Adds an item to the menu.
- int `changed` () const

- Returns the combined [changed\(\)](#) state of the input and menu button widget.*
- void **clear** ()
 - Removes all items from the menu.*
- void **clear_changed** ()
 - Clears the [changed\(\)](#) state of both input and menu button widgets.*
- [FL_Boxtype](#) **down_box** () const
 - Gets the box type of the menu button.*
- void **down_box** ([FL_Boxtype](#) b)
 - Sets the box type of the menu button.*
- [FL_Input_Choice](#) (int X, int Y, int W, int H, const char *L=0)
 - Creates a new [FL_Input_Choice](#) widget using the given position, size, and label string.*
- [FL_Input](#) * **input** ()
 - Returns a pointer to the internal [FL_Input](#) widget.*
- const [FL_Menu_Item](#) * **menu** ()
 - Gets the [FL_Menu_Item](#) array used for the menu.*
- void **menu** (const [FL_Menu_Item](#) *m)
 - Sets the [FL_Menu_Item](#) array used for the menu.*
- [FL_Menu_Button](#) * **menubutton** ()
 - Returns a pointer to the internal [FL_Menu_Button](#) widget.*
- void **resize** (int X, int Y, int W, int H) [FL_OVERRIDE](#)
 - Resizes the [FL_Input_Choice](#) widget.*
- void **set_changed** ()
 - Sets the [changed\(\)](#) state of both input and menu button widgets to the specified value.*
- [FL_Color](#) **textcolor** () const
 - Gets the [FL_Input](#) text field's text color.*
- void **textcolor** ([FL_Color](#) c)
 - Sets the [FL_Input](#) text field's text color to c.*
- [FL_Font](#) **textfont** () const
 - Gets the [FL_Input](#) text field's font style.*
- void **textfont** ([FL_Font](#) f)
 - Sets the [FL_Input](#) text field's font style to f.*
- [FL_Fontsize](#) **textsize** () const
 - Gets the [FL_Input](#) text field's font size.*
- void **textsize** ([FL_Fontsize](#) s)
 - Sets the [FL_Input](#) text field's font size to s.*
- int **update_menubutton** ()
 - Updates the menubutton with the string value in [FL_Input](#).*
- const char * **value** () const
 - Returns the [FL_Input](#) text field's current contents.*
- void **value** (const char *val)
 - Sets the [FL_Input](#) text field's contents to val.*
- void **value** (int val)
 - Chooses item# val in the menu, and sets the [FL_Input](#) text field to that value.*

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *[&_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
*Removes the widget at *index* from the group and deletes it.*
- void [end](#) ()
Exactly the same as [current\(this->parent\(\)\)](#).
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\) const](#).*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does [insert\(w, find\(before\)\)](#).
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)

- Removes the widget `o` from the group.*
- void `remove` (int index)
 - Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget * resizable` () const
 - Returns the group's resizable widget.*
- void `resizable` (`FI_Widget &o`)
 - Sets the group's resizable widget.*
- void `resizable` (`FI_Widget *o`)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- virtual `~FI_Group` ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FI_Align align` () const
 - Gets the label alignment.*
- void `align` (`FI_Align alignment`)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window * as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Window * as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype new_box`)
 - Sets the box type for the widget.*
- `FI_Callback_p callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback *cb`)

- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool `auto_free`)

Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback *cb`, void `*p`)

Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0 *cb`)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback1 *cb`, long `p=0`)

Sets the current callback function for the widget.
- unsigned int `changed` () const

Checks if the widget value changed since the last callback.
- void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar c=0`)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (`FI_Color bg`)

Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned `a`)

For back compatibility only.
- int `contains` (const `FI_Widget *w`) const

Checks if `w` is a child of this widget.
- void `copy_label` (const char `*new_label`)

Sets the current label.
- void `copy_tooltip` (const char `*text`)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar c`)

Sets the damage bits for the widget.
- void `damage` (`uchar c`, int `x`, int `y`, int `w`, int `h`)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.

- const [FI_Image](#) * [deimage](#) () const
Gets the image that is used as part of the widget label when in the inactive state.
- void [deimage](#) ([FI_Image](#) &img)
Sets the image to use as part of the widget label when in the inactive state.
- void [deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- int [deimage_bound](#) () const
Returns whether the inactive image is managed by the widget.
- void [do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with default arguments.
- void [do_callback](#) ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- void [do_callback](#) ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- void [draw_label](#) (int, int, int, int, [FI_Align](#)) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int [h](#) () const
Gets the widget height.
- virtual void [hide](#) ()
Makes a widget invisible.
- [FI_Image](#) * [image](#) ()
Gets the image that is used as part of the widget label when in the active state.
- const [FI_Image](#) * [image](#) () const
Gets the image that is used as part of the widget label when in the active state.
- void [image](#) ([FI_Image](#) &img)
Sets the image to use as part of the widget label when in the active state.
- void [image](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- int [image_bound](#) () const
Returns whether the image is managed by the widget.
- int [inside](#) (const [FI_Widget](#) *wgt) const
Checks if this widget is a child of wgt.
- int [is_label_copied](#) () const
Returns whether the current label was assigned with [copy_label\(\)](#).
- const char * [label](#) () const
Gets the current label text.
- void [label](#) (const char *text)
Sets the current label pointer.
- void [label](#) ([FI_Labeltype](#) a, const char *b)
Shortcut to set the label text and type in one call.
- [FI_Color](#) [labelcolor](#) () const
Gets the label color.
- void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
- [FI_Font](#) [labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)

- Sets the font size in pixels.*
- [FI_Labeltype labeltype](#) () const
 - Gets the label type.*
- void [labeltype](#) ([FI_Labeltype](#) a)
 - Sets the label type.*
- void [measure_label](#) (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
- bool [needs_keyboard](#) () const
 - Returns whether this widget needs a keyboard.*
- void [needs_keyboard](#) (bool needs)
 - Sets whether this widget needs a keyboard.*
- unsigned int [output](#) () const
 - Returns if a widget is used for output only.*
- [FI_Group * parent](#) () const
 - Returns a pointer to the parent widget.*
- void [parent](#) ([FI_Group *p](#))
 - Internal use only - "for hacks only".*
- void [position](#) (int X, int Y)
 - Repositions the window or widget.*
- void [redraw](#) ()
 - Schedules the drawing of the widget.*
- void [redraw_label](#) ()
 - Schedules the drawing of the label.*
- [FI_Color selection_color](#) () const
 - Gets the selection color.*
- void [selection_color](#) ([FI_Color](#) a)
 - Sets the selection color.*
- void [set_active](#) ()
 - Marks the widget as active without sending events or changing focus.*
- void [set_changed](#) ()
 - Marks the value of the widget as changed.*
- void [set_output](#) ()
 - Sets a widget to output only.*
- void [set_visible](#) ()
 - Makes the widget visible.*
- void [set_visible_focus](#) ()
 - Enables keyboard focus navigation with this widget.*
- int [shortcut_label](#) () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void [shortcut_label](#) (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void [show](#) ()
 - Makes a widget visible.*
- void [size](#) (int W, int H)
 - Changes the size of the widget.*
- int [take_focus](#) ()
 - Gives the widget the keyboard focus.*
- unsigned int [takeevents](#) () const
 - Returns if the widget is able to take events.*
- int [test_shortcut](#) ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*

- const char * [tooltip](#) () const
Gets the current tooltip text.
- void [tooltip](#) (const char *text)
Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
Gets the widget type.
- void [type](#) ([uchar](#) t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [FI_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [FI_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~FI_Widget](#) ()
Destroys the widget.

Protected Member Functions

- virtual int [inp_h](#) () const
See [inp_x\(\)](#) for info.
- virtual int [inp_w](#) () const
See [inp_x\(\)](#) for info.
- virtual int [inp_x](#) () const
The methods [inp_x\(\)](#), [inp_y\(\)](#), [inp_w\(\)](#) and [inp_h\(\)](#) return the desired position and size of the internal [FI_Input](#) widget.

- virtual int **inp_y** () const
See [inp_x\(\)](#) for info.
- virtual int **menu_h** () const
See [menu_x\(\)](#) for info.
- virtual int **menu_w** () const
See [menu_x\(\)](#) for info.
- virtual int **menu_x** () const
The methods [menu_x\(\)](#), [menu_y\(\)](#), [menu_w\(\)](#) and [menu_h\(\)](#) return the desired position and size of the internal [FI_Menu_Button](#) widget.
- virtual int **menu_y** () const
See [menu_x\(\)](#) for info.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * **bounds** ()
Returns the internal array of widget sizes and positions.
- void **draw** () [FL_OVERRIDE](#)
Draws the widget.
- void **draw_child** ([FI_Widget](#) &widget) const
Forces a child to redraw.
- void **draw_children** ()
Draws all children of the group.
- void **draw_outside_label** (const [FI_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int **on_insert** ([FI_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int **on_move** (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void **on_remove** (int)
Allow derived groups to act when a child widget is removed from the group.
- int * **sizes** ()
Returns the internal array of widget sizes and positions.
- void **update_child** ([FI_Widget](#) &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const

- Draws a focus box for the widget at the given position and size.*

 - void `draw_label` () const

Draws the widget's label at the defined label position.

 - void `draw_label` (int, int, int, int) const

Draws the label in an arbitrary bounding box.

 - `Fl_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)

Creates a widget at the given position and size.

 - unsigned int `flags` () const

Gets the widget flags mask.

 - void `h` (int `v`)

Internal use only.

 - void `set_flag` (unsigned int `c`)

Sets a flag in the flags mask.

 - void `w` (int `v`)

Internal use only.

 - void `x` (int `v`)

Internal use only.

 - void `y` (int `v`)

Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `Fl_Group`

- static `Fl_Group` * `current` ()
- Returns the currently active group.*
- static void `current` (`Fl_Group` *`g`)
- Sets the current group.*

Static Public Member Functions inherited from `Fl_Widget`

- static void `default_callback` (`Fl_Widget` *`widget`, void *`data`)
- The default callback for all widgets that don't set a callback.*
- static unsigned int `label_shortcut` (const char *`t`)
- Returns the Unicode value of the '&x' shortcut in a given text.*
- static int `test_shortcut` (const char *`s`, const bool `require_alt=false`)
- Returns true if the given text `t` contains the entered '&x' shortcut.*

Protected Types inherited from `Fl_Widget`

- enum {
 - `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
 - `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 - ,
 - `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 - ,
 - `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 - ,
 - `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU` = 1<<19 ,
 - `NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
 - `AUTO_DELETE_USER_DATA` = 1<<23 ,
 - `MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
 - `USERFLAG1` = 1<<31 }

flags possible values enumeration.

12.76.1 Detailed Description

A combination of the input widget and a menu button.

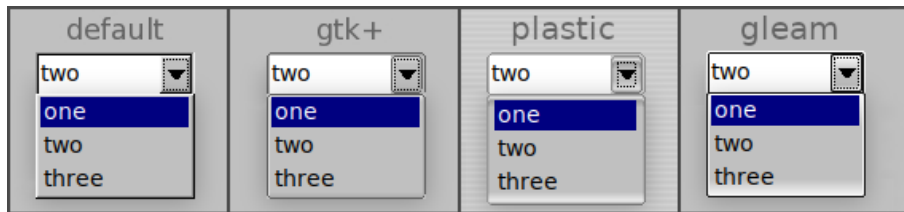


Figure 12.26 Fl_Input_Choice widget

The user can either type into the input area, or use the menu button chooser on the right to choose an item which loads the input area with the selected text.

The application can directly access both the internal `Fl_Input` and `Fl_Menu_Button` widgets respectively using the `input()` and `menubutton()` accessor methods.

The default behavior is to invoke the `Fl_Input_Choice::callback()` if the user changes the input field's contents, either by typing, pasting, or clicking a different item in the choice menu.

The callback can determine if an item was picked vs. typing into the input field by checking the value of `menubutton()->changed()`, which will be:

- 1: the user picked a different item in the choice menu
- 0: the user typed or pasted directly into the input field

Example Use of Fl_Input_Choice

```
#include <stdio.h>
#include <FL/FL.H>
#include <FL/FL_Double_Window.H>
#include <FL/Fl_Input_Choice.H>
// Fl_Input_Choice callback()
void choice_cb(Fl_Widget *w, void *userdata) {
    // Show info about the picked item
    Fl_Input_Choice *choice = (Fl_Input_Choice*)w;
    printf("*** Choice Callback:\n");
    printf("    widget's text value='%s'\n", choice->value()); // normally all you need
    // Access the menu via menubutton()..
    const Fl_Menu_Item *item = choice->menubutton()->mvalue();
    printf("    item label()='%s'\n", item ? item->label() : "(No item)");
    printf("    item value()=%d\n", choice->menubutton()->value());
    printf("    input value()='%s'\n", choice->input()->value());
    printf("    The user %s\n", choice->menubutton()->changed()
           ? "picked a menu item"
           : "typed text");
}

int main() {
    Fl_Double_Window win(200,100,"Input Choice");
    win.begin();
        Fl_Input_Choice choice(10,10,100,30);
        choice.callback(choice_cb, 0);
        choice.add("Red");
        choice.add("Orange");
        choice.add("Yellow");
        //choice.value("Red"); // uncomment to make "Red" default
    win.end();
    win.show();
    return Fl::run();
}
```

Subclassing Example

One can subclass `Fl_Input_Choice` to override the virtual methods `inp_x/y/w/h()` and `menu_x/y/w/h()` to take control of the internal `Fl_Input` and `Fl_Menu_Button` widget positioning. In this example, input and menubutton's positions are swapped:

```
#include <FL/FL.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Input_Choice.H>

class MyInputChoice : public Fl_Input_Choice {
protected:
    virtual int inp_x() const { return x() + Fl::box_dx(box()) + menu_w(); } // override to reposition
```

```

    virtual int menu_x() const { return x() + Fl::box_dx(box()); } // override to reposition
public:
    MyInputChoice(int X,int Y,int W,int H,const char*L=0) : Fl_Input_Choice(X,Y,W,H,L) {
        resize(X,Y,W,H); // necessary for ctor to trigger our overrides
    }
};

int main(int argc, char **argv) {
    Fl_Window *win = new Fl_Window(400,300);
    MyInputChoice *mychoice = new MyInputChoice(150,40,150,25,"Right Align Input");
    mychoice->add("Aaa");
    mychoice->add("Bbb");
    mychoice->add("Ccc");
    win->end();
    win->resizable(win);
    win->show();
    return Fl::run();
}

```

12.76.2 Constructor & Destructor Documentation

12.76.2.1 Fl_Input_Choice()

```

Fl_Input_Choice::Fl_Input_Choice (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )

```

Creates a new [Fl_Input_Choice](#) widget using the given position, size, and label string. Inherited destructor destroys the widget and any values associated with it.

12.76.3 Member Function Documentation

12.76.3.1 add()

```

void Fl_Input_Choice::add (
    const char * s ) [inline]

```

Adds an item to the menu.

When any item is selected, the [Fl_Input_Choice callback\(\)](#) is invoked, which can do something with the selected item.

You can access the more complex [Fl_Menu_Button::add\(\)](#) methods (setting item-specific callbacks, userdata, etc), via [menubutton\(\)](#). Example:

```

Fl_Input_Choice *choice = new Fl_Input_Choice(100,10,120,25,"Fonts");
Fl_Menu_Button *mb = choice->menubutton(); // use Fl_Input_Choice's Fl_Menu_Button
mb->add("Helvetica", 0, MyFont_CB, (void*)mydata); // use Fl_Menu_Button's add() methods
mb->add("Courier", 0, MyFont_CB, (void*)mydata);
mb->add("More..", 0, FontDialog_CB, (void*)mydata);

```

12.76.3.2 inp_x()

```

virtual int Fl_Input_Choice::inp_x ( ) const [inline], [protected], [virtual]

```

The methods [inp_x\(\)](#), [inp_y\(\)](#), [inp_w\(\)](#) and [inp_h\(\)](#) return the desired position and size of the internal [Fl_Input](#) widget. These can be overridden by a subclass to redefine positioning. See code example in the Description for subclassing details.

12.76.3.3 input()

```

Fl_Input * Fl_Input_Choice::input ( ) [inline]

```

Returns a pointer to the internal [Fl_Input](#) widget.

This can be used to directly access all of the [Fl_Input](#) widget's methods.

12.76.3.4 menu_x()

```

virtual int Fl_Input_Choice::menu_x ( ) const [inline], [protected], [virtual]

```

The methods [menu_x\(\)](#), [menu_y\(\)](#), [menu_w\(\)](#) and [menu_h\(\)](#) return the desired position and size of the internal [Fl_Menu_Button](#) widget.

These can be overridden by a subclass to redefine positioning. See code example in the Description for subclassing details.

12.76.3.5 menubutton()

```
Fl_Menu_Button * Fl_Input_Choice::menubutton ( ) [inline]
```

Returns a pointer to the internal [Fl_Menu_Button](#) widget.

This can be used to access any of the methods of the menu button, e.g.

```
Fl_Input_Choice *choice = new Fl_Input_Choice(100,10,120,25,"Choice:");
[...]
```

```
// Print all the items in the choice menu
for ( int t=0; t<choice->menubutton()->size(); t++ ) {
    const Fl_Menu_Item &item = choice->menubutton()->menu()[t];
    printf("item %d -- label=%s\n", t, item.label() ? item.label() : "(Null)");
}
```

12.76.3.6 resize()

```
void Fl_Input_Choice::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the [Fl_Input_Choice](#) widget.

Reimplemented from [Fl_Group](#).

12.76.3.7 update_menubutton()

```
int Fl_Input_Choice::update_menubutton ( )
```

Updates the menubutton with the string value in [Fl_Input](#).

If the string value currently in [Fl_Input](#) matches one of the menu items in [menubutton\(\)](#), that menu item will become the current item selected.

Call this method after setting [value\(const char*\)](#) if you need the [menubutton\(\)](#) to be synchronized with the [Fl_Input](#) field.

```
// Add items
choice->add(".25");
choice->add(".50");
choice->add("1.0");
choice->add("2.0");
choice->add("4.0");

choice->value("1.0");           // sets Fl_Input to "1.0"
choice->update_menubutton();    // cause menubutton to reflect this value too
                                // (returns 1 if match was found, 0 if not)

// Verify menubutton()'s value.
printf("menu button choice index=%d, value=%s\n",
       choice->menubutton()->value(), // would be -1 if update not done
       choice->menubutton()->text());  // would be NULL if update not done
```

Returns

1 if a matching menuitem was found and value set, 0 if not.

Version

1.4.0

12.76.3.8 value() [1/2]

```
void Fl_Input_Choice::value (
    const char * val ) [inline]
```

Sets the [Fl_Input](#) text field's contents to `val`.

Note it is possible to set the [value\(\)](#) to one that is not in the menubutton's list of choices.

Setting the [value\(\)](#) does NOT affect the menubutton's selection. If that's needed, call [update_menubutton\(\)](#) after setting [value\(\)](#).

See also

void [value\(int val\)](#), [update_menubutton\(\)](#)

12.76.3.9 value() [2/2]

```
void Fl_Input_Choice::value (
    int val )
```

Chooses item# `val` in the menu, and sets the [Fl_Input](#) text field to that value. Any previous text is cleared.

See also

void [value\(const char *val\)](#)

The documentation for this class was generated from the following files:

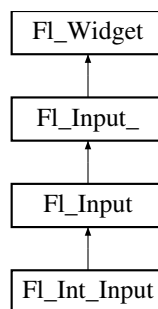
- [Fl_Input_Choice.H](#)
- [Fl_Input_Choice.cxx](#)

12.77 Fl_Int_Input Class Reference

The [Fl_Int_Input](#) class is a subclass of [Fl_Input](#) that only allows the user to type decimal digits (or hex numbers of the form 0xae).

```
#include <Fl_Int_Input.H>
```

Inheritance diagram for [Fl_Int_Input](#):



Public Member Functions

- [Fl_Int_Input](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Int_Input](#) widget using the given position, size, and label string.

Public Member Functions inherited from [Fl_Input](#)

- [Fl_Input](#) (int, int, int, int, const char *l=0)
Creates a new [Fl_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [Fl_Input_](#)

- int [append](#) (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool [can_redo](#) () const
Check if there is a redo action available.
- bool [can_undo](#) () const

- Check if the last operation can be undone.*

 - int `copy` (int clipboard)

Put the current selection into the clipboard.
- int `copy_cuts` ()
- Copies the yank buffer to the clipboard.*

 - `FI_Color cursor_color` () const

Gets the color of the cursor.
- void `cursor_color` (`FI_Color` n)
- Sets the color of the cursor.*

 - int `cut` ()

Deletes the current selection.
- int `cut` (int a, int b)
- Deletes all characters between index a and b.*

 - int `cut` (int n)

Deletes the next n bytes rounded to characters before or after the cursor.
- double `dvalue` () const
- Returns the widget text interpreted as a floating point number.*

 - `FI_Input_` (int, int, int, int, const char *=0)

Creates a new `FI_Input_` widget.
- unsigned int `index` (int i) const
- Returns the character at index i.*

 - int `input_type` () const

Gets the input field type.
- void `input_type` (int t)
- Sets the input field type.*

 - int `insert` (const char *t, int l=0)

Inserts text at the cursor position.
- int `insert_position` () const
- Gets the position of the text cursor.*

 - int `insert_position` (int p)

Sets the cursor position and mark.
- int `insert_position` (int p, int m)
- Sets the index for the cursor and mark.*

 - int `ivalue` () const

Returns the widget text interpreted as a signed integer.
- int `mark` () const
- Gets the current selection mark.*

 - int `mark` (int m)

Sets the current selection mark.
- int `maximum_size` () const
- Gets the maximum length of the input field in characters.*

 - void `maximum_size` (int m)

Sets the maximum length of the input field in characters.
- int `position` () const
- int `position` (int p)
- int `position` (int p, int m)
- int `readonly` () const
- Gets the read-only state of the input field.*

 - void `readonly` (int b)

Sets the read-only state of the input field.
- int `redo` ()

- Redo previous undo operation.*

 - int [replace](#) (int b, int e, const char *text, int ilen=0)

Deletes text from b to e and inserts the new string text.
- void [resize](#) (int, int, int, int) [FL_OVERRIDE](#)

Changes the size of the widget.
- int [shortcut](#) () const

Return the shortcut key associated with this widget.
- void [shortcut](#) (int s)

Sets the shortcut key associated with this widget.
- int [size](#) () const

Returns the number of bytes in value().
- void [size](#) (int W, int H)

Sets the width and height of this widget.
- int [static_value](#) (const char *)

Changes the widget text.
- int [static_value](#) (const char *, int)

Changes the widget text.
- int [tab_nav](#) () const

Gets whether the Tab key causes focus navigation in multiline input fields or not.
- void [tab_nav](#) (int val)

Sets whether the Tab key does focus navigation, or inserts tab characters into [Fl_Multiline_Input](#).
- [Fl_Color](#) [textcolor](#) () const

Gets the color of the text in the input field.
- void [textcolor](#) ([Fl_Color](#) n)

Sets the color of the text in the input field.
- [Fl_Font](#) [textfont](#) () const

Gets the font of the text in the input field.
- void [textfont](#) ([Fl_Font](#) s)

Sets the font of the text in the input field.
- [Fl_Fontsize](#) [textsize](#) () const

Gets the size of the text in the input field.
- void [textsize](#) ([Fl_Fontsize](#) s)

Sets the size of the text in the input field.
- int [undo](#) ()

Undoes previous changes to the text buffer.
- const char * [value](#) () const

Returns the text displayed in the widget.
- int [value](#) (const char *)

Changes the widget text.
- int [value](#) (const char *, int)

Changes the widget text.
- int [value](#) (double value)

Changes the widget text to a floating point number ("%g").
- int [value](#) (int value)

Changes the widget text to a signed integer number.
- int [wrap](#) () const

Gets the word wrapping state of the input field.
- void [wrap](#) (int b)

Sets the word wrapping state of the input field.
- [~Fl_Input](#) ()

Destroys the widget.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_GI_Window](#) * **as_gi_window** ()
Returns an [FI_GI_Window](#) pointer if this widget is an [FI_GI_Window](#).
- virtual class [FI_GI_Window](#) const * **as_gi_window** () const
- virtual [FI_Group](#) * **as_group** ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) **box** () const
Gets the box type of the widget.
- void **box** ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p](#) **callback** () const
Gets the current callback function for the widget.
- void **callback** ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void **callback** ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void **callback** ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (FI_Color bg)

Sets the background color of the widget.
- void `color` (FI_Color bg, FI_Color sel)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const FI_Widget *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (FI_Image &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (FI_Image *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*
- unsigned int `output` () const
 - Returns if a widget is used for output only.*
- `Fl_Group` * `parent` () const
 - Returns a pointer to the parent widget.*
- void `parent` (`Fl_Group` *p)
 - Internal use only - "for hacks only".*
- void `position` (int X, int Y)
 - Repositions the window or widget.*
- void `redraw` ()
 - Schedules the drawing of the widget.*
- void `redraw_label` ()
 - Schedules the drawing of the label.*
- `Fl_Color` `selection_color` () const
 - Gets the selection color.*
- void `selection_color` (`Fl_Color` a)
 - Sets the selection color.*
- void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
- void `set_changed` ()
 - Marks the value of the widget as changed.*
- void `set_output` ()
 - Sets a widget to output only.*
- void `set_visible` ()
 - Makes the widget visible.*
- void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
- int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void `show` ()
 - Makes a widget visible.*
- void `size` (int W, int H)
 - Changes the size of the widget.*
- int `take_focus` ()
 - Gives the widget the keyboard focus.*
- unsigned int `takeevents` () const
 - Returns if the widget is able to take events.*
- int `test_shortcut` ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
- const char * `tooltip` () const
 - Gets the current tooltip text.*
- void `tooltip` (const char *text)
 - Sets the current tooltip text.*
- `Fl_Window` * `top_window` () const
 - Returns a pointer to the top-level window for the widget.*
- `Fl_Window` * `top_window_offset` (int &xoff, int &yoff) const
 - Finds the x/y offset of the current widget relative to the top-level window.*
- `uchar` `type` () const
 - Gets the widget type.*

- void `type` (`uchar t`)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data *v`, bool `auto_free`)
Sets the user data for this widget.
- void `user_data` (void *`v`)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int `v`)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar i`)
Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget *widget`, void *`data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *`t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
Returns true if the given text `t` contains the entered '&x' shortcut.

Static Public Attributes inherited from `FI_Input`

- static const char * `copy_menu_text` = "Copy"
[this text may be customized at run-time]
- static const char * `cut_menu_text` = "Cut"
[this text may be customized at run-time]
- static const char * `paste_menu_text` = "Paste"
[this text may be customized at run-time]

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from [FI_Input](#)

- void [draw](#) () [FL_OVERRIDE](#)
 - Draws the widget.*
- int [handle_key](#) ()
 - Handles a keystroke.*
- int [handle_rmb](#) ()
 - Handle right mouse button down events.*

Protected Member Functions inherited from [FI_Input_](#)

- int [apply_undo](#) ()
 - Apply the current undo/redo operation.*
- void [drawtext](#) (int, int, int, int)
 - Draws the text in the passed bounding box.*
- void [drawtext](#) (int, int, int, int, bool draw_active)
 - Draws the text in the passed bounding box.*
- void [handle_mouse](#) (int, int, int, int, int keepmark=0)
 - Handles mouse clicks and mouse moves.*
- int [handletext](#) (int e, int, int, int, int)
 - Handles all kinds of text field related events.*
- int [line_end](#) (int i) const
 - Finds the end of a line.*
- int [line_start](#) (int i) const
 - Finds the start of a line.*
- int [linesPerPage](#) ()
- void [maybe_do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- int [up_down_position](#) (int, int keepmark=0)
 - Moves the cursor to the column given by up_down_pos.*
- int [word_end](#) (int i) const
 - Finds the end of a word.*
- int [word_start](#) (int i) const
 - Finds the start of a word.*
- int [xscroll](#) () const
- int [yscroll](#) () const
- void [yscroll](#) (int yOffset)

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.77.1 Detailed Description

The [FI_Int_Input](#) class is a subclass of [FI_Input](#) that only allows the user to type decimal digits (or hex numbers of the form 0xae).

12.77.2 Constructor & Destructor Documentation

12.77.2.1 [FI_Int_Input](#)()

```
FI_Int_Input::FI_Int_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [FI_Int_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

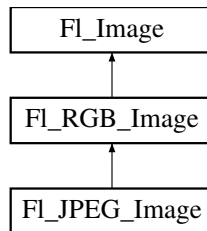
- `FI_Int_Input.H`
- `FI_Input.cxx`

12.78 FI_JPEG_Image Class Reference

The `FI_JPEG_Image` class supports loading, caching, and drawing of Joint Photographic Experts Group (JPEG) File Interchange Format (JFIF) images.

```
#include <FI_JPEG_Image.H>
```

Inheritance diagram for `FI_JPEG_Image`:



Public Member Functions

- `FI_JPEG_Image` (const char *filename)
The constructor loads the JPEG image from the given jpeg filename.
- `FI_JPEG_Image` (const char *name, const unsigned char *data, int data_length=-1)
The constructor loads the JPEG image from memory.

Public Member Functions inherited from `FI_RGB_Image`

- virtual `FI_SVG_Image * as_svg_image ()`
Returns whether an image is an `FI_SVG_Image` or not.
- int `cache_h ()`
- int `cache_w ()`
- void `color_average` (FI_Color c, float i) `FL_OVERRIDE`
The `color_average()` method averages the colors in the image with the provided FLTK color value.
- `FI_Image * copy ()` const
- `FI_Image * copy` (int W, int H) const `FL_OVERRIDE`
Creates a resized copy of the image.
- void `desaturate ()` `FL_OVERRIDE`
The `desaturate()` method converts an image to grayscale.
- void `draw` (int X, int Y)
- void `draw` (int X, int Y, int W, int H, int cx=0, int cy=0) `FL_OVERRIDE`
Draws the image to the current drawing surface with a bounding box.
- `FI_RGB_Image` (const `FI_Pixmap *pxm`, `FI_Color` bg=`FL_GRAY`)
The constructor creates a new RGBA image from the specified `FI_Pixmap`.
- `FI_RGB_Image` (const `uchar *bits`, int bits_length, int W, int H, int D, int LD)
The constructor creates a new image from the specified data.
- `FI_RGB_Image` (const `uchar *bits`, int W, int H, int D=3, int LD=0)
The constructor creates a new image from the specified data.
- void `label` (`FI_Menu_Item *m`) `FL_OVERRIDE`
This method is an obsolete way to set the image attribute of a menu item.
- void `label` (`FI_Widget *w`) `FL_OVERRIDE`
This method is an obsolete way to set the image attribute of a widget or menu item.
- virtual void `normalize ()`

- *Makes sure the object is fully initialized.*
- void `uncache ()` `FL_OVERRIDE`
If the image has been cached for display, delete the cache data.
- `~FI_RGB_Image ()` `FL_OVERRIDE`
The destructor frees all memory and server resources that are used by the image.

Public Member Functions inherited from `FI_Image`

- virtual class `FI_Shared_Image * as_shared_image ()`
Returns whether an image is an `FI_Shared_Image` or not.
- `FI_Image * copy ()` const
Creates a copy of the image in the same size.
- int `count ()` const
Returns the number of data values associated with the image.
- int `d ()` const
Returns the image depth.
- const char *const * `data ()` const
Returns a pointer to the current image data array.
- int `data_h ()` const
Returns the height of the image data.
- int `data_w ()` const
Returns the width of the image data.
- void `draw (int X, int Y)`
Draws the image to the current drawing surface.
- int `fail ()` const
Returns a value that is not 0 if there is currently no image available.
- `FI_Image (int W, int H, int D)`
The constructor creates an empty image with the specified width, height, and depth.
- int `h ()` const
Returns the current image drawing height in FLTK units.
- void `inactive ()`
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- int `ld ()` const
Returns the current line data size in bytes.
- virtual void `release ()`
Releases an `FI_Image` - the same as 'delete this'.
- virtual void `scale (int width, int height, int proportional=1, int can_expand=0)`
Sets the drawing size of the image.
- int `w ()` const
Returns the current image drawing width in FLTK units.
- virtual `~FI_Image ()`
The destructor is a virtual method that frees all memory used by the image.

Protected Member Functions

- void `load_jpg_ (const char *filename, const char *sharename, const unsigned char *data, int data_length=-1)`

Protected Member Functions inherited from FI_Image

- void **d** (int D)
Sets the current image depth.
- void **data** (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void **draw_empty** (int X, int Y)
The protected method `draw_empty()` draws a box with an X in it.
- int **draw_scaled** (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void **h** (int H)
Sets the height of the image data.
- void **ld** (int LD)
Sets the current line data size in bytes.
- void **w** (int W)
Sets the width of the image data.

Additional Inherited Members

Static Public Member Functions inherited from FI_RGB_Image

- static size_t **max_size** ()
Returns the maximum allowed image size in bytes when creating an `FI_RGB_Image` object.
- static void **max_size** (size_t size)
Sets the maximum allowed image size in bytes when creating an `FI_RGB_Image` object.

Static Public Member Functions inherited from FI_Image

- static FI_Labeltype **define_FL_IMAGE_LABEL** ()
- static FI_RGB_Scaling **RGB_scaling** ()
Returns the currently used RGB image scaling method.
- static void **RGB_scaling** (FI_RGB_Scaling)
Sets the RGB image scaling method used for copy(int, int).
- static FI_RGB_Scaling **scaling_algorithm** ()
Gets what algorithm is used when resizing a source image to draw it.
- static void **scaling_algorithm** (FI_RGB_Scaling algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Public Attributes inherited from FI_RGB_Image

- int **alloc_array**
If non-zero, the object's data array is delete[]'d when deleting the object.
- const uchar * **array**
Points to the start of the object's data array.

Static Public Attributes inherited from FI_Image

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
True after `fl_register_images()` was called, false before.

Static Protected Member Functions inherited from [FI_Image](#)

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

12.78.1 Detailed Description

The [FI_JPEG_Image](#) class supports loading, caching, and drawing of Joint Photographic Experts Group (JPEG) File Interchange Format (JFIF) images.

The class supports grayscale and color (RGB) JPEG image files.

12.78.2 Constructor & Destructor Documentation

12.78.2.1 [FI_JPEG_Image\(\)](#) [1/2]

```
FI_JPEG_Image::FI_JPEG_Image (
    const char * filename )
```

The constructor loads the JPEG image from the given jpeg filename.

The inherited destructor frees all memory and server resources that are used by the image.

Use [FI_Image::fail\(\)](#) to check if [FI_JPEG_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the JPEG format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason. If the image has loaded correctly, `w()`, `h()`, and `d()` should return values greater than zero.

Parameters

<i>in</i>	<i>filename</i>	a full path and name pointing to a valid jpeg file.
-----------	-----------------	---

See also

`FI_JPEG_Image::FI_JPEG_Image(const char *imagename, const unsigned char *data)`

12.78.2.2 [FI_JPEG_Image\(\)](#) [2/2]

```
FI_JPEG_Image::FI_JPEG_Image (
    const char * name,
    const unsigned char * data,
    int data_length = -1 )
```

The constructor loads the JPEG image from memory.

Construct an image from a block of memory inside the application. Fluid offers "binary Data" chunks as a great way to add image data into the C++ source code. `name_png` can be NULL. If a name is given, the image is added to the list of shared images (see: [FI_Shared_Image](#)) and will be available by that name.

The inherited destructor frees all memory and server resources that are used by the image.

Use [FI_Image::fail\(\)](#) to check if [FI_JPEG_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the JPEG format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason. If the image has loaded correctly, `w()`, `h()`, and `d()` should return values greater than zero.

Parameters

<i>name</i>	A unique name or NULL
<i>data</i>	A pointer to the memory location of the JPEG image
<i>data_length</i>	optional length of <code>data</code> . This will protect memory outside of the <code>data</code> array from illegal read operations

See also

[FI_JPEG_Image::FI_JPEG_Image\(const char *filename\)](#)
[FI_Shared_Image](#)

The documentation for this class was generated from the following files:

- [FI_JPEG_Image.H](#)
- [FI_JPEG_Image.cxx](#)

12.79 FI_Label Struct Reference

This struct stores all information for a text or mixed graphics label.

```
#include <FI_Widget.H>
```

Public Member Functions

- void [draw](#) (int, int, int, int, [FI_Align](#)) const
Draws the label aligned to the given box.
- void [measure](#) (int &w, int &h) const
Measures the size of the label.

Public Attributes

- [FI_Align](#) **align_**
alignment of label
- [FI_Color](#) **color**
text color
- [FI_Image](#) * **deimage**
optional image for a deactivated label
- [FI_Font](#) **font**
label font used in text
- [FI_Image](#) * **image**
optional image for an active label
- [FI_Fontsize](#) **size**
size of label font
- [uchar](#) **type**
type of label.
- const char * **value**
label text

12.79.1 Detailed Description

This struct stores all information for a text or mixed graphics label.

Todo There is an aspiration that the [FI_Label](#) type will become a widget by itself. That way we will be avoiding a lot of code duplication by handling labels in a similar fashion to widgets containing text. We also provide an easy interface for very complex labels, containing html or vector graphics. However, this re-factoring is not in place in this release.

12.79.2 Member Function Documentation

12.79.2.1 draw()

```
void Fl_Label::draw (
    int X,
    int Y,
    int W,
    int H,
    Fl_Align align ) const
```

Draws the label aligned to the given box.

Draws a label with arbitrary alignment in an arbitrary box.

12.79.2.2 measure()

```
void Fl_Label::measure (
    int & W,
    int & H ) const
```

Measures the size of the label.

Parameters

in, out	<i>W,H</i>	: this is the requested size for the label text plus image; on return, this will contain the size needed to fit the label
---------	------------	---

12.79.3 Member Data Documentation

12.79.3.1 type

```
uchar Fl_Label::type
```

type of label.

See also

[Fl_Labeltype](#)

The documentation for this struct was generated from the following files:

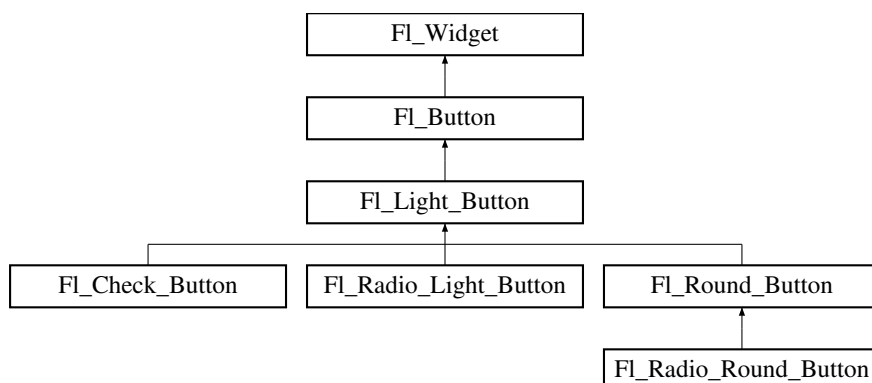
- [Fl_Widget.H](#)
- [fl_labeltype.cxx](#)

12.80 Fl_Light_Button Class Reference

This subclass displays the "on" state by turning on a light, rather than drawing pushed in.

```
#include <Fl_Light_Button.H>
```

Inheritance diagram for Fl_Light_Button:



Public Member Functions

- [FI_Light_Button](#) (int x, int y, int w, int h, const char *l=0)
Creates a new [FI_Light_Button](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [FI_Button](#)

- int [clear](#) ()
Same as `value(0)`.
- [uchar compact](#) ()
Return true if buttons are rendered as compact buttons.
- void [compact](#) ([uchar](#) v)
Decide if buttons should be rendered in compact mode.
- [FI_Boxtype down_box](#) () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void [down_box](#) ([FI_Boxtype](#) b)
Sets the down box type.
- [FI_Color down_color](#) () const
(for backwards compatibility)
- void [down_color](#) (unsigned c)
(for backwards compatibility)
- [FI_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int [set](#) ()
Same as `value(1)`.
- void [setonly](#) ()
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- int [shortcut](#) () const
Returns the current shortcut key for the button.
- void [shortcut](#) (const char *s)
(for backwards compatibility)
- void [shortcut](#) (int s)
Sets the shortcut key to `s`.
- char [value](#) () const
Returns the current value of the button (0 or 1).
- int [value](#) (int v)
Sets the current value of the button.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.

- void `align` (`FI_Align` alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
 - Returns an `FI_Group` pointer if this widget is an `FI_Group`.*
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*

- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar` c)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar` c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (int, int, int, int)
 - Internal use only.*
- void `deactivate` ()
 - Deactivates the widget.*
- `FI_Image` * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
- const `FI_Image` * `deimage` () const
 - Gets the image that is used as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image` &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with default arguments.*
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `draw_label` (int, int, int, int, `FI_Align`) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int `h` () const
 - Gets the widget height.*
- virtual void `hide` ()
 - Makes a widget invisible.*
- `FI_Image` * `image` ()

- Gets the image that is used as part of the widget label when in the active state.*

 - const `FI_Image * image` () const
- Gets the image that is used as part of the widget label when in the active state.*

 - void `image (FI_Image &img)`
- Sets the image to use as part of the widget label when in the active state.*

 - void `image (FI_Image *img)`
- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound` () const
- Returns whether the image is managed by the widget.*

 - int `inside (const FI_Widget *wgt)` const
- Checks if this widget is a child of wgt.*

 - int `is_label_copied` () const
- Returns whether the current label was assigned with `copy_label()`.*

 - const char * `label` () const
- Gets the current label text.*

 - void `label (const char *text)`
- Sets the current label pointer.*

 - void `label (FI_Labeltype a, const char *b)`
- Shortcut to set the label text and type in one call.*

 - `FI_Color labelcolor` () const
- Gets the label color.*

 - void `labelcolor (FI_Color c)`
- Sets the label color.*

 - `FI_Font labelfont` () const
- Gets the font to use.*

 - void `labelfont (FI_Font f)`
- Sets the font to use.*

 - `FI_Fontsize labelsize` () const
- Gets the font size in pixels.*

 - void `labelsize (FI_Fontsize pix)`
- Sets the font size in pixels.*

 - `FI_Labeltype labeltype` () const
- Gets the label type.*

 - void `labeltype (FI_Labeltype a)`
- Sets the label type.*

 - void `measure_label (int &ww, int &hh)` const
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard (bool needs)`
- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group * parent` () const
- Returns a pointer to the parent widget.*

 - void `parent (FI_Group *p)`
- Internal use only - "for hacks only".*

 - void `position (int X, int Y)`
- Repositions the window or widget.*

 - void `redraw` ()
- Schedules the drawing of the widget.*

- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int `x`, int `y`, int `w`, int `h`)
Changes the size or position of the widget.
- `FI_Color selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` `a`)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int `value`)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int `W`, int `H`)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *`text`)
Sets the current tooltip text.
- `FI_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &`xoff`, int &`yoff`) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (`uchar` `t`)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *`v`, bool `auto_free`)
Sets the user data for this widget.
- void `user_data` (void *`v`)

- *Sets the user data for this widget.*
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from `FI_Button`

- void `simulate_key_action` ()

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const

- Draws the widget's label at the defined label position.*

 - void `draw_label` (int, int, int, int) const

Draws the label in an arbitrary bounding box.

 - `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)

Creates a widget at the given position and size.

 - unsigned int `flags` () const

Gets the widget flags mask.

 - void `h` (int `v`)

Internal use only.

 - void `set_flag` (unsigned int `c`)

Sets a flag in the flags mask.

 - void `w` (int `v`)

Internal use only.

 - void `x` (int `v`)

Internal use only.

 - void `y` (int `v`)

Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void `default_callback` (`FI_Widget` *`widget`, void *`data`)
- The default callback for all widgets that don't set a callback.*
- static unsigned int `label_shortcut` (const char *`t`)
- Returns the Unicode value of the '&x' shortcut in a given text.*
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
- Returns true if the given text `t` contains the entered '&x' shortcut.*

Protected Types inherited from FI_Widget

- enum {
 - `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
 - `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 - ,
 - `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 - ,
 - `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 - ,
 - `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU` = 1<<19 ,
 - `NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
 - `AUTO_DELETE_USER_DATA` = 1<<23 ,
 - `MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
 - `USERFLAG1` = 1<<31 }

flags possible values enumeration.

Static Protected Member Functions inherited from FI_Button

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from FI_Button

- static `FI_Widget_Tracker` * `key_release_tracker` = 0

12.80.1 Detailed Description

This subclass displays the "on" state by turning on a light, rather than drawing pushed in.

The shape of the "light" is initially set to `FL_DOWN_BOX`. The color of the light when on is controlled with `selection_color()`, which defaults to `FL_YELLOW`.

Buttons generate callbacks when they are clicked by the user. You control exactly when and how by changing the values for `type()` and `when()`.

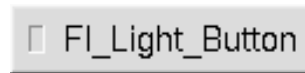


Figure 12.27 `Fl_Light_Button`

12.80.2 Constructor & Destructor Documentation

12.80.2.1 `Fl_Light_Button()`

```
Fl_Light_Button::Fl_Light_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Light_Button` widget using the given position, size, and label string.

The default box type is `FL_UP_BOX` and the default down box type `down_box()` is `FL_NO_BOX (0)`.

The `selection_color()` sets the color of the "light". Default is `FL_YELLOW`.

The default label alignment is `'FL_ALIGN_LEFT|FL_ALIGN_INSIDE'` so the label is drawn inside the button area right of the "light".

Note

Do not change the default box types of `Fl_Light_Button`. The box types determine how the button is drawn. If you change the `down_box()` type the drawing behavior is undefined.

12.80.3 Member Function Documentation

12.80.3.1 `draw()`

```
void Fl_Light_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from `Fl_Button`.

12.80.3.2 `handle()`

```
int Fl_Light_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses)

in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[Fl_Event](#)

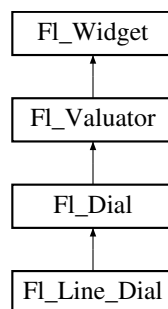
Reimplemented from [Fl_Button](#).

The documentation for this class was generated from the following files:

- `Fl_Light_Button.H`
- `Fl_Light_Button.cxx`

12.81 Fl_Line_Dial Class Reference

Inheritance diagram for Fl_Line_Dial:



Public Member Functions

- `Fl_Line_Dial` (int X, int Y, int W, int H, const char *L=0)

Public Member Functions inherited from [Fl_Dial](#)

- short `angle1` () const
Sets Or gets the angles used for the minimum and maximum values.
- void `angle1` (short a)
See short `angle1()` const.
- short `angle2` () const
See short `angle1()` const.
- void `angle2` (short a)
See short `angle1()` const.
- void `angles` (short a, short b)
See short `angle1()` const.
- `Fl_Dial` (int x, int y, int w, int h, const char *l=0)

Creates a new *FI_Dial* widget using the given position, size, and label string.

- int **handle** (int) **FL_OVERRIDE**

Allow subclasses to handle event based on current position and size.

Public Member Functions inherited from **FI_Valuator**

- void **bounds** (double a, double b)

Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)

Clamps the passed value to the valuator range.
- virtual int **format** (char *)

Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)

Adds n times the step value to the passed value.
- double **maximum** () const

Gets the maximum value for the valuator.
- void **maximum** (double a)

Sets the maximum value for the valuator.
- double **minimum** () const

Gets the minimum value for the valuator.
- void **minimum** (double a)

Sets the minimum value for the valuator.
- void **precision** (int digits)

Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)

Sets the minimum and maximum values for the valuator.
- double **round** (double)

Round the passed value to the nearest step increment.
- double **step** () const

Gets or sets the step value.
- void **step** (double a, int b)

See double *FI_Valuator::step()* const
- void **step** (double s)

See double *FI_Valuator::step()* const.
- void **step** (int a)

See double *FI_Valuator::step()* const
- double **value** () const

Gets the floating point(double) value.
- int **value** (double)

Sets the current value.

Public Member Functions inherited from **FI_Widget**

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()

Activates the widget.
- unsigned int **active** () const

Returns whether the widget is active.
- int **active_r** () const

- Returns whether the widget and all of its parents are active.*

 - `FI_Align align () const`

Gets the label alignment.

 - `void align (FI_Align alignment)`

Sets the label alignment.

 - `long argument () const`

Gets the current user data (long) argument that is passed to the callback function.

 - `void argument (long v)`

Sets the current user data (long) argument that is passed to the callback function.

 - virtual class `FI_Gl_Window * as_gl_window ()`

Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.

 - virtual class `FI_Gl_Window const * as_gl_window () const`
 - virtual `FI_Group * as_group ()`

Returns an FI_Group pointer if this widget is an FI_Group.

 - virtual `FI_Group const * as_group () const`
 - virtual `FI_Window * as_window ()`

Returns an FI_Window pointer if this widget is an FI_Window.

 - virtual `FI_Window const * as_window () const`
 - `void bind_deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.

 - `void bind_deimage (int f)`

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

 - `void bind_image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.

 - `void bind_image (int f)`

Bind the image to the widget, so the widget will delete the image when it is no longer needed.

 - `FI_Boxtype box () const`

Gets the box type of the widget.

 - `void box (FI_Boxtype new_box)`

Sets the box type for the widget.

 - `FI_Callback_p callback () const`

Gets the current callback function for the widget.

 - `void callback (FI_Callback *cb)`

Sets the current callback function for the widget.

 - `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

Sets the current callback function and managed user data for the widget.

 - `void callback (FI_Callback *cb, void *p)`

Sets the current callback function and data for the widget.

 - `void callback (FI_Callback0 *cb)`

Sets the current callback function for the widget.

 - `void callback (FI_Callback1 *cb, long p=0)`

Sets the current callback function for the widget.

 - `unsigned int changed () const`

Checks if the widget value changed since the last callback.

 - `void clear_active ()`

Marks the widget as inactive without sending events or changing focus.

 - `void clear_changed ()`

Marks the value of the widget as unchanged.

 - `void clear_damage (uchar c=0)`

Clears or sets the damage flags.

 - `void clear_output ()`

- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `draw_label` (int, int, int, int, `FI_Align`) const
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int `h` () const
- Gets the widget height.*

- virtual void `hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- void `image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- void `image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- int `image_bound () const`
Returns whether the image is managed by the widget.
- int `inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- int `is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- const char * `label () const`
Gets the current label text.
- void `label (const char *text)`
Sets the current label pointer.
- void `label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- void `labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- void `labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`
Gets the font size in pixels.
- void `labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- void `labeltype (FI_Labeltype a)`
Sets the label type.
- void `measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard () const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- unsigned int `output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- void `parent (FI_Group *p)`
Internal use only - "for hacks only".
- void `position (int X, int Y)`

- Repositions the window or widget.*

 - void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()
- Schedules the drawing of the label.*

 - virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
- `FI_Color selection_color` () const
- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)

Sets the selection color.
- void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()

Marks the value of the widget as changed.
- void `set_output` ()
- Sets a widget to output only.*

 - void `set_visible` ()

Makes the widget visible.
- void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void `show` ()

Makes a widget visible.
- void `size` (int W, int H)
- Changes the size of the widget.*

 - int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window * top_window` () const
- Returns a pointer to the top-level window for the widget.*

 - `FI_Window * top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
- Gets the widget type.*

 - void `type` (`uchar` t)

Sets the widget type.
- int `use_accents_menu` ()
- Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.*

 - void * `user_data` () const

Gets the user data for this widget.

- void **user_data** ([FI_Callback_User_Data](#) *v, bool auto_free)
 - Sets the user data for this widget.*
- void **user_data** (void *v)
 - Sets the user data for this widget.*
- unsigned int **visible** () const
 - Returns whether a widget is visible.*
- unsigned int **visible_focus** () const
 - Checks whether this widget has a visible focus.*
- void **visible_focus** (int v)
 - Modifies keyboard focus navigation.*
- int **visible_r** () const
 - Returns whether a widget and all its parents are visible.*
- int **w** () const
 - Gets the widget width.*
- [FI_When](#) **when** () const
 - Returns the conditions under which the callback is called.*
- void **when** (uchar i)
 - Sets the flags used to decide when a callback is called.*
- [FI_Window](#) * **window** () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int **x** () const
 - Gets the widget position in its window.*
- int **y** () const
 - Gets the widget position in its window.*
- virtual **~FI_Widget** ()
 - Destroys the widget.*

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
 - The default callback for all widgets that don't set a callback.*
- static unsigned int **label_shortcut** (const char *t)
 - Returns the Unicode value of the '&x' shortcut in a given text.*
- static int **test_shortcut** (const char *, const bool require_alt=false)
 - Returns true if the given text t contains the entered '&x' shortcut.*

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }
 - flags possible values enumeration.*

Protected Member Functions inherited from [FI_Dial](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draws dial at current position and size.
- void [draw](#) (int X, int Y, int W, int H)
Draws dial at given position and size.
- int [handle](#) (int event, int X, int Y, int W, int H)
Allows subclasses to handle event based on given position and size.

Protected Member Functions inherited from [FI_Valuator](#)

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
Creates a new [FI_Valuator](#) widget using the given position, size, and label string.
- void [handle_drag](#) (double newvalue)
Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.
- void [handle_push](#) ()
Stores the current value in the previous value.
- void [handle_release](#) ()
Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.
- int [horizontal](#) () const
Tells if the valuator is an [FL_HORIZONTAL](#) one.
- double [previous_value](#) () const
Gets the previous floating point value before an event changed it.
- void [set_value](#) (double v)
Sets the current floating point value.
- double [softclamp](#) (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void [value_damage](#) ()
Asks for partial redraw.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.

- `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int `v`)
Internal use only.
- void `set_flag` (unsigned int `c`)
Sets a flag in the flags mask.
- void `w` (int `v`)
Internal use only.
- void `x` (int `v`)
Internal use only.
- void `y` (int `v`)
Internal use only.

The documentation for this class was generated from the following files:

- `FI_Line_Dial.H`
- `FI_Dial.cxx`

12.82 FI_Mac_App_Menu Class Reference

Static Public Member Functions

- static void `custom_application_menu_items` (const `FI_Menu_Item` *`m`)
Adds custom menu item(s) to the application menu of the system menu bar.

Static Public Attributes

- static const char * `about`
Localizable text for the "About xxx" application menu item.
- static const char * `hide`
Localizable text for the "Hide xxx" application menu item.
- static const char * `hide_others`
Localizable text for the "Hide Others" application menu item.
- static const char * `print`
Localizable text for the "Print Front Window" application menu item.
- static const char * `print_no_titlebar`
Localizable text for the "Print Front Window" application menu item.
- static const char * `quit`
Localizable text for the "Quit xxx" application menu item.
- static const char * `services`
Localizable text for the "Services" application menu item.
- static const char * `show`
Localizable text for the "Show All" application menu item.
- static const char * `toggle_print_titlebar`
Localizable text for the "Toggle print titlebar" application menu item.

12.82.1 Member Function Documentation

12.82.1.1 custom_application_menu_items()

```
static void Fl_Mac_App_Menu::custom_application_menu_items (  
    const Fl_Menu_Item * m ) [static]
```

Adds custom menu item(s) to the application menu of the system menu bar.

They are positioned after the "Print Front Window / Toggle printing of titlebar" items, or at their place if they were removed with `Fl_Mac_App_Menu::print = ""`.

Parameters

<i>m</i>	zero-ending array of Fl_Menu_Item 's.
----------	---

12.82.2 Member Data Documentation

12.82.2.1 print

```
const char* Fl_Mac_App_Menu::print [static]
```

Localizable text for the "Print Front Window" application menu item.

This menu item and next one won't be displayed if [Fl_Mac_App_Menu::print](#) is set to an empty string.

The documentation for this class was generated from the following file:

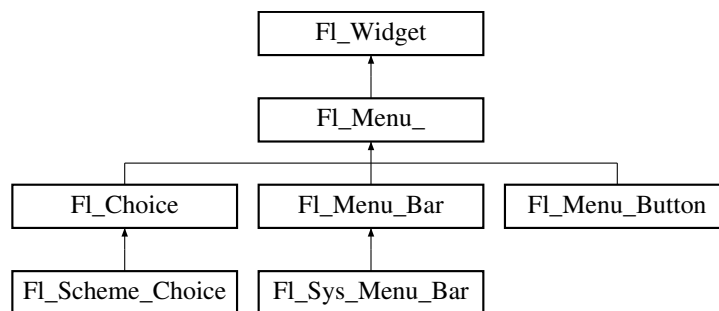
- [mac.H](#)

12.83 Fl_Menu_ Class Reference

Base class of all widgets that have a menu in FLTK.

```
#include <Fl_Menu_.H>
```

Inheritance diagram for [Fl_Menu_](#):



Public Member Functions

- int [add](#) (const char *)

This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.
- int [add](#) (const char *, int [shortcut](#), [Fl_Callback *](#), void *=0, int=0)

Adds a new menu item.
- int [add](#) (const char *a, const char *b, [Fl_Callback *](#)c, void *d=0, int e=0)

See int [Fl_Menu_::add](#)(const char label, int shortcut, [Fl_Callback*](#), void *user_data=0, int flags=0)*
- void [clear](#) ()

Same as [menu](#)(NULL), set the array pointer to null, indicating a zero-length menu.
- int [clear_submenu](#) (int [index](#))

Clears the specified submenu pointed to by [index](#) of all menu items.
- void [copy](#) (const [Fl_Menu_Item *](#)m, void *[user_data](#)=0)

Sets the menu array pointer with a copy of m that will be automatically deleted.
- [Fl_Boxtype](#) [down_box](#) () const

This box type is used to surround the currently-selected items in the menus.
- void [down_box](#) ([Fl_Boxtype](#) b)

Sets the box type used to surround the currently-selected items in the menus.
- [Fl_Color](#) [down_color](#) () const

For back compatibility, same as [selection_color](#)()
- void [down_color](#) (unsigned c)

- For back compatibility, same as [selection_color\(\)](#)*
- int [find_index](#) (const char *name) const

Find the menu item index for a given menu `pathname`, such as "Edit/Copy".
- int [find_index](#) (const [FI_Menu_Item](#) *item) const

Find the index into the menu array for a given `item`.
- int [find_index](#) ([FI_Callback](#) *cb) const

Find the index into the menu array for a given callback `cb`.
- const [FI_Menu_Item](#) * [find_item](#) (const char *name)

Find the menu item for a given menu `pathname`, such as "Edit/Copy".
- const [FI_Menu_Item](#) * [find_item](#) ([FI_Callback](#) *)

Find the menu item for the given callback `cb`.
- const [FI_Menu_Item](#) * [find_item_with_argument](#) (long)

Find the menu item for the given user argument `v`.
- const [FI_Menu_Item](#) * [find_item_with_user_data](#) (void *)

Find the menu item for the given user data `v`.
- [FI_Menu_](#) (int, int, int, int, const char * = 0)

Creates a new `FI_Menu_` widget using the given position, size, and label string.
- void [global](#) ()

Make the shortcuts for this menu work no matter what window has the focus when you type it.
- int [insert](#) (int index, const char *, int [shortcut](#), [FI_Callback](#) *, void * = 0, int = 0)

Inserts a new menu item at the specified `index` position.
- int [insert](#) (int index, const char *a, const char *b, [FI_Callback](#) *c, void *d = 0, int e = 0)

See int `FI_Menu_::insert(const char label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)`*
- int [item_pathname](#) (char *name, int namelen, const [FI_Menu_Item](#) *finditem = 0) const

Get the menu 'pathname' for the specified menuitem.
- const [FI_Menu_Item](#) * [menu](#) () const

Returns a pointer to the array of `FI_Menu_Items`.
- void [menu](#) (const [FI_Menu_Item](#) *m)

Sets the menu array pointer directly.
- [FI_Boxtype](#) [menu_box](#) () const

Get the box type for the menu popup windows.
- void [menu_box](#) ([FI_Boxtype](#) b)

Set the box type for the menu popup windows.
- const [FI_Menu_Item](#) * [menu_end](#) ()

Finishes menu modifications and returns `menu()`.
- int [mode](#) (int i) const

Gets the flags of item `i`.
- void [mode](#) (int i, int fl)

Sets the flags of item `i`.
- const [FI_Menu_Item](#) * [mvalue](#) () const

Returns a pointer to the last menu item that was picked.
- const [FI_Menu_Item](#) * [picked](#) (const [FI_Menu_Item](#) *)

When user picks a menu item, call this.
- const [FI_Menu_Item](#) * [prev_mvalue](#) () const

Returns a pointer to the menu item that was picked before the current one was picked.
- void [remove](#) (int)

Deletes item `i` from the menu.
- void [replace](#) (int, const char *)

Changes the text of item `i`.
- void [setonly](#) ([FI_Menu_Item](#) *item)

Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.

- void **shortcut** (int i, int s)
Changes the shortcut of item i to s.
- int **size** () const
This returns the number of [FI_Menu_Item](#) structures that make up the menu, correctly counting submenus.
- void **size** (int W, int H)
- const [FI_Menu_Item](#) * **test_shortcut** ()
Returns the menu item with the entered shortcut (key value).
- const char * **text** () const
Returns the title of the last item chosen.
- const char * **text** (int i) const
Returns the title of item i.
- [FI_Color](#) **textcolor** () const
Get the current color of menu item labels.
- void **textcolor** ([FI_Color](#) c)
Sets the current color of menu item labels.
- [FI_Font](#) **textfont** () const
Gets the current font of menu item labels.
- void **textfont** ([FI_Font](#) c)
Sets the current font of menu item labels.
- [FI_Fontsize](#) **textsize** () const
Gets the font size of menu item labels.
- void **textsize** ([FI_Fontsize](#) c)
Sets the font size of menu item labels.
- int **value** () const
Returns the index into menu() of the last item chosen by the user.
- int **value** (const [FI_Menu_Item](#) *)
The value is the index into menu() of the last item chosen by the user.
- int **value** (int i)
The value is the index into menu() of the last item chosen by the user.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const

- virtual `FI_Group * as_group ()`
Returns an `FI_Group` pointer if this widget is an `FI_Group`.
- virtual `FI_Group const * as_group () const`
- virtual `FI_Window * as_window ()`
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- virtual `FI_Window const * as_window () const`
- void `bind_deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage (int f)`
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- void `bind_image (int f)`
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`
Gets the box type of the widget.
- void `box (FI_Boxtype new_box)`
Sets the box type for the widget.
- `FI_Callback_p callback () const`
Gets the current callback function for the widget.
- void `callback (FI_Callback *cb)`
Sets the current callback function for the widget.
- void `callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`
Sets the current callback function and managed user data for the widget.
- void `callback (FI_Callback *cb, void *p)`
Sets the current callback function and data for the widget.
- void `callback (FI_Callback0 *cb)`
Sets the current callback function for the widget.
- void `callback (FI_Callback1 *cb, long p=0)`
Sets the current callback function for the widget.
- unsigned int `changed () const`
Checks if the widget value changed since the last callback.
- void `clear_active ()`
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed ()`
Marks the value of the widget as unchanged.
- void `clear_damage (uchar c=0)`
Clears or sets the damage flags.
- void `clear_output ()`
Sets a widget to accept input.
- void `clear_visible ()`
Hides the widget.
- void `clear_visible_focus ()`
Disables keyboard focus navigation with this widget.
- `FI_Color color () const`
Gets the background color of the widget.
- void `color (FI_Color bg)`
Sets the background color of the widget.
- void `color (FI_Color bg, FI_Color sel)`
Sets the background and selection color of the widget.
- `FI_Color color2 () const`

- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget *w`) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar c`)

Sets the damage bits for the widget.
- void `damage` (`uchar c`, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- virtual void `draw` ()=0

Draws the widget.
- void `draw_label` (int, int, int, int, `FI_Align`) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- virtual int `handle` (int event)

Handles the specified event.
- virtual void `hide` ()

Makes a widget invisible.
- `FI_Image * image` ()

Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)

Sets the image to use as part of the widget label when in the active state.

- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group * parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group *p`)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color selection_color` () const

- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)

Sets the selection color.

 - void `set_active` ()

Marks the widget as active without sending events or changing focus.

 - void `set_changed` ()

Marks the value of the widget as changed.

 - void `set_output` ()

Sets a widget to output only.

 - void `set_visible` ()

Makes the widget visible.

 - void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.

 - int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.

 - void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.

 - virtual void `show` ()

Makes a widget visible.

 - void `size` (int W, int H)

Changes the size of the widget.

 - int `take_focus` ()

Gives the widget the keyboard focus.

 - unsigned int `takeevents` () const

Returns if the widget is able to take events.

 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.

 - const char * `tooltip` () const

Gets the current tooltip text.

 - void `tooltip` (const char *text)

Sets the current tooltip text.

 - `FI_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.

 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.

 - `uchar` `type` () const

Gets the widget type.

 - void `type` (`uchar` t)

Sets the widget type.

 - int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.

 - void * `user_data` () const

Gets the user data for this widget.

 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.

 - void `user_data` (void *v)

Sets the user data for this widget.

 - unsigned int `visible` () const

Returns whether a widget is visible.

 - unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.

- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- int `item_pathname_` (char *name, int namelen, const `FI_Menu_Item` *finditem, const `FI_Menu_Item` *menu=0) const

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.

- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Protected Attributes

- **uchar alloc**
- **uchar down_box_**
- **FI_Boxtype menu_box_**
- **FI_Color textcolor_**
- **FI_Font textfont_**
- **FI_Fontsize textsize_**

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
, **OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
, **MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
, **GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

12.83.1 Detailed Description

Base class of all widgets that have a menu in FLTK.

Currently FLTK provides you with [FI_Menu_Button](#), [FI_Menu_Bar](#), and [FI_Choice](#).

The class contains a pointer to an array of structures of type [FI_Menu_Item](#). The array may either be supplied directly by the user program, or it may be "private": a dynamically allocated array managed by the [FI_Menu_](#).

When the user clicks a menu item, [value\(\)](#) is set to that item and then:

- If the [FI_Menu_Item](#) has a callback set, that callback is invoked with any userdata configured for it. (The [FI_Menu_](#) widget's callback is NOT invoked.)

- For any `Fl_Menu_Items` that **don't** have a callback set, the `Fl_Menu_` widget's callback is invoked with any userdata configured for it. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

The line spacing between menu items can be controlled with the global setting `Fl::menu_linespacing()`.

See also

[Fl_Widget::shortcut_label\(int\)](#)

12.83.2 Constructor & Destructor Documentation

12.83.2.1 Fl_Menu_()

```
Fl_Menu_::Fl_Menu_ (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Menu_` widget using the given position, size, and label string. `menu()` is initialized to null.

12.83.3 Member Function Documentation

12.83.3.1 add() [1/2]

```
int Fl_Menu_::add (
    const char * str )
```

This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.

The passed string is split at any '|' characters and then `add(s,0,0,0,0)` is done with each section. This is often useful if you are just using the value, and is compatible with Forms and other GL programs. The section strings use the same special characters as described for the long version of `add()`.

No items must be added to a menu during a callback to the same menu.

Parameters

<i>str</i>	string containing multiple menu labels as described above
------------	---

Returns

the index into the `menu()` array, where the entry was added

12.83.3.2 add() [2/2]

```
int Fl_Menu_::add (
    const char * label,
    int shortcut,
    Fl_Callback * callback,
    void * userdata = 0,
    int flags = 0 )
```

Adds a new menu item.

Parameters

in	<i>label</i>	The text label for the menu item.
in	<i>shortcut</i>	Optional keyboard shortcut that can be an int or string: (FL_CTRL+'a') or "^a". Default 0 if none.
in	<i>callback</i>	Optional callback invoked when user clicks the item. Default 0 if none.

Parameters

in	<i>userdata</i>	Optional user data passed as an argument to the callback. Default 0 if none.
in	<i>flags</i>	Optional flags that control the type of menu item; see below. Default is 0 for none.

Returns

The index into the menu() array, where the entry was added.

Description

If the menu array was directly set with menu(x), then [copy\(\)](#) is done to make a private array.

Since this method can change the internal menu array, any menu item pointers or indices the application may have cached can become stale, and should be recalculated/refreshed.

A menu item's callback must not [add\(\)](#) items to its parent menu during the callback.

Due to backwards compatibility and historical restrictions we recommend to use either

- static menu arrays that are not extended during runtime or
- dynamic, extendable menu item arrays that are entirely created by using [add\(\)](#) or [insert\(\)](#).

This ensures that all menu arrays and strings are copied to internal storage and released when required.

Note

If you create menus from static [FI_Menu_Item](#) arrays and [add\(\)](#) or [insert\(\)](#) more menu items later, then the menu array is copied to local storage but some local (static) strings may appear to "leak memory". This is a known issue and discouraged usage (see description above) but the impact on memory usage should typically be small.

Detailed Description of Parameters

label

The menu item's label. This argument is required and must not be NULL.

The characters "&", "/", "\", and "_" are treated as special characters in the label string. The "&" character specifies that the following character is an accelerator and will be underlined. The "/" character is used to escape the next character in the string. Labels starting with the "_" character cause a divider to be placed after that menu item.

A label of the form "File/Quit" will create the submenu "File" with a menu item called "Quit".

The label string is copied to new memory and can be freed. The other arguments (including the shortcut) are copied into the menu item unchanged.

If an item exists already with that name then it is replaced with this new one. Otherwise this new one is added to the end of the correct menu or submenu. The return value is the offset into the array that the new entry was placed at.

shortcut

The keyboard shortcut for this menu item.

This parameter is optional, and defaults to 0 to indicate no shortcut.

The shortcut can either be a raw integer value (eg. `FL_CTRL+'A'`) or a string (eg. `"^c"` or `"^97"`).

Raw integer shortcuts can be a combination of keyboard chars (eg. 'A') and optional keyboard modifiers (see [Fl::event_state\(\)](#), e.g. `FL_SHIFT`, etc). In addition, `FL_COMMAND` can be used to denote `FL_META` under Mac OS X and `FL_CTRL` under other platforms.

String shortcuts can be specified in one of two ways:

```
[#+^]<ascii_value>    e.g. "97", "^97", "+97", "#97"  
[#+^]<ascii_char>    e.g. "a", "^a", "+a", "#a"
```

..where `<ascii_value>` is a decimal value representing an ASCII character (eg. 97 is the ascii code for 'a'), and the optional prefixes enhance the value that follows. Multiple prefixes must appear in the order below.

```
# - Alt  
+ - Shift  
^ - Control
```

Internally, the text shortcuts are converted to integer values using `fl_old_shortcut(const char*)`.

callback

The callback to invoke when this menu item is selected.

This parameter is optional, and defaults to 0 for no callback.

userdata

The callback's 'user data' that is passed to the callback.

This parameter is optional, and defaults to 0.

flags

These are bit flags to define what kind of menu item this is.

This parameter is optional, and defaults to 0 to define a 'regular' menu item.

These flags can be 'OR'ed together:

```
FL_MENU_INACTIVE // Deactivate menu item (gray out)
FL_MENU_TOGGLE  // Item is a checkbox toggle (shows checkbox for on/off state)
FL_MENU_VALUE   // The on/off state for checkbox/radio buttons (if set, state is 'on')
FL_MENU_RADIO   // Item is a radio button (one checkbox of many can be on)
FL_MENU_INVISIBLE // Item will not show up (shortcut will work)
FL_SUBMENU_POINTER // Indicates user_data() is a pointer to another menu array
FL_SUBMENU      // This item is a submenu to other items
FL_MENU_DIVIDER // Creates divider line below this item. Also ends a group of radio buttons.
```

All other bits in 'flags' are reserved and must not be used.

If FL_SUBMENU is set in an item's flags, then actually two items are added:

- the first item is the menu item (submenu title), as expected, and
- the second item is the submenu terminating item with the label and all other members set to 0.

If you add submenus with the 'path' technique, then the corresponding submenu terminators (maybe more than one) are added as well.

Todo Raw integer shortcut needs examples. Dependent on responses to <https://www.fltk.org/newsgroups.php?gfltk.coredev+v:10086> and results of STR#2344

12.83.3.3 clear()

```
void Fl_Menu_::clear ( )
```

Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.

Menus must not be cleared during a callback to the same menu.

12.83.3.4 clear_submenu()

```
int Fl_Menu_::clear_submenu (
    int index )
```

Clears the specified submenu pointed to by `index` of all menu items.

This method is useful for clearing a submenu so that it can be re-populated with new items. Example: a "File/Recent Files/..." submenu that shows the last few files that have been opened.

The specified `index` must point to a submenu.

The submenu is cleared with [remove\(\)](#). If the menu array was directly set with `menu(x)`, then [copy\(\)](#) is done to make a private array.

Warning

Since this method can change the internal menu array, any menu item pointers or indices the application may have cached can become stale, and should be recalculated/refreshed.

Example:

```
int index = menubar->find_index("File/Recent"); // get index of "File/Recent" submenu
if ( index != -1 ) menubar->clear_submenu(index); // clear the submenu
menubar->add("File/Recent/Aaa");
menubar->add("File/Recent/Bbb");
[...]
```

Parameters

<i>index</i>	The index of the submenu to be cleared
--------------	--

Returns

0 on success, -1 if the index is out of range or not a submenu

See also

[remove\(int\)](#)

12.83.3.5 copy()

```
void Fl_Menu_::copy (
    const Fl_Menu_Item * m,
    void * ud = 0 )
```

Sets the menu array pointer with a copy of *m* that will be automatically deleted.

If userdata *ud* is not NULL, then all user data pointers are changed in the menus as well. See `void Fl_Menu_::menu(const Fl_Menu_Item* m)`.

12.83.3.6 down_box() [1/2]

```
Fl_Boxtype Fl_Menu_::down_box ( ) const [inline]
```

This box type is used to surround the currently-selected items in the menus.

If this is FL_NO_BOX then it acts like FL_THIN_UP_BOX and `selection_color()` acts like FL_WHITE, for back compatibility.

12.83.3.7 down_box() [2/2]

```
void Fl_Menu_::down_box (
    Fl_Boxtype b ) [inline]
```

Sets the box type used to surround the currently-selected items in the menus.

12.83.3.8 find_index() [1/3]

```
int Fl_Menu_::find_index (
    const char * pathname ) const
```

Find the menu item index for a given menu *pathname*, such as "Edit/Copy".

This method finds a menu item's index position for the given menu *pathname*, also traversing submenus, but **not** submenu pointers (FL_SUBMENU_POINTER).

To get the menu item pointer for a *pathname*, use `find_item()`

Parameters

in	<i>pathname</i>	The path and name of the menu item to find
----	-----------------	--

Returns

The index of the matching item, or -1 if not found.

See also

[item_pathname\(\)](#)

12.83.3.9 find_index() [2/3]

```
int Fl_Menu_::find_index (
    const Fl_Menu_Item * item ) const
```

Find the index into the menu array for a given *item*.

A way to convert a menu item pointer into an index.

Does **not** handle items that are in submenu pointers (FL_SUBMENU_POINTER).

-1 is returned if the item is not in this menu or is part of an FL_SUBMENU_POINTER submenu.

Current implementation is fast and not expensive.


```
// Convert an index-to-item
int index = 12;
const Fl_Menu_Item *item = mymenu->menu() + index;

// Convert an item-to-index
int index = mymenu->find_index(item);
if ( index == -1 ) { ..error.. }
```

Parameters

<i>in</i>	<i>item</i>	The item to be found
-----------	-------------	----------------------

Returns

The index of the item, or -1 if not found.

See also

menu()

12.83.3.10 find_index() [3/3]

```
int Fl_Menu_::find_index (
    Fl_Callback * cb ) const
```

Find the index into the menu array for a given callback *cb*.

This method finds a menu item's index position, also traversing submenus, but **not** submenu pointers (FL_↔SUBMENU_POINTER). This is useful if an application uses internationalisation and a menu item can not be found using its label. This search is also much faster.

Parameters

<i>cb</i>	Find the first item with this callback
-----------	--

Returns

The index of the item with the specific callback, or -1 if not found

See also

find_index(const char*)

12.83.3.11 find_item() [1/2]

```
const Fl_Menu_Item * Fl_Menu_::find_item (
    const char * pathname )
```

Find the menu item for a given menu *pathname*, such as "Edit/Copy".

This method finds a menu item in the menu array, also traversing submenus, but not submenu pointers (FL_↔SUBMENU_POINTER).

To get the menu item's index, use find_index(const char*)

Example:

```
Fl_Menu_Bar *menubar = new Fl_Menu_Bar(..);
menubar->add("File/&Open");
menubar->add("File/&Save");
menubar->add("Edit/&Copy");
// [...]
Fl_Menu_Item *item;
if ( ( item = (Fl_Menu_Item*)menubar->find_item("File/&Open") ) != NULL ) {
    item->labelcolor(FL_RED);
}
if ( ( item = (Fl_Menu_Item*)menubar->find_item("Edit/&Copy") ) != NULL ) {
    item->labelcolor(FL_GREEN);
}
```

Parameters

<i>pathname</i>	The path and name of the menu item
-----------------	------------------------------------

Returns

The item found, or NULL if not found

See also

[find_index\(const char*\)](#), [find_item\(Fl_Callback*\)](#), [item_pathname\(\)](#)

12.83.3.12 find_item() [2/2]

```
const Fl_Menu_Item * Fl_Menu_::find_item (
    Fl_Callback * cb )
```

Find the menu item for the given callback *cb*.

This method finds a menu item in a menu array, also traversing submenus, but not submenu pointers. This is useful if an application uses internationalisation and a menu item can not be found using its label. This search is also much faster.

Parameters

<i>in</i>	<i>cb</i>	find the first item with this callback
-----------	-----------	--

Returns

The item found, or NULL if not found

See also

[find_item\(const char*\)](#)

12.83.3.13 find_item_with_argument()

```
const Fl_Menu_Item * Fl_Menu_::find_item_with_argument (
    long v )
```

Find the menu item for the given user argument *v*.

Parameters

<i>in</i>	<i>v</i>	find the first item with this user argument
-----------	----------	---

Returns

The item found, or NULL if not found

See also

[find_item\(const char*\)](#)

12.83.3.14 find_item_with_user_data()

```
const Fl_Menu_Item * Fl_Menu_::find_item_with_user_data (
    void * v )
```

Find the menu item for the given user data *v*.

Parameters

in	v	find the first item with this user data
----	---	---

Returns

The item found, or NULL if not found

See also

[find_item\(const char*\)](#)

12.83.3.15 global()

```
void Fl_Menu_::global ( )
```

Make the shortcuts for this menu work no matter what window has the focus when you type it.

This is done by using [Fl::add_handler\(\)](#). This `Fl_Menu_` widget does not have to be visible (ie the window it is in can be hidden, or it does not have to be put in a window at all).

Currently there can be only one `global()` menu. Setting a new one will replace the old one. There is no way to remove the `global()` setting (so don't destroy the widget!)

12.83.3.16 insert()

```
int Fl_Menu_::insert (
    int index,
    const char * label,
    int shortcut,
    Fl_Callback * callback,
    void * userdata = 0,
    int flags = 0 )
```

Inserts a new menu item at the specified `index` position.

If `index` is -1, the menu item is appended; same behavior as [add\(\)](#).

To properly insert a menu item, `label` must be the name of the item (eg. "Quit"), and not a 'menu pathname' (eg. "File/Quit"). If a menu pathname is specified, the value of `index` is *ignored*, the new item's position defined by the pathname.

For more details, see [add\(\)](#). Except for the `index` parameter, [add\(\)](#) has more detailed information on parameters and behavior, and is functionally equivalent.

Parameters

in	<i>index</i>	The menu array's index position where the new item is inserted. If -1, behavior is the same as add() .
in	<i>label</i>	The text label for the menu item. If the label is a menu pathname, <code>index</code> is ignored, and the pathname indicates the position of the new item.
in	<i>shortcut</i>	Optional keyboard shortcut. Can be an int (FL_CTRL+'a') or a string ("^a"). Default is 0.
in	<i>callback</i>	Optional callback invoked when user clicks the item. Default 0 if none.
in	<i>userdata</i>	Optional user data passed as an argument to the callback. Default 0 if none.
in	<i>flags</i>	Optional flags that control the type of menu item; see add() for more info. Default is 0 for none.

Returns

The index into the menu() array, where the entry was added.

See also

[add\(\)](#)

12.83.3.17 item_pathname()

```
int Fl_Menu_::item_pathname (
    char * name,
    int namelen,
    const Fl_Menu_Item * finditem = 0 ) const
```

Get the menu 'pathname' for the specified menuitem.

If finditem==NULL, [mvalue\(\)](#) is used (the most recently picked menuitem).

Example:

```
Fl_Menu_Bar *menubar = 0;
void my_menu_callback(Fl_Widget*,void*) {
    char name[80];
    if ( menubar->item_pathname(name, sizeof(name)-1) == 0 ) { // recently picked item
        if ( strcmp(name, "File/&Open") == 0 ) { .. } // open invoked
        if ( strcmp(name, "File/&Save") == 0 ) { .. } // save invoked
        if ( strcmp(name, "Edit/&Copy") == 0 ) { .. } // copy invoked
    }
}
int main() {
    [...]
    menubar = new Fl_Menu_Bar(..);
    menubar->add("File/&Open", 0, my_menu_callback);
    menubar->add("File/&Save", 0, my_menu_callback);
    menubar->add("Edit/&Copy", 0, my_menu_callback);
    [...]
}
```

Returns

- 0 : OK (name has menuitem's pathname)
- -1 : item not found (name=="")
- -2 : 'name' not large enough (name=="")

See also

[find_item\(\)](#)

12.83.3.18 menu() [1/2]

```
const Fl_Menu_Item * Fl_Menu_::menu ( ) const [inline]
```

Returns a pointer to the array of Fl_Menu_Items.

This will either be the value passed to menu(value) or the private copy or an internal (temporary) location (see note below).

Note

Implementation details - may be changed in the future. All modifications of the menu array are done by copying the entire menu array to an internal storage for optimization of memory allocations, for instance when using [add\(\)](#) or [insert\(\)](#). While this is done, menu() returns the pointer to this internal location. The entire menu will be copied back to private storage when needed, i.e. when **another** Fl_Menu_ is modified. You can force this reallocation after you're done with all menu modifications by calling [Fl_Menu_::menu_end\(\)](#) to make sure menu() returns a permanent pointer to private storage (until the menu is modified again). Note also that some menu methods (e.g. [Fl_Menu_Button::popup\(\)](#)) call [menu_end\(\)](#) internally to ensure a consistent menu array while the menu is open.

See also

[size\(\)](#) – returns the [size](#) of the [Fl_Menu_Item](#) array.

[menu_end\(\)](#) – finish menu modifications (optional)

Example: How to walk the array:

```
for ( int t=0; t<menubar->size(); t++ ) { // walk array of items
    const Fl_Menu_Item &item = menubar->menu()[t]; // get each item
    fprintf(stderr, "item #%d -- label=%s, value=%s type=%s\n",
        t,
        item.label() ? item.label() : "(Null)", // menu terminators have NULL labels
        (item.flags & FL_MENU_VALUE) ? "set" : "clear", // value of toggle or radio items
        (item.flags & FL_SUBMENU) ? "Submenu" : "Item"); // see if item is a submenu or actual item
}
```

12.83.3.19 menu() [2/2]

```
void Fl_Menu_::menu (
    const Fl_Menu_Item * m )
```

Sets the menu array pointer directly.

If the old menu is private it is deleted. NULL is allowed and acts the same as a zero-length menu. If you try to modify the array (with [add\(\)](#), [replace\(\)](#), or [remove\(\)](#)) a private copy is automatically done.

12.83.3.20 menu_box() [1/2]

```
Fl_Boxtype Fl_Menu_::menu_box ( ) const [inline]
```

Get the box type for the menu popup windows.

Returns

the box type, or FL_NO_BOX if [Fl_Menu_::box\(\)](#) is to be used instead

12.83.3.21 menu_box() [2/2]

```
void Fl_Menu_::menu_box (
    Fl_Boxtype b ) [inline]
```

Set the box type for the menu popup windows.

If menu_box set to FL_NO_BOX, the menu window will use [Fl_Menu_::box\(\)](#) instead.

Parameters

in	<i>b</i>	new box type or FL_NO_BOX
----	----------	---------------------------

12.83.3.22 menu_end()

```
const Fl_Menu_Item * Fl_Menu_::menu_end ( )
```

Finishes menu modifications and returns menu().

Call [menu_end\(\)](#) after using [add\(\)](#), [insert\(\)](#), [remove\(\)](#), or any other methods that may change the menu array if you want to access the menu array anytime later with menu(). This should be called only once after the **last** menu modification for performance reasons.

Does nothing if the menu array is already in a private location.

Some methods like [Fl_Menu_Button::popup\(\)](#) call this method before their menu is opened.

Note

After menu changes like [add\(\)](#), [insert\(\)](#), etc. menu() would return a pointer to a temporary internal menu array that may be relocated at unexpected times. This is due to performance considerations and may be changed w/o further notice.

Since

1.4.0

Returns

New [Fl_Menu_Item](#) array pointer.

See also

[Fl_Menu_::menu\(\)](#)

12.83.3.23 mode() [1/2]

```
int Fl_Menu_::mode (
    int i ) const [inline]
```

Gets the flags of item *i*.

For a list of the flags, see [Fl_Menu_Item](#).

12.83.3.24 mode() [2/2]

```
void Fl_Menu_::mode (
    int i,
    int fl ) [inline]
```

Sets the flags of item *i*.

For a list of the flags, see [Fl_Menu_Item](#).

12.83.3.25 mvalue()

```
const Fl_Menu_Item * Fl_Menu_::mvalue ( ) const [inline]
```

Returns a pointer to the last menu item that was picked.

12.83.3.26 picked()

```
const Fl_Menu_Item * Fl_Menu_::picked (
    const Fl_Menu_Item * v )
```

When user picks a menu item, call this.

It will do the callback. Unfortunately this also casts away `const` for the checkboxes, but this was necessary so non-checkbox menus can really be declared `const`...

12.83.3.27 prev_mvalue()

```
const Fl_Menu_Item * Fl_Menu_::prev_mvalue ( ) const [inline]
```

Returns a pointer to the menu item that was picked before the current one was picked.

This call gives devs additional details how a user changed a choice in the [Fl_Choice](#) widget.

12.83.3.28 remove()

```
void Fl_Menu_::remove (
    int i )
```

Deletes item *i* from the menu.

If the menu array was directly set with `menu(x)` then `copy()` is done to make a private array.

No items must be removed from a menu during a callback to the same menu.

Parameters

<i>i</i>	index into menu array
----------	-----------------------

12.83.3.29 replace()

```
void Fl_Menu_::replace (
    int i,
```

```
const char * str )
```

Changes the text of item *i*.

This is the only way to get slash into an [add\(\)](#)'ed menu item. If the menu array was directly set with [menu\(x\)](#) then [copy\(\)](#) is done to make a private array.

Parameters

<i>i</i>	index into menu array
<i>str</i>	new label for menu item at index <i>i</i>

12.83.3.30 size()

```
int Fl_Menu_::size ( ) const
```

This returns the number of [Fl_Menu_Item](#) structures that make up the menu, correctly counting submenus.

This includes the "terminator" item at the end. To copy a menu array you need to copy [size\(\)*sizeof\(Fl_Menu_Item\)](#) bytes. If the menu is NULL this returns zero (an empty menu will return 1).

12.83.3.31 test_shortcut()

```
const Fl_Menu_Item * Fl_Menu_::test_shortcut ( ) [inline]
```

Returns the menu item with the entered shortcut (key value).

This searches the complete [menu\(\)](#) for a shortcut that matches the entered key value. It must be called for a [FL_KEYBOARD](#) or [FL_SHORTCUT](#) event.

If a match is found, the menu's callback will be called.

Returns

matched [Fl_Menu_Item](#) or NULL.

12.83.3.32 text() [1/2]

```
const char * Fl_Menu_::text ( ) const [inline]
```

Returns the title of the last item chosen.

12.83.3.33 text() [2/2]

```
const char * Fl_Menu_::text (
    int i ) const [inline]
```

Returns the title of item *i*.

12.83.3.34 textcolor()

```
Fl_Color Fl_Menu_::textcolor ( ) const [inline]
```

Get the current color of menu item labels.

12.83.3.35 textfont() [1/2]

```
Fl_Font Fl_Menu_::textfont ( ) const [inline]
```

Gets the current font of menu item labels.

12.83.3.36 textfont() [2/2]

```
void Fl_Menu_::textfont (
    Fl_Font c ) [inline]
```

Sets the current font of menu item labels.

12.83.3.37 textsize() [1/2]

```
Fl_Fontsize Fl_Menu_::textsize ( ) const [inline]
```

Gets the font size of menu item labels.

12.83.3.38 textsize() [2/2]

```
void Fl_Menu_::textsize (
    Fl_Fontsize c ) [inline]
```

Sets the font size of menu item labels.

12.83.3.39 value() [1/3]

```
int Fl_Menu_::value ( ) const [inline]
```

Returns the index into menu() of the last item chosen by the user.

It is zero initially.

12.83.3.40 value() [2/3]

```
int Fl_Menu_::value (
    const Fl_Menu_Item * m )
```

The value is the index into menu() of the last item chosen by the user.

It is zero initially. You can set it as an integer, or set it with a pointer to a menu item. The set routines return non-zero if the new value is different than the old one.

12.83.3.41 value() [3/3]

```
int Fl_Menu_::value (
    int i ) [inline]
```

The value is the index into menu() of the last item chosen by the user.

It is zero initially. You can set it as an integer, or set it with a pointer to a menu item. The set routines return non-zero if the new value is different than the old one.

The documentation for this class was generated from the following files:

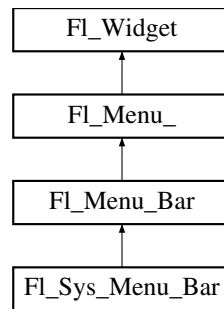
- Fl_Menu_.H
- Fl_Menu_-debug-disabled.cxx
- Fl_Menu_-delete-labels.cxx
- Fl_Menu_.cxx
- Fl_Menu_add.cxx
- Fl_Menu_global.cxx

12.84 FI_Menu_Bar Class Reference

This widget provides a standard menubar interface.

```
#include <Fl_Menu_Bar.H>
```

Inheritance diagram for Fl_Menu_Bar:



Public Member Functions

- [Fl_Menu_Bar](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Menu_Bar](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- virtual void [update](#) ()
Updates the menu bar after any change to its items.

Public Member Functions inherited from [Fl_Menu_](#)

- int [add](#) (const char *)
This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.
- int [add](#) (const char *, int [shortcut](#), [Fl_Callback](#) *, void *=0, int=0)
Adds a new menu item.
- int [add](#) (const char *a, const char *b, [Fl_Callback](#) *c, void *d=0, int e=0)
See int [Fl_Menu_::add](#)(const char label, int shortcut, [Fl_Callback](#)*, void *user_data=0, int flags=0)*
- void [clear](#) ()
Same as [menu](#)(NULL), set the array pointer to null, indicating a zero-length menu.
- int [clear_submenu](#) (int index)
*Clears the specified submenu pointed to by *index* of all menu items.*
- void [copy](#) (const [Fl_Menu_Item](#) *m, void *user_data=0)
Sets the menu array pointer with a copy of m that will be automatically deleted.
- [Fl_Boxtype](#) [down_box](#) () const
This box type is used to surround the currently-selected items in the menus.
- void [down_box](#) ([Fl_Boxtype](#) b)
Sets the box type used to surround the currently-selected items in the menus.
- [Fl_Color](#) [down_color](#) () const
For back compatibility, same as [selection_color](#)()
- void [down_color](#) (unsigned c)
For back compatibility, same as [selection_color](#)()
- int [find_index](#) (const char *name) const
*Find the menu item index for a given menu *pathname*, such as "Edit/Copy".*
- int [find_index](#) (const [Fl_Menu_Item](#) *item) const
*Find the index into the menu array for a given *item*.*
- int [find_index](#) ([Fl_Callback](#) *cb) const
*Find the index into the menu array for a given callback *cb*.*
- const [Fl_Menu_Item](#) * [find_item](#) (const char *name)
*Find the menu item for a given menu *pathname*, such as "Edit/Copy".*
- const [Fl_Menu_Item](#) * [find_item](#) ([Fl_Callback](#) *)
*Find the menu item for the given callback *cb*.*

- const [FI_Menu_Item](#) * [find_item_with_argument](#) (long)
 - Find the menu item for the given user argument v.*
- const [FI_Menu_Item](#) * [find_item_with_user_data](#) (void *)
 - Find the menu item for the given user data v.*
- [FI_Menu_](#) (int, int, int, int, const char *=0)
 - Creates a new [FI_Menu_](#) widget using the given position, size, and label string.*
- void [global](#) ()
 - Make the shortcuts for this menu work no matter what window has the focus when you type it.*
- int [insert](#) (int index, const char *, int [shortcut](#), [FI_Callback](#) *, void *=0, int=0)
 - Inserts a new menu item at the specified *index* position.*
- int [insert](#) (int index, const char *a, const char *b, [FI_Callback](#) *c, void *d=0, int e=0)
 - See int [FI_Menu_::insert](#)(const char* label, int shortcut, [FI_Callback](#)*, void *user_data=0, int flags=0)*
- int [item_pathname](#) (char *name, int namelen, const [FI_Menu_Item](#) *finditem=0) const
 - Get the menu 'pathname' for the specified menuitem.*
- const [FI_Menu_Item](#) * [menu](#) () const
 - Returns a pointer to the array of [FI_Menu_Items](#).*
- void [menu](#) (const [FI_Menu_Item](#) *m)
 - Sets the menu array pointer directly.*
- [FI_Boxtype](#) [menu_box](#) () const
 - Get the box type for the menu popup windows.*
- void [menu_box](#) ([FI_Boxtype](#) b)
 - Set the box type for the menu popup windows.*
- const [FI_Menu_Item](#) * [menu_end](#) ()
 - Finishes menu modifications and returns [menu](#)()*
- int [mode](#) (int i) const
 - Gets the flags of item i.*
- void [mode](#) (int i, int fl)
 - Sets the flags of item i.*
- const [FI_Menu_Item](#) * [mvalue](#) () const
 - Returns a pointer to the last menu item that was picked.*
- const [FI_Menu_Item](#) * [picked](#) (const [FI_Menu_Item](#) *)
 - When user picks a menu item, call this.*
- const [FI_Menu_Item](#) * [prev_mvalue](#) () const
 - Returns a pointer to the menu item that was picked before the current one was picked.*
- void [remove](#) (int)
 - Deletes item *i* from the menu.*
- void [replace](#) (int, const char *)
 - Changes the text of item *i*.*
- void [setonly](#) ([FI_Menu_Item](#) *item)
 - Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.*
- void [shortcut](#) (int i, int s)
 - Changes the shortcut of item *i* to *s*.*
- int [size](#) () const
 - This returns the number of [FI_Menu_Item](#) structures that make up the menu, correctly counting submenus.*
- void [size](#) (int W, int H)
- const [FI_Menu_Item](#) * [test_shortcut](#) ()
 - Returns the menu item with the entered shortcut (key value).*
- const char * [text](#) () const
 - Returns the title of the last item chosen.*
- const char * [text](#) (int i) const
 - Returns the title of item *i*.*

- [FI_Color](#) `textcolor` () const
Get the current color of menu item labels.
- void `textcolor` ([FI_Color](#) c)
Sets the current color of menu item labels.
- [FI_Font](#) `textfont` () const
Gets the current font of menu item labels.
- void `textfont` ([FI_Font](#) c)
Sets the current font of menu item labels.
- [FI_Fontsize](#) `textsize` () const
Gets the font size of menu item labels.
- void `textsize` ([FI_Fontsize](#) c)
Sets the font size of menu item labels.
- int `value` () const
Returns the index into menu() of the last item chosen by the user.
- int `value` (const [FI_Menu_Item](#) *)
The value is the index into menu() of the last item chosen by the user.
- int `value` (int i)
The value is the index into menu() of the last item chosen by the user.

Public Member Functions inherited from [FI_Widget](#)

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) `align` () const
Gets the label alignment.
- void `align` ([FI_Align](#) alignment)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument` (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * `as_gl_window` ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * `as_gl_window` () const
- virtual [FI_Group](#) * `as_group` ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * `as_group` () const
- virtual [FI_Window](#) * `as_window` ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * `as_window` () const
- void `bind_deimage` ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` ([FI_Image](#) *img)

- Sets the image to use as part of the widget label when in the active state.*

 - void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
 - `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
 - void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
 - `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
 - void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
 - void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
 - unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
 - void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
 - void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
 - void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
 - void `clear_output` ()
 - Sets a widget to accept input.*
 - void `clear_visible` ()
 - Hides the widget.*
 - void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
 - `FI_Color` `color` () const
 - Gets the background color of the widget.*
 - void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
 - void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
 - `FI_Color` `color2` () const
 - For back compatibility only.*
 - void `color2` (unsigned a)
 - For back compatibility only.*
 - int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
 - void `copy_label` (const char *new_label)
 - Sets the current label.*
 - void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*

- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget *widget`, `long arg`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const

- Gets the label color.*
- void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
- [FI_Font](#) [labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype](#) [labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.

- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- void `draw ()` [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from [FI_Menu_](#)

- int `item_pathname_ (char *name, int namelen, const FI_Menu_Item *finditem, const FI_Menu_Item *menu=0)` const

Protected Member Functions inherited from [FI_Widget](#)

- void `clear_flag (unsigned int c)`
Clears a flag in the flags mask.
- void `draw_backdrop ()` const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void `draw_box ()` const
Draws the widget box according its box style.
- void `draw_box (FI_Boxtype t, FI_Color c)` const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box (FI_Boxtype t, int x, int y, int w, int h, FI_Color c)` const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus ()` const
Draws a focus rectangle around the widget.
- void `draw_focus (FI_Boxtype t, int X, int Y, int W, int H)` const
Draws a focus rectangle around the widget.
- void `draw_focus (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg)` const
Draws a focus box for the widget at the given position and size.
- void `draw_label ()` const
Draws the widget's label at the defined label position.
- void `draw_label (int, int, int, int)` const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags ()` const
Gets the widget flags mask.
- void `h (int v)`
Internal use only.
- void `set_flag (unsigned int c)`
Sets a flag in the flags mask.
- void `w (int v)`
Internal use only.
- void `x (int v)`
Internal use only.
- void `y (int v)`
Internal use only.

Friends

- class [FI_Sys_Menu_Bar_Driver](#)

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void `default_callback` (`FI_Widget *widget`, `void *data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (`const char *t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (`const char *`, `const bool require_alt=false`)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
 ,
`OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
 ,
`MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
 ,
`GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,
`AUTO_DELETE_USER_DATA = 1<<23` ,
`MAXIMIZED = 1<<24` , `POPOP = 1<<25` , `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` ,
`USERFLAG1 = 1<<31` }
flags possible values enumeration.

Protected Attributes inherited from FI_Menu_

- `uchar alloc`
- `uchar down_box_`
- `FI_Boxtype menu_box_`
- `FI_Color textcolor_`
- `FI_Font textfont_`
- `FI_Fontsize textsize_`

12.84.1 Detailed Description

This widget provides a standard menubar interface.

Usually you will put this widget along the top edge of your window. The height of the widget should be 30 for the menu titles to draw correctly with the default font.

The items on the bar and the menus they bring up are defined by a single `FI_Menu_Item` array. Because a `FI_Menu_Item` array defines a hierarchy, the top level menu defines the items in the menubar, while the submenus define the pull-down menus. Sub-sub menus and lower pop up to the right of the submenus.

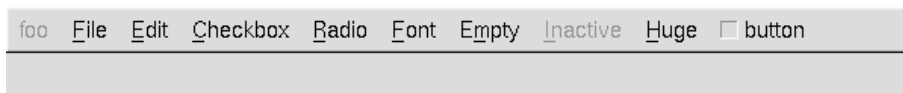


Figure 12.28 menubar

If there is an item in the top menu that is not a title of a submenu, then it acts like a "button" in the menubar. Clicking on it will pick it.

When the user clicks a menu item, `value()` is set to that item and then:

- The item's callback is done if one has been set; the `FI_Menu_Bar` is passed as the `FI_Widget*` argument, along with any userdata configured for the callback.

- If the item does not have a callback, the `Fl_Menu_Bar`'s callback is done instead, along with any userdata configured for the callback. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

Submenus will also pop up in response to shortcuts indicated by putting a '&' character in the name field of the menu item. If you put a '&' character in a top-level "button" then the shortcut picks it. The '&' character in submenus is ignored until the menu is popped up.

Typing the `shortcut()` of any of the menu items will cause callbacks exactly the same as when you pick the item with the mouse.

12.84.2 Constructor & Destructor Documentation

12.84.2.1 Fl_Menu_Bar()

```
Fl_Menu_Bar::Fl_Menu_Bar (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_Menu_Bar` widget using the given position, size, and label string.

The default boxtype is `FL_UP_BOX`.

The constructor sets `menu()` to `NULL`. See `Fl_Menu_` for the methods to set or change the menu.

`labelsize()`, `labelfont()`, and `labelcolor()` are used to control how the menubar items are drawn. They are initialized from the `Fl_Menu` static variables, but you can change them if desired.

`label()` is ignored unless you change `align()` to put it outside the menubar.

The destructor removes the `Fl_Menu_Bar` widget and all of its menu items.

12.84.3 Member Function Documentation

12.84.3.1 draw()

```
void Fl_Menu_Bar::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

Reimplemented in `Fl_Sys_Menu_Bar`.

12.84.3.2 handle()

```
int Fl_Menu_Bar::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

12.84.3.3 update()

```
virtual void FI_Menu_Bar::update ( ) [inline], [virtual]
```

Updates the menu bar after any change to its items.

This is useful when the menu bar can be an [FI_Sys_Menu_Bar](#) object.

Reimplemented in [FI_Sys_Menu_Bar](#).

The documentation for this class was generated from the following files:

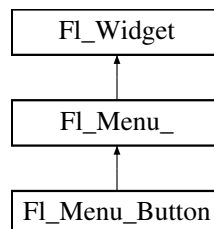
- [FI_Menu_Bar.H](#)
- [FI_Menu_Bar.cxx](#)

12.85 FI_Menu_Button Class Reference

This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of [FI_Menu_Item](#) objects.

```
#include <FI_Menu_Button.H>
```

Inheritance diagram for [FI_Menu_Button](#):

**Public Types**

- enum [popup_buttons](#) {
[POPUP1](#) = 1 , [POPUP2](#) , [POPUP12](#) , [POPUP3](#) ,
[POPUP13](#) , [POPUP23](#) , [POPUP123](#) }

indicate what mouse buttons pop up the menu.

Public Member Functions

- [FI_Menu_Button](#) (int, int, int, int, const char *≠0)
Creates a new [FI_Menu_Button](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- const [FI_Menu_Item](#) * [popup](#) ()
Act exactly as though the user clicked the button or typed the shortcut key.

Public Member Functions inherited from [FI_Menu_](#)

- int [add](#) (const char *)
This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.
- int [add](#) (const char *, int [shortcut](#), [FI_Callback](#) *, void *=0, int=0)
Adds a new menu item.
- int [add](#) (const char *a, const char *b, [FI_Callback](#) *c, void *d=0, int e=0)
See int [FI_Menu_::add](#)(const char label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)*
- void [clear](#) ()
Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.
- int [clear_submenu](#) (int index)
Clears the specified submenu pointed to by index of all menu items.
- void [copy](#) (const [FI_Menu_Item](#) *m, void *user_data=0)
Sets the menu array pointer with a copy of m that will be automatically deleted.
- [FI_Boxtype](#) [down_box](#) () const
This box type is used to surround the currently-selected items in the menus.
- void [down_box](#) ([FI_Boxtype](#) b)
Sets the box type used to surround the currently-selected items in the menus.
- [FI_Color](#) [down_color](#) () const
For back compatibility, same as [selection_color\(\)](#)
- void [down_color](#) (unsigned c)
For back compatibility, same as [selection_color\(\)](#)
- int [find_index](#) (const char *name) const
Find the menu item index for a given menu pathname, such as "Edit/Copy".
- int [find_index](#) (const [FI_Menu_Item](#) *item) const
Find the index into the menu array for a given item.
- int [find_index](#) ([FI_Callback](#) *cb) const
Find the index into the menu array for a given callback cb.
- const [FI_Menu_Item](#) * [find_item](#) (const char *name)
Find the menu item for a given menu pathname, such as "Edit/Copy".
- const [FI_Menu_Item](#) * [find_item](#) ([FI_Callback](#) *)
Find the menu item for the given callback cb.
- const [FI_Menu_Item](#) * [find_item_with_argument](#) (long)
Find the menu item for the given user argument v.
- const [FI_Menu_Item](#) * [find_item_with_user_data](#) (void *)
Find the menu item for the given user data v.
- [FI_Menu_](#) (int, int, int, int, const char *=0)
Creates a new [FI_Menu_](#) widget using the given position, size, and label string.
- void [global](#) ()
Make the shortcuts for this menu work no matter what window has the focus when you type it.
- int [insert](#) (int index, const char *, int [shortcut](#), [FI_Callback](#) *, void *=0, int=0)
Inserts a new menu item at the specified index position.
- int [insert](#) (int index, const char *a, const char *b, [FI_Callback](#) *c, void *d=0, int e=0)
See int [FI_Menu_::insert](#)(const char label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)*
- int [item_pathname](#) (char *name, int namelen, const [FI_Menu_Item](#) *finditem=0) const
Get the menu 'pathname' for the specified menuitem.
- const [FI_Menu_Item](#) * [menu](#) () const
Returns a pointer to the array of [FI_Menu_Items](#).
- void [menu](#) (const [FI_Menu_Item](#) *m)
Sets the menu array pointer directly.

- [FI_Boxtype menu_box](#) () const
Get the box type for the menu popup windows.
- void [menu_box](#) ([FI_Boxtype](#) b)
Set the box type for the menu popup windows.
- const [FI_Menu_Item](#) * [menu_end](#) ()
Finishes menu modifications and returns menu().
- int [mode](#) (int i) const
Gets the flags of item i.
- void [mode](#) (int i, int fl)
Sets the flags of item i.
- const [FI_Menu_Item](#) * [mvalue](#) () const
Returns a pointer to the last menu item that was picked.
- const [FI_Menu_Item](#) * [picked](#) (const [FI_Menu_Item](#) *)
When user picks a menu item, call this.
- const [FI_Menu_Item](#) * [prev_mvalue](#) () const
Returns a pointer to the menu item that was picked before the current one was picked.
- void [remove](#) (int)
Deletes item i from the menu.
- void [replace](#) (int, const char *)
Changes the text of item i.
- void [setonly](#) ([FI_Menu_Item](#) *item)
Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.
- void [shortcut](#) (int i, int s)
Changes the shortcut of item i to s.
- int [size](#) () const
This returns the number of [FI_Menu_Item](#) structures that make up the menu, correctly counting submenus.
- void [size](#) (int W, int H)
- const [FI_Menu_Item](#) * [test_shortcut](#) ()
Returns the menu item with the entered shortcut (key value).
- const char * [text](#) () const
Returns the title of the last item chosen.
- const char * [text](#) (int i) const
Returns the title of item i.
- [FI_Color](#) [textcolor](#) () const
Get the current color of menu item labels.
- void [textcolor](#) ([FI_Color](#) c)
Sets the current color of menu item labels.
- [FI_Font](#) [textfont](#) () const
Gets the current font of menu item labels.
- void [textfont](#) ([FI_Font](#) c)
Sets the current font of menu item labels.
- [FI_Fontsize](#) [textsize](#) () const
Gets the font size of menu item labels.
- void [textsize](#) ([FI_Fontsize](#) c)
Sets the font size of menu item labels.
- int [value](#) () const
Returns the index into menu() of the last item chosen by the user.
- int [value](#) (const [FI_Menu_Item](#) *)
The value is the index into menu() of the last item chosen by the user.
- int [value](#) (int i)
The value is the index into menu() of the last item chosen by the user.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_GI_Window](#) * [as_gi_window](#) ()
Returns an [FI_GI_Window](#) pointer if this widget is an [FI_GI_Window](#).
- virtual class [FI_GI_Window](#) const * [as_gi_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#), [FI_Callback_User_Data *p](#), bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback *cb](#), void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0 *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1 *cb](#), long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (FI_Color bg)

Sets the background color of the widget.
- void `color` (FI_Color bg, FI_Color sel)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const FI_Widget *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (FI_Image &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (FI_Image *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*
- unsigned int `output` () const
 - Returns if a widget is used for output only.*
- `FI_Group * parent` () const
 - Returns a pointer to the parent widget.*
- void `parent` (`FI_Group *p`)
 - Internal use only - "for hacks only".*
- void `position` (int X, int Y)
 - Repositions the window or widget.*
- void `redraw` ()
 - Schedules the drawing of the widget.*
- void `redraw_label` ()
 - Schedules the drawing of the label.*
- virtual void `resize` (int x, int y, int w, int h)
 - Changes the size or position of the widget.*
- `FI_Color selection_color` () const
 - Gets the selection color.*
- void `selection_color` (`FI_Color a`)
 - Sets the selection color.*
- void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
- void `set_changed` ()
 - Marks the value of the widget as changed.*
- void `set_output` ()
 - Sets a widget to output only.*
- void `set_visible` ()
 - Makes the widget visible.*
- void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
- int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void `show` ()
 - Makes a widget visible.*
- void `size` (int W, int H)
 - Changes the size of the widget.*
- int `take_focus` ()
 - Gives the widget the keyboard focus.*
- unsigned int `takeevents` () const
 - Returns if the widget is able to take events.*
- int `test_shortcut` ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
- const char * `tooltip` () const
 - Gets the current tooltip text.*
- void `tooltip` (const char *text)
 - Sets the current tooltip text.*
- `FI_Window * top_window` () const
 - Returns a pointer to the top-level window for the widget.*
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const
 - Finds the x/y offset of the current widget relative to the top-level window.*

- [uchar type](#) () const
Gets the widget type.
- void [type](#) (uchar t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) (FI_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [FI_When when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) (uchar i)
Sets the flags used to decide when a callback is called.
- [FI_Window * window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~FI_Widget](#) ()
Destroys the widget.

Protected Member Functions

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from [FI_Menu_](#)

- int [item_pathname_](#) (char *name, int namelen, const [FI_Menu_Item](#) *finditem, const [FI_Menu_Item](#) *menu=0) const

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void [draw_box](#) () const

- Draws the widget box according its box style.*

 - void **draw_box** (FI_Boxtype t, FI_Color c) const

Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const

Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int **flags** () const

Gets the widget flags mask.
- void **h** (int v)

Internal use only.
- void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.
- void **x** (int v)

Internal use only.
- void **y** (int v)

Internal use only.

Static Protected Attributes

- static FI_Menu_Button * **pressed_menu_button_** = NULL

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
- The default callback for all widgets that don't set a callback.*
- static unsigned int **label_shortcut** (const char *t)
- Returns the Unicode value of the '&x' shortcut in a given text.*
- static int **test_shortcut** (const char *, const bool require_alt=false)
- Returns true if the given text t contains the entered '&x' shortcut.*

Protected Types inherited from FI_Widget

- enum {
- INACTIVE** = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
- FORCE_POSITION** = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
- ,
- OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
- ,
- MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15

```
,
GROUP_RELATIVE = 1<<16, COPIED_TOOLTIP = 1<<17, FULLSCREEN = 1<<18, MAC_USE_ACCENTS_MENU
= 1<<19,
NEEDS_KEYBOARD = 1<<20, IMAGE_BOUND = 1<<21, DEIMAGE_BOUND = 1<<22,
AUTO_DELETE_USER_DATA = 1<<23,
MAXIMIZED = 1<<24, POPUP = 1<<25, USERFLAG3 = 1<<29, USERFLAG2 = 1<<30,
USERFLAG1 = 1<<31 }
```

flags possible values enumeration.

Protected Attributes inherited from [FI_Menu_](#)

- [uchar](#) `alloc`
- [uchar](#) `down_box_`
- [FI_Boxtype](#) `menu_box_`
- [FI_Color](#) `textcolor_`
- [FI_Font](#) `textfont_`
- [FI_Fontsize](#) `textsize_`

12.85.1 Detailed Description

This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of [FI_Menu_Item](#) objects.



Figure 12.29 `menu_button`

Normally any mouse button will pop up a menu and it is lined up below the button as shown in the picture. However an [FI_Menu_Button](#) may also control a pop-up menu. This is done by setting the `type()`. If `type()` is zero a normal menu button is produced. If it is nonzero then this is a pop-up menu. The bits in `type()` indicate what mouse buttons pop up the menu (see [FI_Menu_Button::popup_buttons](#)).

The menu will also pop up in response to shortcuts indicated by putting a '&' character in the `label()`.

Typing the `shortcut()` of any of the menu items will cause callbacks exactly the same as when you pick the item with the mouse. The '&' character in menu item names are only looked at when the menu is popped up, however.

When the user clicks a menu item, `value()` is set to that item and then:

- The item's callback is done if one has been set; the [FI_Menu_Button](#) is passed as the `FI_Widget*` argument, along with any userdata configured for the callback.
- If the item does not have a callback, the [FI_Menu_Button](#)'s callback is done instead, along with any userdata configured for it. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

12.85.2 Member Enumeration Documentation

12.85.2.1 popup_buttons

enum [Fl_Menu_Button::popup_buttons](#)

indicate what mouse buttons pop up the menu.

Values for `type()` used to indicate what mouse buttons pop up the menu. [Fl_Menu_Button::POPUP3](#) is usually what you want.

Enumerator

POPUP1	pops up with the mouse 1st button.
POPUP2	pops up with the mouse 2nd button.
POPUP12	pops up with the mouse 1st or 2nd buttons.
POPUP3	pops up with the mouse 3rd button.
POPUP13	pops up with the mouse 1st or 3rd buttons.
POPUP23	pops up with the mouse 2nd or 3rd buttons.
POPUP123	pops up with any mouse button.

12.85.3 Constructor & Destructor Documentation

12.85.3.1 Fl_Menu_Button()

```
Fl_Menu_Button::Fl_Menu_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Menu_Button](#) widget using the given position, size, and label string.

The default boxtype is `FL_UP_BOX`.

The constructor sets `menu()` to `NULL`. See [Fl_Menu_](#) for the methods to set or change the menu.

12.85.4 Member Function Documentation

12.85.4.1 draw()

```
void Fl_Menu_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.85.4.2 handle()

```
int Fl_Menu_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

12.85.4.3 popup()

```
const FI_Menu_Item * FI_Menu_Button::popup ( )
```

Act exactly as though the user clicked the button or typed the shortcut key.

The menu appears, it waits for the user to pick an item, and if they pick one it sets `value()` and does the callback or sets `changed()` as described above. The menu item is returned or NULL if the user dismisses the menu.

Note

Since FLTK 1.4.0 `FI_Menu_::menu_end()` is called before the menu pops up to make sure the menu array is located in private storage.

See also

[FI_Menu_::menu_end\(\)](#)

The documentation for this class was generated from the following files:

- `FI_Menu_Button.H`
- `FI_Menu_Button.cxx`

12.86 FI_Menu_Item Struct Reference

The `FI_Menu_Item` structure defines a single menu item that is used by the `FI_Menu_` class.

```
#include <FI_Menu_Item.H>
```

Public Member Functions

- void **activate** ()
Allows a menu item to be picked.
- int **active** () const
Gets whether or not the item can be picked.
- int **activevisible** () const
Returns non 0 if FL_INACTIVE and FL_INVISIBLE are cleared, 0 otherwise.

- int **add** (const char *, int shortcut, FI_Callback *, void *=0, int=0)
Adds a menu item.
- int **add** (const char *a, const char *b, FI_Callback *c, void *d=0, int e=0)
See int add(const char, int shortcut, FI_Callback*, void*, int)*
- long **argument** () const
Gets the user_data() argument that is sent to the callback function.
- void **argument** (long v)
Sets the user_data() argument that is sent to the callback function.
- FI_Callback_p **callback** () const
Returns the callback function that is set for the menu item.
- void **callback** (FI_Callback *c)
Sets the menu item's callback function.
- void **callback** (FI_Callback *c, void *p)
Sets the menu item's callback function and userdata() argument.
- void **callback** (FI_Callback0 *c)
Sets the menu item's callback function.
- void **callback** (FI_Callback1 *c, long p=0)
Sets the menu item's callback function and userdata() argument.
- void **check** ()
Back compatibility only.
- int **checkbox** () const
Returns true if a checkbox will be drawn next to this item.
- int **checked** () const
Back compatibility only.
- void **clear** ()
Turns the check or radio item "off" for the menu item.
- void **deactivate** ()
Prevents a menu item from being picked.
- void **do_callback** (FI_Widget *o) const
Calls the FI_Menu_Item item's callback, and provides the FI_Widget argument.
- void **do_callback** (FI_Widget *o, long arg) const
Calls the FI_Menu_Item item's callback, and provides the FI_Widget argument.
- void **do_callback** (FI_Widget *o, void *arg) const
Calls the FI_Menu_Item item's callback, and provides the FI_Widget argument.
- void **draw** (int x, int y, int w, int h, const FI_Menu_ *, int t=0) const
Draws the menu item in bounding box x,y,w,h, optionally selects the item.
- const FI_Menu_Item * **find_shortcut** (int *ip=0, const bool require_alt=false) const
Search only the top level menu for a shortcut.
- FI_Menu_Item * **first** ()
Returns the first menu item, same as next(0).
- const FI_Menu_Item * **first** () const
Returns the first menu item, same as next(0).
- void **hide** ()
Hides an item in the menu.
- void **image** (FI_Image &image)
Compatibility API for FLUID, same as image.label(this).
- void **image** (FI_Image *image)
Compatibility API for FLUID, same as image->label(this).
- void **image_label** (const FI_Image *image)
Sets the title (label()) to an icon or image.
- int **insert** (int, const char *, int, FI_Callback *, void *=0, int=0)

- Inserts an item at position `index`.*

 - `const char * label () const`
Returns the title (label) of the menu item.
 - `void label (const char *a)`
Sets the title (label) of the menu item.
 - `void label (FI_Labeltype a, const char *b)`
Sets the title (label) and the label type of the menu item.
 - `FI_Color labelcolor () const`
Gets the menu item's label color.
 - `void labelcolor (FI_Color a)`
Sets the menu item's label color.
 - `FI_Font labelfont () const`
Gets the menu item's label font.
 - `void labelfont (FI_Font a)`
Sets the menu item's label font.
 - `FI_Fontsize labelsize () const`
Gets the label font pixel size/height.
 - `void labelsize (FI_Fontsize a)`
Sets the label font pixel size/height.
 - `FI_Labeltype labeltype () const`
Returns the menu item's labeltype.
 - `void labeltype (FI_Labeltype a)`
Sets the menu item's labeltype.
 - `int measure (int *h, const FI_Menu_ *) const`
Measures width of label, including effect of & characters.
 - `void multi_Label (const FI_Multi_Label *ml)`
Sets the title (label()) and labeltype() to an FI_Multi_Label.
 - `FI_Menu_Item * next (int i=1)`
Advances a pointer by n items through a menu array, skipping the contents of submenus and invisible items.
 - `const FI_Menu_Item * next (int=1) const`
Advance a pointer by n items through a menu array, skipping the contents of submenus and invisible items.
 - `const FI_Menu_Item * popup (int X, int Y, const char *title=0, const FI_Menu_Item *picked=0, const FI_Menu_Item *s=0) const`
This method is called by widgets that want to display menus.
 - `const FI_Menu_Item * pulldown (int X, int Y, int W, int H, const FI_Menu_Item *picked=0, const FI_Menu_Item *s=0, const FI_Menu_Item *title=0, int menubar=0) const`
Pulldown() is similar to popup(), but a rectangle is provided to position the menu.
 - `int radio () const`
Returns true if this item is a radio item.
 - `void set ()`
Turns the check or radio item "on" for the menu item.
 - `void setonly (FI_Menu_Item const *first=NULL)`
Turns the radio item "on" for the menu item and turns "off" adjacent radio items set.
 - `int shortcut () const`
Gets what key combination shortcut will trigger the menu item.
 - `void shortcut (int s)`
Sets exactly what key combination will trigger the menu item.
 - `void show ()`
Makes an item visible in the menu.
 - `int size () const`
Size of the menu starting from this menu item.

- int `submenu` () const
Returns true if either `FL_SUBMENU` or `FL_SUBMENU_POINTER` is on in the flags.
- const `FI_Menu_Item` * `test_shortcut` () const
This is designed to be called by a `widgets handle()` method in response to a `FL_SHORTCUT` event.
- void `uncheck` ()
Back compatibility only.
- void * `user_data` () const
Gets the `user_data()` argument that is sent to the callback function.
- void `user_data` (void *v)
Sets the `user_data()` argument that is sent to the callback function.
- int `value` () const
Returns the current value of the check or radio item.
- void `value` (int v)
Sets the current value of the check or radio item.
- int `visible` () const
Gets the visibility of an item.

Public Attributes

- `FI_Callback` * `callback_`
menu item callback
- int `flags`
menu item flags like `FL_MENU_TOGGLE`, `FL_MENU_RADIO`
- `FI_Color` `labelcolor_`
menu item text color
- `FI_Font` `labelfont_`
which font for this menu item text
- `FI_Fontsize` `labelsize_`
size of menu item text
- `uchar` `labeltype_`
how the menu item text looks like
- int `shortcut_`
menu item shortcut
- const char * `text`
menu item text, returned by `label()`
- void * `user_data_`
menu item `user_data` for the menu's callback

12.86.1 Detailed Description

The `FI_Menu_Item` structure defines a single menu item that is used by the `FI_Menu_` class.

```

struct FI_Menu_Item {
    const char*   text;           // label()
    int           shortcut_;
    FI_Callback*  callback_;
    void*         user_data_;
    int           flags;
    uchar        labeltype_;
    uchar        labelfont_;
    uchar        labelsize_;
    uchar        labelcolor_;
};

enum { // values for flags:
    FL_MENU_INACTIVE   = 1,           // Deactivate menu item (gray out)
    FL_MENU_TOGGLE     = 2,           // Item is a checkbox toggle (shows checkbox for on/off state)
    FL_MENU_VALUE      = 4,           // The on/off state for checkbox/radio buttons (if set, state is 'on')
    FL_MENU_RADIO      = 8,           // Item is a radio button (one checkbox of many can be on)
    FL_MENU_INVISIBLE  = 0x10,        // Item will not show up (shortcut will work)
    FL_SUBMENU_POINTER = 0x20,        // Indicates user_data() is a pointer to another menu array
};

```

```

FL_SUBMENU      = 0x40,          // This item is a submenu to other items
FL_MENU_DIVIDER = 0x80,          // Creates divider line below this item. Also ends a group of radio
                        buttons.
FL_MENU_HORIZONTAL = 0x100,      // ??? -- reserved, internal (do not use)
FL_MENU_RESERVED = 0xfffff00    // These bits are reserved for internal or future usage (do not use)
};

```

Typically menu items are statically defined; for example:

```

Fl_Menu_Item popup[] = {
  {"&alpha",      FL_ALT+'a', the_cb, (void*)1},
  {"&beta",       FL_ALT+'b', the_cb, (void*)2},
  {"&gamma",      FL_ALT+'c', the_cb, (void*)3, FL_MENU_DIVIDER},
  {"&strange",    0,          strange_cb},
  {"&charm",      0,          charm_cb},
  {"&truth",      0,          truth_cb},
  {"b&eauty",    0,          beauty_cb},
  {"sub&menu",   0,          0, 0, FL_SUBMENU},
  {"one"},
  {"two"},
  {"three"},
  {0},
  {"inactive",   FL_ALT+'i', 0, 0, FL_MENU_INACTIVE|FL_MENU_DIVIDER},
  {"invisible",  FL_ALT+'i', 0, 0, FL_MENU_INVISIBLE},
  {"check",      FL_ALT+'i', 0, 0, FL_MENU_TOGGLE|FL_MENU_VALUE},
  {"box",        FL_ALT+'i', 0, 0, FL_MENU_TOGGLE},
  {0}};

```

produces:

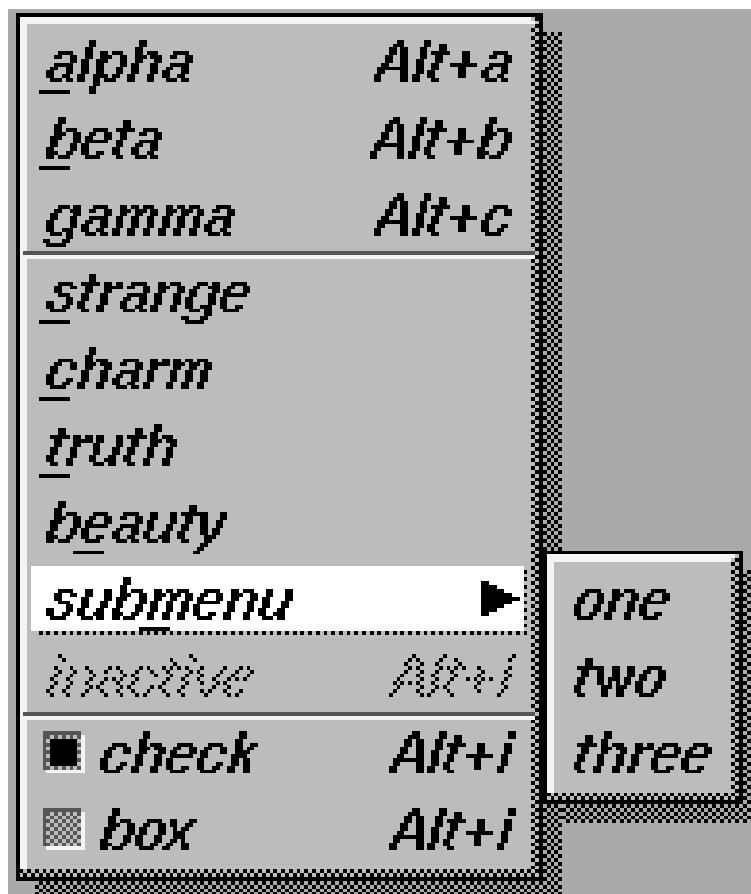


Figure 12.30 menu

A submenu title is identified by the bit `FL_SUBMENU` in the flags field, and ends with a `label()` that is `NULL`. You can nest menus to any depth. A pointer to the first item in the submenu can be treated as an `Fl_Menu` array itself. It is also possible to make separate submenu arrays with `FL_SUBMENU_POINTER` flags.

You should use the method functions to access structure members and not access them directly to avoid compatibility problems with future releases of FLTK.

Note

Adding menu items with [insert\(\)](#), [add\(\)](#), or any of its overloaded variants copies the entire menu to internal storage. Using the memory of a static menu array after that would access unused (but not released) memory and thus have no effect.

12.86.2 Member Function Documentation**12.86.2.1 add()**

```
int Fl_Menu_Item::add (
    const char * mytext,
    int sc,
    Fl_Callback * cb,
    void * data = 0,
    int myflags = 0 )
```

Adds a menu item.

The text is split at '/' characters to automatically produce submenus (actually a totally unnecessary feature as you can now add submenu titles directly by setting FL_SUBMENU in the flags).

Returns

the index into the menu() array, where the entry was added

See also

[Fl_Menu_Item::insert\(int, const char*, int, Fl_Callback*, void*, int\)](#)

12.86.2.2 argument() [1/2]

```
long Fl_Menu_Item::argument ( ) const [inline]
```

Gets the [user_data\(\)](#) argument that is sent to the callback function.

For convenience you can also define the callback as taking a long argument. This method casts the stored [user_data\(\)](#) argument to long and returns it as a *long* value.

12.86.2.3 argument() [2/2]

```
void Fl_Menu_Item::argument (
    long v ) [inline]
```

Sets the [user_data\(\)](#) argument that is sent to the callback function.

For convenience you can also define the callback as taking a long argument. This method casts the given argument *v* to void* and stores it in the menu item's [userdata\(\)](#) member. This may not be portable to some machines.

12.86.2.4 callback() [1/5]

```
Fl_Callback_p Fl_Menu_Item::callback ( ) const [inline]
```

Returns the callback function that is set for the menu item.

Each item has space for a callback function and an argument for that function. Due to back compatibility, the [Fl_Menu_Item](#) itself is not passed to the callback, instead you have to get it by calling `((Fl_Menu_*)w)->mvalue()` where *w* is the widget argument.

12.86.2.5 callback() [2/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback * c ) [inline]
```

Sets the menu item's callback function.

This method does not set the [userdata\(\)](#) argument.

See also

[Fl_Callback_p Fl_MenuItem::callback\(\) const](#)

12.86.2.6 callback() [3/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback * c,
    void * p ) [inline]
```

Sets the menu item's callback function and userdata() argument.

See also

[Fl_Callback_p](#) Fl_MenuItem::callback() const

12.86.2.7 callback() [4/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback0 * c ) [inline]
```

Sets the menu item's callback function.

This method does not set the userdata() argument.

See also

[Fl_Callback_p](#) Fl_MenuItem::callback() const

12.86.2.8 callback() [5/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback1 * c,
    long p = 0 ) [inline]
```

Sets the menu item's callback function and userdata() argument.

The argument *is* cast to void* and stored as the userdata() for the menu item's callback function.

See also

[Fl_Callback_p](#) Fl_MenuItem::callback() const

12.86.2.9 check()

```
void Fl_Menu_Item::check ( ) [inline]
```

Back compatibility only.

Deprecated Please use [Fl_Menu_Item::set\(\)](#) instead. This method will be removed in FLTK 1.5.0 or later.

See also

[set\(\)](#)

12.86.2.10 checkbox()

```
int Fl_Menu_Item::checkbox ( ) const [inline]
```

Returns true if a checkbox will be drawn next to this item.

This is true if FL_MENU_TOGGLE or FL_MENU_RADIO is set in the flags.

12.86.2.11 checked()

```
int Fl_Menu_Item::checked ( ) const [inline]
```

Back compatibility only.

Deprecated Please use [Fl_Menu_Item::value\(\)](#) instead. This method will be removed in FLTK 1.5.0 or later.

See also

[value\(\)](#)

12.86.2.12 deactivate()

```
void Fl_Menu_Item::deactivate ( ) [inline]
```

Prevents a menu item from being picked.

Note that this will also cause the menu item to appear grayed-out.

12.86.2.13 do_callback() [1/3]

```
void Fl_Menu_Item::do_callback (
    Fl_Widget * o ) const [inline]
```

Calls the [Fl_Menu_Item](#) item's callback, and provides the [Fl_Widget](#) argument.

The callback is called with the stored [user_data\(\)](#) as its second argument. You must first check that [callback\(\)](#) is non-zero before calling this.

12.86.2.14 do_callback() [2/3]

```
void Fl_Menu_Item::do_callback (
    Fl_Widget * o,
    long arg ) const [inline]
```

Calls the [Fl_Menu_Item](#) item's callback, and provides the [Fl_Widget](#) argument.

This call overrides the callback's second argument with the given value `arg`. `long arg` is cast to `void*` when calling the callback. You must first check that [callback\(\)](#) is non-zero before calling this.

12.86.2.15 do_callback() [3/3]

```
void Fl_Menu_Item::do_callback (
    Fl_Widget * o,
    void * arg ) const [inline]
```

Calls the [Fl_Menu_Item](#) item's callback, and provides the [Fl_Widget](#) argument.

This call overrides the callback's second argument with the given value `arg`. You must first check that [callback\(\)](#) is non-zero before calling this.

12.86.2.16 find_shortcut()

```
const Fl_Menu_Item * Fl_Menu_Item::find_shortcut (
    int * ip = 0,
    const bool require_alt = false ) const
```

Search only the top level menu for a shortcut.

Either `&x` in the label or the shortcut fields are used.

This tests the current event, which must be an `FL_KEYBOARD` or `FL_SHORTCUT`, against a shortcut value.

Parameters

<code>ip</code>	returns the index of the item, if <code>ip</code> is not NULL.
<code>require_alt</code>	if true: match only if Alt key is pressed.

Returns

found [Fl_Menu_Item](#) or NULL

12.86.2.17 image() [1/2]

```
void Fl_Menu_Item::image (
    Fl_Image & image ) [inline]
```

Compatibility API for FLUID, same as `image.label(this)`.

Note

This method is intended for internal use by fluid and may not do what you expect.

12.86.2.18 image() [2/2]

```
void Fl_Menu_Item::image (
    Fl_Image * image ) [inline]
```

Compatibility API for FLUID, same as `image->label(this)`.

Note

This method is intended for internal use by fluid and may not do what you expect.

12.86.2.19 image_label()

```
void Fl_Menu_Item::image_label (
    const Fl_Image * image ) [inline]
```

Sets the title (`label()`) to an icon or image.

This sets the `labeltype()` to `_FL_IMAGE_LABEL` (note the leading underscore).

See also

`const char* Fl_Menu_Item::label() const`

Since

1.4.0

12.86.2.20 insert()

```
int Fl_Menu_Item::insert (
    int index,
    const char * mytext,
    int sc,
    Fl_Callback * cb,
    void * data = 0,
    int myflags = 0 )
```

Inserts an item at position `index`.

If `index` is -1, the item is added the same way as `Fl_Menu_Item::add()`.

If 'mytext' contains any un-escaped front slashes (`/`), it's assumed a menu pathname is being specified, and the value of `index` will be ignored.

In all other aspects, the behavior of `insert()` is the same as `add()`.

Parameters

in	<i>index</i>	insert new items here
in	<i>mytext</i>	new label string, details see above
in	<i>sc</i>	keyboard shortcut for new item
in	<i>cb</i>	callback function for new item
in	<i>data</i>	user data for new item
in	<i>myflags</i>	menu flags as described in Fl_Menu_Item

Returns

the index into the `menu()` array, where the entry was added

12.86.2.21 label() [1/3]

```
const char * Fl_Menu_Item::label ( ) const [inline]
```

Returns the title (`label`) of the menu item.

A NULL here indicates the end of the menu (or of a submenu). A '&' in the item will print an underscore under the next letter, and if the menu is popped up that letter will be a "shortcut" to pick that item. To get a real '&' put two in a row.

The returned value depends on the [labeltype\(\)](#) that has been used to store the label.

Returns

A pointer to the label cast to (const char *)

Return values

(a)	A pointer to text (const char *)
(b)	A pointer to an image (FI_Image *)
(c)	A pointer to a "multi label" (FI_Multi_Label *)
NULL	End of menu or submenu

See also

[FI_Menu_Item::label\(const char *\)](#)
[FI_Menu_Item::label\(FI_Labeltype, const char *\)](#)
[FI_Menu_Item::image_label\(const FI_Image *\)](#)
[FI_Menu_Item::multi_label\(const FI_Multi_Label *\)](#)
[FI_Multi_Label::label\(FI_Menu_Item *\)](#)

12.86.2.22 label() [2/3]

```
void Fl_Menu_Item::label (
    const char * a ) [inline]
```

Sets the title (label) of the menu item.

Note

This does **not** change the [labeltype\(\)](#) for backwards compatibility. Take care to assign the correct [labeltype\(\)](#) if you assign different label types to the same menu item sequentially.

The default [labeltype\(\)](#) is FL_NORMAL_LABEL.

See also

[label\(FI_Labeltype, const char*\)](#)
const char* [FI_Menu_Item::label\(\) const](#)

12.86.2.23 label() [3/3]

```
void Fl_Menu_Item::label (
    FI_Labeltype a,
    const char * b ) [inline]
```

Sets the title (label) and the label type of the menu item.

The default FI_Labeltype when using [FI_Menu_Item::label\(const char* a\)](#) is FL_NORMAL_LABEL but you can set any other label type, for instance FL_EMBOSSED_LABEL.

Special labeltypes are:

- FL_ICON_LABEL: draws the icon ([FI_Image](#)) associated with the text
- FL_IMAGE_LABEL: draws the image ([FI_Image](#)) associated with the text
- FL_MULTI_LABEL: draws multiple parts side by side, see [FI_Multi_Label](#)

See also

const char* [FI_Menu_Item::label\(\) const](#)

12.86.2.24 labelcolor() [1/2]

```
Fl_Color Fl_Menu_Item::labelcolor ( ) const [inline]
```

Gets the menu item's label color.

This color is passed to the `labeltype` routine, and is typically the color of the label text. This defaults to `FL_BLACK`. If this color is not black fltk will **not** use overlay bitplanes to draw the menu - this is so that images put in the menu draw correctly.

12.86.2.25 labelcolor() [2/2]

```
void Fl_Menu_Item::labelcolor (
    Fl_Color a ) [inline]
```

Sets the menu item's label color.

See also

[Fl_Color Fl_Menu_Item::labelcolor\(\) const](#)

12.86.2.26 labelfont() [1/2]

```
Fl_Font Fl_Menu_Item::labelfont ( ) const [inline]
```

Gets the menu item's label font.

Fonts are identified by small 8-bit indexes into a table. See the enumeration list for predefined fonts. The default value is a Helvetica font. The function [Fl::set_font\(\)](#) can define new fonts.

12.86.2.27 labelfont() [2/2]

```
void Fl_Menu_Item::labelfont (
    Fl_Font a ) [inline]
```

Sets the menu item's label font.

Fonts are identified by small 8-bit indexes into a table. See the enumeration list for predefined fonts. The default value is a Helvetica font. The function [Fl::set_font\(\)](#) can define new fonts.

12.86.2.28 labeltype() [1/2]

```
Fl_Labeltype Fl_Menu_Item::labeltype ( ) const [inline]
```

Returns the menu item's labeltype.

A labeltype identifies a routine that draws the label of the widget. This can be used for special effects such as emboss, or to use the [label\(\)](#) pointer as another form of data such as a bitmap. The value `FL_NORMAL_LABEL` prints the label as text.

12.86.2.29 labeltype() [2/2]

```
void Fl_Menu_Item::labeltype (
    Fl_Labeltype a ) [inline]
```

Sets the menu item's labeltype.

A labeltype identifies a routine that draws the label of the widget. This can be used for special effects such as emboss, or to use the [label\(\)](#) pointer as another form of data such as a bitmap. The value `FL_NORMAL_LABEL` prints the label as text.

12.86.2.30 measure()

```
int Fl_Menu_Item::measure (
    int * hp,
    const Fl_Menu_ * m ) const
```

Measures width of label, including effect of & characters.

Optionally, can get height if hp is not NULL.

12.86.2.31 multi_label()

```
void Fl_Menu_Item::multi_label (
    const Fl_Multi_Label * ml ) [inline]
```

Sets the title ([label\(\)](#)) and [labeltype\(\)](#) to an [Fl_Multi_Label](#).

This sets the [labeltype\(\)](#) to `_FL_MULTI_LABEL` (note the leading underscore).

See also

```
const char* Fl_Menu_Item::label() const
```

Since

1.4.0

12.86.2.32 next() [1/2]

```
Fl_Menu_Item * Fl_Menu_Item::next (
    int i = 1 ) [inline]
```

Advances a pointer by n items through a menu array, skipping the contents of submenus and invisible items.

There are two calls so that you can advance through const and non-const data.

12.86.2.33 next() [2/2]

```
const Fl_Menu_Item * Fl_Menu_Item::next (
    int n = 1 ) const
```

Advance a pointer by n items through a menu array, skipping the contents of submenus and invisible items.

There are two calls so that you can advance through const and non-const data.

12.86.2.34 popup()

```
const Fl_Menu_Item * Fl_Menu_Item::popup (
    int X,
    int Y,
    const char * title = 0,
    const Fl_Menu_Item * picked = 0,
    const Fl_Menu_ * menu_button = 0 ) const
```

This method is called by widgets that want to display menus.

The menu stays up until the user picks an item or dismisses it. The selected item (or NULL if none) is returned. *This does not do the callbacks or change the state of check or radio items.*

The menu is positioned so the cursor is centered over the item picked. This will work even if `picked` is in a submenu. If `picked` is zero or not in the menu item table the menu is positioned with the cursor in the top-left corner.

Parameters

in	<code>X,Y</code>	the position of the mouse cursor, relative to the window that got the most recent event (usually you can pass Fl::event_x() and Fl::event_y() unchanged here).
in	<code>title</code>	a character string title for the menu. If non-zero a small box appears above the menu with the title in it.
in	<code>picked</code>	if this pointer is not NULL, the popup menu will appear so that the picked menu is under the mouse pointer.
in	<code>menu_button</code>	is a pointer to an Fl_Menu_ from which the color and boxtypes for the menu are pulled. If NULL then defaults are used.

Returns

a pointer to the menu item selected by the user, or NULL

12.86.2.35 pulldown()

```
const Fl_Menu_Item * Fl_Menu_Item::pulldown (
    int X,
    int Y,
    int W,
    int H,
    const Fl_Menu_Item * initial_item = 0,
    const Fl_Menu_ * pbutton = 0,
    const Fl_Menu_Item * title = 0,
    int menubar = 0 ) const
```

Pulldown() is similar to [popup\(\)](#), but a rectangle is provided to position the menu.

The menu is made at least *W* wide, and the picked item *initial_item* is centered over the rectangle (like [Fl_Choice](#) uses).

If *initial_item* is NULL or not found, the menu is aligned just below the rectangle (like a pulldown menu).

The *title* and *menubar* arguments are used internally by the [Fl_Menu_Bar](#) widget.

12.86.2.36 radio()

```
int Fl_Menu_Item::radio ( ) const [inline]
```

Returns true if this item is a radio item.

When a radio button is selected all "adjacent" radio buttons are turned off. A set of radio items is delimited by an item that has [radio\(\)](#) false, or by an item with `FL_MENU_DIVIDER` turned on.

12.86.2.37 set()

```
void Fl_Menu_Item::set ( ) [inline]
```

Turns the check or radio item "on" for the menu item.

Note that this does not turn off any adjacent radio items like [setonly\(\)](#) does.

12.86.2.38 setonly()

```
void Fl_Menu_Item::setonly (
    Fl_Menu_Item const * first = NULL )
```

Turns the radio item "on" for the menu item and turns "off" adjacent radio items set.

Note

This method is dangerous if radio items are first in the menu. Make sure that *first* is set correctly or use [Fl_Menu_::setonly\(Fl_Menu_Item*\)](#) instead.

Parameters

in	<i>first</i>	start of menu array or NULL (default) if the radio group is not the first item
----	--------------	--

12.86.2.39 shortcut()

```
void Fl_Menu_Item::shortcut (
    int s ) [inline]
```

Sets exactly what key combination will trigger the menu item.

The value is a logical 'or' of a key and a set of shift flags, for instance `FL_ALT+'a'` or `FL_ALT+FL_F+10` or just 'a'. A value of zero disables the shortcut.

The key can be any value returned by [Fl::event_key\(\)](#), but will usually be an ASCII letter. Use a lower-case letter unless you require the shift key to be held down.

The shift flags can be any set of values accepted by [Fl::event_state\(\)](#). If the bit is on that shift key must be pushed. Meta, Alt, Ctrl, and Shift must be off if they are not in the shift flags (zero for the other bits indicates a "don't care" setting).

12.86.2.40 size()

```
int Fl_Menu_Item::size ( ) const
```

Size of the menu starting from this menu item.

This method counts all menu items starting with `this` menu item, including all menu items in the same (sub)menu level, all nested submenus, **and** the terminating empty (0) menu item.

It does **not** count menu items referred to by `FL_SUBMENU_POINTER` menu items (except the single menu item with `FL_SUBMENU_POINTER`).

All menu items counted are consecutive in memory (one array).

Example:

```
schemechoice = new Fl_Choice(X+125,Y,140,25,"FLTK Scheme");
schemechoice->add("none");
schemechoice->add("plastic");
schemechoice->add("gtk+");
schemechoice->add("gleam");
printf("schemechoice->menu()->size() = %d\n", schemechoice->menu()->size());
```

Output:

```
schemechoice->menu()->size() = 5
```

12.86.2.41 submenu()

```
int Fl_Menu_Item::submenu ( ) const [inline]
```

Returns true if either `FL_SUBMENU` or `FL_SUBMENU_POINTER` is on in the flags.

`FL_SUBMENU` indicates an embedded submenu that goes from the next item through the next one with a `NULL label()`. `FL_SUBMENU_POINTER` indicates that `user_data()` is a pointer to another menu array.

12.86.2.42 test_shortcut()

```
const Fl_Menu_Item * Fl_Menu_Item::test_shortcut ( ) const
```

This is designed to be called by a widgets `handle()` method in response to a `FL_SHORTCUT` event.

If the current event matches one of the items shortcut, that item is returned. If the keystroke does not match any shortcuts then `NULL` is returned. This only matches the `shortcut()` fields, not the letters in the title preceeded by ' '.

12.86.2.43 uncheck()

```
void Fl_Menu_Item::uncheck ( ) [inline]
```

Back compatibility only.

Deprecated Please use `Fl_Menu_Item::clear()` instead. This method will be removed in FLTK 1.5.0 or later.

See also

[clear\(\)](#)

12.86.2.44 value()

```
int Fl_Menu_Item::value ( ) const [inline]
```

Returns the current value of the check or radio item.

This is zero (0) if the menu item is not checked and non-zero otherwise.

Since

1.4.0 this method returns 1 if the item is checked but you should not rely on a particular value, only zero or non-zero.

Note

The returned value for a checked menu item was `FL_MENU_VALUE` (4) before FLTK 1.4.0.

The documentation for this struct was generated from the following files:

- [Fl_Menu_Item.H](#)
- [Fl_Menu.cxx](#)

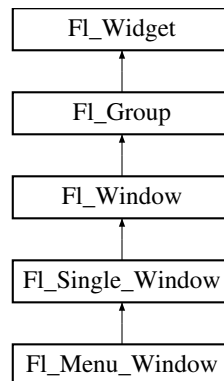
- `Fl_Menu_-debug-disabled.cxx`
- `Fl_Menu_-delete-labels.cxx`
- `Fl_Menu_.cxx`
- `Fl_Menu_add.cxx`

12.87 `Fl_Menu_Window` Class Reference

The `Fl_Menu_Window` widget is a window type used for menus.

```
#include <Fl_Menu_Window.H>
```

Inheritance diagram for `Fl_Menu_Window`:



Public Member Functions

- **`Fl_Menu_Window`** (int W, int H, const char *l=0)
Creates a new `Fl_Menu_Window` widget using the given size, and label string.
- **`Fl_Menu_Window`** (int X, int Y, int W, int H, const char *l=0)
Creates a new `Fl_Menu_Window` widget using the given position, size, and label string.
- `~Fl_Menu_Window` ()
Destroys the window and all of its children.

Public Member Functions inherited from `Fl_Single_Window`

- **`Fl_Single_Window`** (int W, int H, const char *l=0)
Creates a new `Fl_Single_Window` widget using the given size, and label (title) string.
- **`Fl_Single_Window`** (int X, int Y, int W, int H, const char *l=0)
Creates a new `Fl_Single_Window` widget using the given position, size, and label (title) string.
- void `show` () `FL_OVERRIDE`
Makes a widget visible.
- void `show` (int a, char **b)
Same as `Fl_Window::show(int a, char **b)`

Public Member Functions inherited from `Fl_Window`

- virtual class `Fl_Double_Window` * `as_double_window` ()
Return non-null if this is an `Fl_Double_Window` object.
- virtual class `Fl_Overlay_Window` * `as_overlay_window` ()
Return non-null if this is an `Fl_Overlay_Window` object.
- `Fl_Window` const * `as_window` () `const FL_OVERRIDE`
- `Fl_Window` * `as_window` () `FL_OVERRIDE`
Returns an `Fl_Window` pointer if this widget is an `Fl_Window`.

- unsigned int **border** () const
Returns whether the window possesses a border.
- void **border** (int b)
Sets whether or not the window manager border is around the window.
- void **clear_border** ()
Fast inline function to turn the window manager border off.
- void **clear_modal_states** ()
Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.
- void **copy_label** (const char *a)
Sets the window titlebar label to a copy of a character string.
- void **cursor** (const FI_RGB_Image *, int, int)
Changes the cursor for this window using the provided image as cursor's shape.
- void **cursor** (FI_Cursor c, FI_Color, FI_Color=FL_WHITE)
For back compatibility only.
- void **cursor** (FI_Cursor)
Changes the cursor for this window.
- int **decorated_h** () const
Returns the window height including any window title bar and any frame added by the window manager.
- int **decorated_w** () const
Returns the window width including any frame added by the window manager.
- void **default_cursor** (FI_Cursor c, FI_Color, FI_Color=FL_WHITE)
For back compatibility only.
- void **default_cursor** (FI_Cursor)
Sets the default window cursor.
- void **draw_backdrop** ()
Draw the background image if one is set and is aligned inside.
- **FI_Window** (int w, int h, const char *title=0)
Creates a window from the given width w, height h, and title.
- **FI_Window** (int x, int y, int w, int h, const char *title=0)
Creates a window from the given position (x, y), size (w, h) and title.
- void **free_position** ()
Undoes the effect of a previous [resize\(\)](#) or [show\(\)](#) so that the next time [show\(\)](#) is called the window manager is free to position the window.
- void **fullscreen** ()
Makes the window completely fill one or more screens, without any window manager border visible.
- unsigned int **fullscreen_active** () const
Returns non zero if FULLSCREEN flag is set, 0 otherwise.
- void **fullscreen_off** ()
Turns off any side effects of [fullscreen\(\)](#)
- void **fullscreen_off** (int X, int Y, int W, int H)
Turns off any side effects of [fullscreen\(\)](#) and does [resize\(x,y,w,h\)](#).
- void **fullscreen_screens** (int top, int bottom, int left, int right)
Sets which screens should be used when this window is in fullscreen mode.
- int **handle** (int) FL_OVERRIDE
Handles the specified event.
- void **hide** () FL_OVERRIDE
Removes the window from the screen.
- void **hotspot** (const FI_Widget &p, int offscreen=0)
See void [FI_Window::hotspot](#)(int x, int y, int offscreen = 0)
- void **hotspot** (const FI_Widget *, int offscreen=0)
See void [FI_Window::hotspot](#)(int x, int y, int offscreen = 0)

- void **hotspot** (int x, int y, int offscreen=0)

Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.
- const void * **icon** () const

Gets the current icon window target dependent data.
- void **icon** (const **FL_RGB_Image** *)

Sets or resets a single window icon.
- void **icon** (const void *ic)

Platform-specific method to set the window icon usable on Windows and X11 only.
- void **iconize** ()

Iconifies the window.
- const char * **iconlabel** () const

See void [FL_Window::iconlabel\(const char\)](#)*

- void **iconlabel** (const char *)

Sets the icon label.
- void **icons** (const **FL_RGB_Image** *[], int)

Sets the window icons.
- void **icons** (HICON big_icon, HICON small_icon)

Sets the window icons using HICON handles (Windows platform only).
- const char * **label** () const

See void [FL_Window::label\(const char\)](#)*

- void **label** (const char *)

Sets the window title bar label.
- void **label** (const char *label, const char *iconlabel)

Sets the icon label.
- void **make_current** ()

Sets things up so that the drawing functions in <[FL/fl_draw.H](#)> will go into this window.
- void **maximize** ()

Maximizes a top-level window to its current screen.
- unsigned int **maximize_active** () const

Returns whether the window is currently maximized.
- unsigned int **menu_window** () const

Returns true if this window is a menu window.
- unsigned int **modal** () const

Returns true if this window is modal.
- unsigned int **non_modal** () const

Returns true if this window is modal or non-modal.
- **fl_uintptr_t os_id** ()

Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int **override** () const

*Returns non zero if **OVERRIDE** flag is set, 0 otherwise.*
- void **resize** (int X, int Y, int W, int H) **FL_OVERRIDE**

Changes the size and position of the window.
- int **screen_num** ()

The number of the screen containing the mapped window.
- void **screen_num** (int screen_num)

Set the number of the screen where to map the window.
- void **set_menu_window** ()

Marks the window as a menu window.

- void [set_modal](#) ()

A "modal" window, when [shown\(\)](#), will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void [set_non_modal](#) ()

A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.
- void [set_override](#) ()

Activates the flags `NOBORDER|OVERRIDE`.
- void [set_tooltip_window](#) ()

Marks the window as a tooltip window.
- const [FL_Image](#) * [shape](#) ()

Returns the image controlling the window shape or `NULL`.
- void [shape](#) (const [FL_Image](#) &b)

Set the window's shape with an [FL_Image](#).
- void [shape](#) (const [FL_Image](#) *img)

Assigns a non-rectangular shape to the window.
- void [show](#) () [FL_OVERRIDE](#)

Puts the window on the screen.
- void [show](#) (int argc, char **argv)

Puts the window on the screen with [show\(\)](#) and parses command-line arguments.
- int [shown](#) ()

Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).
- void [size_range](#) (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)

Sets the allowable range the user can resize this window to.
- unsigned int [tooltip_window](#) () const

Returns true if this window is a tooltip window.
- void [un_maximize](#) ()

Returns a previously maximized top-level window to its previous size.
- void [wait_for_expose](#) ()

Waits for the window to be displayed after calling [show\(\)](#).
- int [x_root](#) () const

Gets the x position of the window on the screen.
- const char * [xclass](#) () const

Returns the xclass for this window, or a default.
- void [xclass](#) (const char *c)

Sets the xclass for this window.
- int [y_root](#) () const

Gets the y position of the window on the screen.
- virtual [~FL_Window](#) ()

The destructor also deletes all the children.

Public Member Functions inherited from [FL_Group](#)

- [FL_Widget](#) *& [_ddfdesign_kludge](#) ()

This is for forms compatibility only.
- void [add](#) ([FL_Widget](#) &)

The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FL_Widget](#) *o)

See void [FL_Group::add\(FL_Widget &w\)](#)
- void [add_resizable](#) ([FL_Widget](#) &o)

Adds a widget to the group and makes it the resizable widget.

- `FL_Widget *const * array () const`
Returns a pointer to the array of children.
- `FL_Group const * as_group () const FL_OVERRIDE`
- `FL_Group * as_group () FL_OVERRIDE`
Returns an `FL_Group` pointer if this widget is an `FL_Group`.
- `void begin ()`
Sets the current group so you can build the widget tree by just constructing the widgets.
- `FL_Widget * child (int n) const`
Returns `array()[n]`.
- `int children () const`
Returns how many child widgets the group has.
- `void clear ()`
Deletes all child widgets from memory recursively.
- `unsigned int clip_children ()`
Returns the current clipping mode.
- `void clip_children (int c)`
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- `virtual int delete_child (int n)`
Removes the widget at `index` from the group and deletes it.
- `void end ()`
Exactly the same as `current(this->parent())`.
- `int find (const FL_Widget &o) const`
*See `int FL_Group::find(const FL_Widget *w) const`.*
- `int find (const FL_Widget *) const`
Searches the child array for the widget and returns the index.
- `FL_Group (int, int, int, int, const char * = 0)`
Creates a new `FL_Group` widget using the given position, size, and label string.
- `void focus (FL_Widget *W)`
- `void forms_end ()`
This is for forms compatibility only.
- `void init_sizes ()`
Resets the internal array of widget sizes and positions.
- `void insert (FL_Widget &, int i)`
The widget is removed from its current group (if any) and then inserted into this group.
- `void insert (FL_Widget &o, FL_Widget *before)`
This does `insert(w, find(before))`.
- `void remove (FL_Widget &)`
Removes a widget from the group but does not delete it.
- `void remove (FL_Widget *o)`
Removes the widget `o` from the group.
- `void remove (int index)`
Removes the widget at `index` from the group but does not delete it.
- `FL_Widget * resizable () const`
Returns the group's resizable widget.
- `void resizable (FL_Widget &o)`
Sets the group's resizable widget.
- `void resizable (FL_Widget *o)`
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FL_Group ()`
The destructor also deletes all the children.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (FI_Align alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window * as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window const * as_gl_window** () const
- void **bind_deimage** (FI_Image *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (FI_Boxtype new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (FI_Callback *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const
Checks if the widget value changed since the last callback.
- void **clear_active** ()
Marks the widget as inactive without sending events or changing focus.
- void **clear_changed** ()
Marks the value of the widget as unchanged.

- void `clear_damage` (`uchar c=0`)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color color` () const
Gets the background color of the widget.
- void `color` (`FI_Color bg`)
Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)
Sets the background and selection color of the widget.
- `FI_Color color2` () const
For back compatibility only.
- void `color2` (`unsigned a`)
For back compatibility only.
- int `contains` (`const FI_Widget *w`) const
Checks if w is a child of this widget.
- void `copy_label` (`const char *new_label`)
Sets the current label.
- void `copy_tooltip` (`const char *text`)
Sets the current tooltip text.
- `uchar damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget *widget`, `long arg`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) const

- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int `h` () const
Gets the widget height.
 - `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
 - const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
 - void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
 - void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
 - int `image_bound` () const
Returns whether the image is managed by the widget.
 - int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
 - int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
 - const char * `label` () const
Gets the current label text.
 - void `label` (const char *text)
Sets the current label pointer.
 - void `label` (`FI_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
 - `FI_Color labelcolor` () const
Gets the label color.
 - void `labelcolor` (`FI_Color c`)
Sets the label color.
 - `FI_Font labelfont` () const
Gets the font to use.
 - void `labelfont` (`FI_Font f`)
Sets the font to use.
 - `FI_Fontsize labelsize` () const
Gets the font size in pixels.
 - void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
 - `FI_Labeltype labeltype` () const
Gets the label type.
 - void `labeltype` (`FI_Labeltype a`)
Sets the label type.
 - void `measure_label` (int &ww, int &hh) const
Sets width `ww` and height `hh` accordingly with the label size.
 - bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
 - void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
 - unsigned int `output` () const
Returns if a widget is used for output only.
 - `FI_Group * parent` () const
Returns a pointer to the parent widget.
 - void `parent` (`FI_Group *p`)
Internal use only - "for hacks only".

- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `Fl_Color selection_color` () const
Gets the selection color.
- void `selection_color` (`Fl_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takesevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `Fl_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `Fl_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`Fl_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)

- Sets the user data for this widget.*

 - unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When` `when` () const

Returns the conditions under which the callback is called.
- void `when` (uchar i)

Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.
- int `y` () const

Gets the widget position in its window.
- virtual `~FI_Widget` ()

Destroys the widget.

Additional Inherited Members

Public Types inherited from `FI_Window`

- typedef struct HICON__ * `HICON`

Static Public Member Functions inherited from `FI_Window`

- static `FI_Window` * `current` ()

Returns the last window that was made current.
- static void `default_callback` (`FI_Window` *, void *v)

Back compatibility: Sets the default callback v for win to call on close event.
- static void `default_icon` (const `FI_RGB_Image` *)

Sets a single default window icon.
- static void `default_icons` (const `FI_RGB_Image` *[], int)

Sets the default window icons.
- static void `default_icons` (HICON big_icon, HICON small_icon)

Sets the default window icons (Windows platform only).
- static const char * `default_xclass` ()

Returns the default xclass.
- static void `default_xclass` (const char *)

Sets the default window xclass.
- static bool `is_a_rescale` ()

Returns true when a window is being rescaled.
- static char `show_next_window_iconic` ()

Returns the static flag whether the next window should be opened iconified.
- static void `show_next_window_iconic` (char stat)

Sets a static flag whether the next window should be opened iconified.

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPOP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Window](#)

- void [default_size_range](#) ()
Protected method to calculate the default size range of a window.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- virtual void [flush](#) ()
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- int [force_position](#) () const
Returns the internal state of the window's [FORCE_POSITION](#) flag.
- void [force_position](#) (int force)
Sets an internal flag that tells [FLTK](#) and the window manager to honor position requests.
- void [free_icons](#) ()
Deletes all icons previously attached to the window.
- int [is_resizable](#) ()
Protected method to determine whether a window is resizable.

Protected Member Functions inherited from FI_Group

- `FI_Rect * bounds ()`
Returns the internal array of widget sizes and positions.
- `void draw_child (FI_Widget &widget) const`
Forces a child to redraw.
- `void draw_children ()`
Draws all children of the group.
- `void draw_outside_label (const FI_Widget &widget) const`
Parents normally call this to draw outside labels of child widgets.
- `virtual int on_insert (FI_Widget *, int)`
Allow derived groups to act when a widget is added as a child.
- `virtual int on_move (int, int)`
Allow derived groups to act when a widget is moved within the group.
- `virtual void on_remove (int)`
Allow derived groups to act when a child widget is removed from the group.
- `int * sizes ()`
Returns the internal array of widget sizes and positions.
- `void update_child (FI_Widget &widget) const`
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- `void clear_flag (unsigned int c)`
Clears a flag in the flags mask.
- `void draw_backdrop () const`
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- `void draw_box () const`
Draws the widget box according its box style.
- `void draw_box (FI_Boxtype t, FI_Color c) const`
Draws a box of type t, of color c at the widget's position and size.
- `void draw_box (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const`
Draws a box of type t, of color c at the position X,Y and size W,H.
- `void draw_focus () const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int X, int Y, int W, int H) const`
Draws a focus rectangle around the widget.
- `void draw_focus (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const`
Draws a focus box for the widget at the given position and size.
- `void draw_label () const`
Draws the widget's label at the defined label position.
- `void draw_label (int, int, int, int) const`
Draws the label in an arbitrary bounding box.
- `FI_Widget (int x, int y, int w, int h, const char *label=0L)`
Creates a widget at the given position and size.
- `unsigned int flags () const`
Gets the widget flags mask.
- `void h (int v)`
Internal use only.
- `void set_flag (unsigned int c)`
Sets a flag in the flags mask.
- `void w (int v)`

Internal use only.

- void `x` (int `v`)

Internal use only.

- void `y` (int `v`)

Internal use only.

Static Protected Attributes inherited from [FI_Window](#)

- static [FI_Window](#) * `current_`

Stores the last window that was made current.

12.87.1 Detailed Description

The [FI_Menu_Window](#) widget is a window type used for menus.

By default the window is drawn in the hardware overlay planes if they are available so that the menu don't force the rest of the window to redraw.

The documentation for this class was generated from the following files:

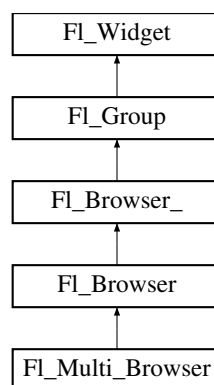
- `FI_Menu_Window.H`
- `FI_Menu_Window.cxx`

12.88 FI_Multi_Browser Class Reference

The [FI_Multi_Browser](#) class is a subclass of [FI_Browser](#) which lets the user select any set of the lines.

```
#include <FI_Multi_Browser.H>
```

Inheritance diagram for [FI_Multi_Browser](#):



Public Member Functions

- [FI_Multi_Browser](#) (int `X`, int `Y`, int `W`, int `H`, const char *`L=0`)

Creates a new [FI_Multi_Browser](#) widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Browser](#)

- void `add` (const char *`newtext`, void *`d=0`)

Adds a new line to the end of the browser.

- void `bottomline` (int `line`)

Scrolls the browser so the bottom item in the browser is showing the specified `line`.

- void `clear` ()

Removes all the lines in the browser.

- char `column_char` () const

Gets the current column separator character.

- void `column_char` (char c)
Sets the column separator to c.
- const int * `column_widths` () const
Gets the current column width array.
- void `column_widths` (const int *arr)
Sets the current array to arr.
- void * `data` (int line) const
Returns the user data() for specified line.
- void `data` (int line, void *d)
Sets the user data for specified line to d.
- void `display` (int line, int val=1)
For back compatibility.
- int `displayed` (int line) const
Returns non-zero if line has been scrolled to a position where it is being displayed.
- `FI_Browser` (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- char `format_char` () const
Gets the current format code prefix character, which by default is '@'.
- void `format_char` (char c)
Sets the current format code prefix character to c.
- void `hide` () `FL_OVERRIDE`
Hides the entire FI_Browser widget – opposite of show().
- void `hide` (int line)
Makes line invisible, preventing selection by the user.
- `FI_Image` * `icon` (int line) const
Returns the icon currently defined for line.
- void `icon` (int line, `FI_Image` *icon)
Set the image icon for line to the value icon.
- void `insert` (int line, const char *newtext, void *d=0)
Insert a new entry whose label is newtext above given line, optional data d.
- void `lineposition` (int line, `FI_Line_Position` pos)
Updates the browser so that line is shown at position pos.
- int `load` (const char *filename)
Clears the browser and reads the file, adding each line from the file to the browser.
- void `make_visible` (int line)
Make the item at the specified line visible().
- void `middleline` (int line)
Scrolls the browser so the middle item in the browser is showing the specified line.
- void `move` (int to, int from)
Line from is removed and reinserted at to.
- void `remove` (int line)
Remove entry for given line number, making the browser one line shorter.
- void `remove_icon` (int line)
Removes the icon for line.
- void `replace` (int a, const char *b)
For back compatibility only.
- int `select` (int line, int val=1)
Sets the selection state of the item at line to the value val.
- int `selected` (int line) const
Returns 1 if specified line is selected, 0 if not.
- void `show` () `FL_OVERRIDE`

- Shows the entire [FL_Browser](#) widget – opposite of [hide\(\)](#).*
- void [show](#) (int line)
 - Makes `line` visible, and available for selection by user.*
- int [size](#) () const
 - Returns how many lines are in the browser.*
- void [size](#) (int W, int H)
- void [swap](#) (int a, int b)
 - Swaps two browser lines `a` and `b`.*
- const char * [text](#) (int line) const
 - Returns the label text for the specified `line`.*
- void [text](#) (int line, const char *newtext)
 - Sets the text for the specified `line` to `newtext`.*
- [FL_Fontsize](#) [textsize](#) () const
 - Gets the default text size (in pixels) for the lines in the browser.*
- void [textsize](#) ([FL_Fontsize](#) newSize)
 - Sets the default text size (in pixels) for the lines in the browser to `newSize`.*
- int [topline](#) () const
 - Returns the line that is currently visible at the top of the browser.*
- void [topline](#) (int line)
 - Scrolls the browser so the top item in the browser is showing the specified `line`.*
- int [value](#) () const
 - Returns the line number of the currently selected line, or 0 if none selected.*
- void [value](#) (int line)
 - Sets the browser's [value\(\)](#), which selects the specified `line`.*
- int [visible](#) (int line) const
 - Returns non-zero if the specified `line` is visible, 0 if hidden.*
- [~FL_Browser](#) ()
 - The destructor deletes all list items and destroys the browser.*

Public Member Functions inherited from [FL_Browser_](#)

- int [deselect](#) (int docallbacks=0)
 - Deselects all items in the list and returns 1 if the state changed or 0 if it did not.*
- void [display](#) (void *item)
 - Displays the `item`, scrolling the list as necessary.*
- int [handle](#) (int event) [FL_OVERRIDE](#)
 - Handles the `event` within the normal widget bounding box.*
- [uchar](#) [has_scrollbar](#) () const
 - Returns the current scrollbar mode, see [FL_Browser_::has_scrollbar\(uchar\)](#)*
- void [has_scrollbar](#) ([uchar](#) mode)
 - Sets whether the widget should have scrollbars or not (default [FL_Browser_::BOTH](#)).*
- int [hposition](#) () const
 - Gets the horizontal scroll position of the list as a pixel position `pos`.*
- void [hposition](#) (int)
 - Sets the horizontal scroll position of the list to pixel position `pos`.*
- int [linespacing](#) () const
 - Return the height of additional spacing between browser lines.*
- void [linespacing](#) (int pixels)
 - Add some space between browser lines.*
- int [position](#) () const
- void [position](#) (int pos)

- void **position** (int x, int y)
- void **resize** (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Repositions and/or resizes the browser.
- void **scrollbar_left** ()
Moves the vertical scrollbar to the lefthand side of the list.
- void **scrollbar_right** ()
Moves the vertical scrollbar to the righthand side of the list.
- int **scrollbar_size** () const
Gets the current size of the scrollbars' troughs, in pixels.
- void **scrollbar_size** (int newSize)
Sets the pixel size of the scrollbars' troughs to newSize, in pixels.
- int **scrollbar_width** () const
Returns the global value [Fl::scrollbar_size\(\)](#).
- void **scrollbar_width** (int width)
Sets the global [Fl::scrollbar_size\(\)](#), and forces this instance of the widget to use it.
- int **select** (void *item, int val=1, int docallbacks=0)
Sets the selection state of item to val, and returns 1 if the state changed or 0 if it did not.
- int **select_only** (void *item, int docallbacks=0)
Selects item and returns 1 if the state changed or 0 if it did not.
- void **sort** (int flags=0)
Sort the items in the browser based on flags.
- [Fl_Color](#) **textcolor** () const
Gets the default text color for the lines in the browser.
- void **textcolor** ([Fl_Color](#) col)
Sets the default text color for the lines in the browser to color col.
- [Fl_Font](#) **textfont** () const
Gets the default text font for the lines in the browser.
- void **textfont** ([Fl_Font](#) font)
Sets the default text font for the lines in the browser to font.
- [Fl_Fontsize](#) **textsize** () const
Gets the default text size (in pixels) for the lines in the browser.
- void **textsize** ([Fl_Fontsize](#) newSize)
Sets the default text size (in pixels) for the lines in the browser to size.
- int **vposition** () const
Gets the vertical scroll position of the list as a pixel position pos.
- void **vposition** (int pos)
Sets the vertical scroll position of the list to pixel position pos.

Public Member Functions inherited from [Fl_Group](#)

- [Fl_Widget](#) *& **_ddfdesign_kludge** ()
This is for forms compatibility only.
- void **add** ([Fl_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void **add** ([Fl_Widget](#) *o)
See void [Fl_Group::add\(Fl_Widget &w\)](#)
- void **add_resizable** ([Fl_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [Fl_Widget](#) *const * **array** () const
Returns a pointer to the array of children.
- [Fl_Group](#) const * **as_group** () const [FL_OVERRIDE](#)

- [FL_Group * as_group \(\)](#) **FL_OVERRIDE**
Returns an *FL_Group* pointer if this widget is an *FL_Group*.
- [void begin \(\)](#)
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FL_Widget * child \(int n\) const](#)
Returns *array()[n]*.
- [int children \(\) const](#)
Returns how many child widgets the group has.
- [void clear \(\)](#)
Deletes all child widgets from memory recursively.
- [unsigned int clip_children \(\)](#)
Returns the current clipping mode.
- [void clip_children \(int c\)](#)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- [virtual int delete_child \(int n\)](#)
Removes the widget at *index* from the group and deletes it.
- [void end \(\)](#)
Exactly the same as *current(this->parent())*.
- [int find \(const FL_Widget &o\) const](#)
See *int FL_Group::find(const FL_Widget *w) const*.
- [int find \(const FL_Widget *\) const](#)
Searches the child array for the widget and returns the index.
- [FL_Group \(int, int, int, int, const char * = 0\)](#)
Creates a new *FL_Group* widget using the given position, size, and label string.
- [void focus \(FL_Widget *W\)](#)
- [void forms_end \(\)](#)
This is for forms compatibility only.
- [int handle \(int\) FL_OVERRIDE](#)
Handles the specified event.
- [void init_sizes \(\)](#)
Resets the internal array of widget sizes and positions.
- [void insert \(FL_Widget &, int i\)](#)
The widget is removed from its current group (if any) and then inserted into this group.
- [void insert \(FL_Widget &o, FL_Widget *before\)](#)
This does *insert(w, find(before))*.
- [void remove \(FL_Widget &\)](#)
Removes a widget from the group but does not delete it.
- [void remove \(FL_Widget *o\)](#)
Removes the widget *o* from the group.
- [void remove \(int index\)](#)
Removes the widget at *index* from the group but does not delete it.
- [FL_Widget * resizable \(\) const](#)
Returns the group's resizable widget.
- [void resizable \(FL_Widget &o\)](#)
Sets the group's resizable widget.
- [void resizable \(FL_Widget *o\)](#)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- [void resize \(int, int, int, int\) FL_OVERRIDE](#)
Resizes the *FL_Group* widget and all of its children.
- [virtual ~FL_Group \(\)](#)
The destructor also deletes all the children.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (**FI_Align** alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window * as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window const * as_gl_window** () const
- virtual **FI_Window * as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window const * as_window** () const
- void **bind_deimage** (**FI_Image *img**)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (**FI_Image *img**)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (**FI_Boxtype** new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (**FI_Callback *cb**)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback *cb**, **FI_Callback_User_Data *p**, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (**FI_Callback *cb**, void *p)
Sets the current callback function and data for the widget.
- void **callback** (**FI_Callback0 *cb**)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback1 *cb**, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const
Checks if the widget value changed since the last callback.
- void **clear_active** ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (uchar c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FL_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FL_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FL_Color` bg, `FL_Color` sel)
- Sets the background and selection color of the widget.*

 - `FL_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FL_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (uchar c)
- Sets the damage bits for the widget.*

 - void `damage` (uchar c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FL_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FL_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FL_Widget` *widget, long arg, `FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h` () `const`
Gets the widget height.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- `int image_bound` () `const`
Returns whether the image is managed by the widget.
- `int inside` (`const FI_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- `int is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- `bool needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- `unsigned int output` () `const`
Returns if a widget is used for output only.
- `FI_Group * parent` () `const`

- Returns a pointer to the parent widget.*

 - void `parent` (`FI_Group *p`)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- `FI_Color selection_color` () const

Gets the selection color.
- void `selection_color` (`FI_Color a`)

Sets the selection color.
- void `set_active` ()

Marks the widget as active without sending events or changing focus.
- void `set_changed` ()

Marks the value of the widget as changed.
- void `set_output` ()

Sets a widget to output only.
- void `set_visible` ()

Makes the widget visible.
- void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window * top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const

Gets the widget type.
- void `type` (`uchar t`)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.

- void **user_data** ([FI_Callback_User_Data](#) *v, bool auto_free)
 - Sets the user data for this widget.*
- void **user_data** (void *v)
 - Sets the user data for this widget.*
- unsigned int **visible** () const
 - Returns whether a widget is visible.*
- unsigned int **visible_focus** () const
 - Checks whether this widget has a visible focus.*
- void **visible_focus** (int v)
 - Modifies keyboard focus navigation.*
- int **visible_r** () const
 - Returns whether a widget and all its parents are visible.*
- int **w** () const
 - Gets the widget width.*
- [FI_When](#) **when** () const
 - Returns the conditions under which the callback is called.*
- void **when** (uchar i)
 - Sets the flags used to decide when a callback is called.*
- [FI_Window](#) * **window** () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int **x** () const
 - Gets the widget position in its window.*
- int **y** () const
 - Gets the widget position in its window.*
- virtual [~FI_Widget](#) ()
 - Destroys the widget.*

Additional Inherited Members

Public Types inherited from [FI_Browser](#)

- enum [FI_Line_Position](#) { **TOP** , **BOTTOM** , **MIDDLE** }
 - For internal use only?*

Public Types inherited from [FI_Browser_](#)

- enum {
 - [HORIZONTAL](#) = 1 , [VERTICAL](#) = 2 , [BOTH](#) = 3 , [ALWAYS_ON](#) = 4 ,
 - [HORIZONTAL_ALWAYS](#) = 5 , [VERTICAL_ALWAYS](#) = 6 , [BOTH_ALWAYS](#) = 7 }
 - Values for [has_scrollbar\(\)](#).*

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * **current** ()
 - Returns the currently active group.*
- static void **current** ([FI_Group](#) *g)
 - Sets the current group.*

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Public Attributes inherited from [FI_Browser_](#)

- [FI_Scrollbar](#) [hscrollbar](#)
Horizontal scrollbar.
- [FI_Scrollbar](#) [scrollbar](#)
Vertical scrollbar.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Browser](#)

- [FL_BLINE](#) * [_remove](#) (int line)
Removes the item at the specified line.
- [FL_BLINE](#) * [find_line](#) (int line) const
Returns the item for specified line.
- int [full_height](#) () const [FL_OVERRIDE](#)
The height of the entire list of all [visible\(\)](#) items in pixels.
- int [incr_height](#) () const [FL_OVERRIDE](#)
The default 'average' item height (including inter-item spacing) in pixels.
- void [insert](#) (int line, [FL_BLINE](#) *item)
Insert specified item above line.
- void * [item_at](#) (int line) const [FL_OVERRIDE](#)
Return the item at specified line.
- void [item_draw](#) (void *item, int X, int Y, int W, int H) const [FL_OVERRIDE](#)
Draws item at the position specified by X Y W H.
- void * [item_first](#) () const [FL_OVERRIDE](#)
Returns the very first item in the list.
- int [item_height](#) (void *item) const [FL_OVERRIDE](#)
Returns height of item in pixels.

- void * [item_last](#) () const [FL_OVERRIDE](#)
Returns the very last item in the list.
- void * [item_next](#) (void *item) const [FL_OVERRIDE](#)
*Returns the next item after *item*.*
- void * [item_prev](#) (void *item) const [FL_OVERRIDE](#)
*Returns the previous item before *item*.*
- void [item_select](#) (void *item, int val) [FL_OVERRIDE](#)
*Change the selection state of *item* to the value *val*.*
- int [item_selected](#) (void *item) const [FL_OVERRIDE](#)
*See if *item* is selected.*
- void [item_swap](#) (void *a, void *b) [FL_OVERRIDE](#)
*Swap the items *a* and *b*.*
- const char * [item_text](#) (void *item) const [FL_OVERRIDE](#)
*Returns the label text for *item*.*
- int [item_width](#) (void *item) const [FL_OVERRIDE](#)
*Returns width of *item* in pixels.*
- int [lineno](#) (void *item) const
*Returns line number corresponding to *item*, or zero if not found.*
- void [swap](#) (FL_BLINE *a, FL_BLINE *b)
*Swap the two items *a* and *b*.*

Protected Member Functions inherited from [FI_Browser_](#)

- void [bbox](#) (int &X, int &Y, int &W, int &H) const
Returns the bounding box for the interior of the list's display window, inside the scrollbars.
- void [deleting](#) (void *item)
*This method should be used when *item* is being deleted from the list.*
- int [displayed](#) (void *item) const
*Returns non-zero if *item* has been scrolled to a position where it is being displayed.*
- void [draw](#) () [FL_OVERRIDE](#)
Draws the list within the normal widget bounding box.
- void * [find_item](#) (int ypos)
*This method returns the item under mouse *y* position *ypos*.*
- [FI_Browser_](#) (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- virtual int [full_width](#) () const
This method may be provided by the subclass to indicate the full width of the item list, in pixels.
- void [inserting](#) (void *a, void *b)
This method should be used when an item is in the process of being inserted into the list.
- virtual int [item_quick_height](#) (void *item) const
*This method may be provided by the subclass to return the height of the *item*, in pixels.*
- int [leftedge](#) () const
*This method returns the *X* position of the left edge of the list area after adjusting for the scrollbar and border, if any.*
- void [new_list](#) ()
This method should be called when the list data is completely replaced or cleared.
- void [redraw_line](#) (void *item)
*This method should be called when the contents of *item* has changed, but not its height.*
- void [redraw_lines](#) ()
This method will cause the entire list to be redrawn.
- void [replacing](#) (void *a, void *b)
*This method should be used when item *a* is being replaced by item *b*.*

- void * [selection](#) () const
Returns the item currently selected, or NULL if there is no selection.
- void [swapping](#) (void *a, void *b)
This method should be used when two items a and b are being swapped.
- void * [top](#) () const
Returns the item that appears at the top of the list.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * [bounds](#) ()
Returns the internal array of widget sizes and positions.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- void [draw_child](#) ([FI_Widget](#) &widget) const
Forces a child to redraw.
- void [draw_children](#) ()
Draws all children of the group.
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int [on_insert](#) ([FI_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int [on_move](#) (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void [on_remove](#) (int)
Allow derived groups to act when a child widget is removed from the group.
- int * [sizes](#) ()
Returns the internal array of widget sizes and positions.
- void [update_child](#) ([FI_Widget](#) &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const

- *Draws the label in an arbitrary bounding box.*
- `FI_Widget` (int *x*, int *y*, int *w*, int *h*, const char **label*=0L)
 - *Creates a widget at the given position and size.*
- unsigned int **flags** () const
 - *Gets the widget flags mask.*
- void **h** (int *v*)
 - *Internal use only.*
- void **set_flag** (unsigned int *c*)
 - *Sets a flag in the flags mask.*
- void **w** (int *v*)
 - *Internal use only.*
- void **x** (int *v*)
 - *Internal use only.*
- void **y** (int *v*)
 - *Internal use only.*

12.88.1 Detailed Description

The `FI_Multi_Browser` class is a subclass of `FI_Browser` which lets the user select any set of the lines.

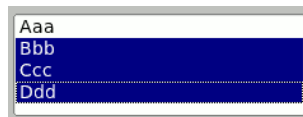


Figure 12.31 FI_Multi_Browser

The user interface is Macintosh style: clicking an item turns off all the others and selects that one, dragging selects all the items the mouse moves over, and ctrl + click (Cmd+click on the Mac OS platform) toggles the items. Shift + click extends the selection until the clicked item. This is different from how forms did it. Normally the callback is done when the user releases the mouse, but you can change this with `when()`. See `FI_Browser` for methods to add and remove lines from the browser.

12.88.2 Constructor & Destructor Documentation

12.88.2.1 FI_Multi_Browser()

```
FI_Multi_Browser::FI_Multi_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `FI_Multi_Browser` widget using the given position, size, and label string.

The default boxtype is `FL_DOWN_BOX`. The constructor specializes `FI_Browser()` by setting the type to `FL_↔MULTI_BROWSER`. The destructor destroys the widget and frees all memory that has been allocated.

The documentation for this class was generated from the following files:

- `FI_Multi_Browser.H`
- `FI_Browser.cxx`

12.89 FI_Multi_Label Struct Reference

Allows a mixed text and/or graphics label to be applied to an `FI_Menu_Item` or `FI_Widget`.

```
#include <FI_Multi_Label.H>
```

Public Member Functions

- void `label (FI_Menu_Item *)`
Associate an `FI_Multi_Label` with an `FI_Menu_Item`.
- void `label (FI_Widget *)`
Associate an `FI_Multi_Label` with an `FI_Widget`.

Public Attributes

- const char * `labela`
Holds the "leftmost" of the two elements in the composite label.
- const char * `labelb`
Holds the "rightmost" of the two elements in the composite label.
- uchar `typea`
Holds the "type" of `labela`.
- uchar `typeb`
Holds the "type" of `labelb`.

12.89.1 Detailed Description

Allows a mixed text and/or graphics label to be applied to an `FI_Menu_Item` or `FI_Widget`.

Most regular FLTK widgets now support the ability to associate both images and text with a label but some special cases, notably the non-widget `FI_Menu_Item` objects, do not. `FI_Multi_Label` may be used to create menu items that have an icon and text, which would not normally be possible for an `FI_Menu_Item`. For example, `FI_Multi_Label` is used in the New->Code submenu in fluid, and others.

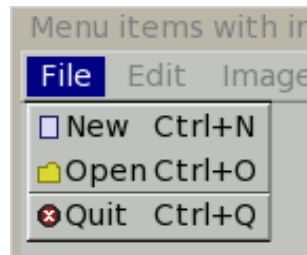


Figure 12.32 Menu items with icons using `FI_Multi_Label`

Each `FI_Multi_Label` holds two elements, `labela` and `labelb`; each may hold either a text label (const char*) or an image (`FI_Image*`). When displayed, `labela` is drawn first and `labelb` is drawn immediately to its right. More complex labels can be constructed by setting `labelb` as another `FI_Multi_Label` and thus chaining up a series of label elements.

When assigning a label element to one of `labela` or `labelb`, they should be explicitly cast to (const char*) if they are not of that type already.

Note

An `FI_Multi_Label` object and all its components (label text, images, chained `FI_Multi_Label`'s and their linked objects) must exist during the lifetime of the widget or menu item they are assigned to. It is the responsibility of the user's code to release these linked objects if necessary after the widget or menu is deleted.

Example Use: `FI_Menu_Bar`

```

FI_Pixmap *image = new FI_Pixmap(..); // image for menu item; any FI_Image based widget
FI_Menu_Bar *menu = new FI_Menu_Bar(..); // can be any FI_Menu_oriented widget (FI_Choice,
    FI_Menu_Button..)

// Create a menu item
int i = menu->add("File/New", ..);
FI_Menu_Item *item = (FI_Menu_Item*)&(menu->menu()[i]);

// Create a multi label, assign it an image + text
FI_Multi_Label *ml = new FI_Multi_Label;

// Left side of label is an image

```

```

ml->typea = FL_IMAGE_LABEL;
ml->labela = (const char*)image;           // any Fl_Image widget: Fl_Pixmap, Fl_PNG_Image, etc..

// Right side of label is label text
ml->typeb = FL_NORMAL_LABEL;
ml->labelb = item->label();

// Assign the multilabel to the menu item
// ml->label(item); // deprecated since 1.4.0; backwards compatible with 1.3.x
item->label(ml); // new method since 1.4.0

```

See also

[Fl_Label](#) and [Fl_Labeltype](#) and examples/howto-menu-with-images.cxx

12.89.2 Member Function Documentation

12.89.2.1 label() [1/2]

```

void Fl_Multi_Label::label (
    Fl_Menu_Item * o )

```

Associate an [Fl_Multi_Label](#) with an [Fl_Menu_Item](#).

This uses [Fl_Menu_Item::label\(Fl_Labeltype a, const char *b\)](#) internally to set the *label* and the label type of the menu item, i.e. it stores a *pointer* to the [Fl_Multi_Label](#) object (*this*). An existing label (pointer) will be overwritten.

This sets the type of the menu item's label to `_FL_MULTI_LABEL` - note the leading underscore ('_').

There is no way to use a method like [Fl_Widget::copy_label\(\)](#) that transfers ownership of the [Fl_Multi_Label](#) and its linked objects (images, text, and chained [Fl_Multi_Label](#)'s) to the menu item.

The [Fl_Multi_Label](#) and all linked images, text labels, or chained [Fl_Multi_Label](#) objects must exist during the lifetime of the menu and will not be released when the menu item is destroyed.

Note

The user's code is responsible for releasing the [Fl_Multi_Label](#) and all linked objects (images, text, chained [Fl_Multi_Label](#)'s) after the menu has been deleted. This may cause memory leaks if [Fl_Multi_Label](#) is used and reassigned w/o releasing the objects assigned to it.

Deprecated since 1.4.0: please use [Fl_Menu_Item::label\(Fl_Multi_Label *\)](#)

See also

[Fl_Menu_Item::label\(Fl_Multi_Label *\)](#)

12.89.2.2 label() [2/2]

```

void Fl_Multi_Label::label (
    Fl_Widget * o )

```

Associate an [Fl_Multi_Label](#) with an [Fl_Widget](#).

This method uses [Fl_Widget::label\(Fl_Labeltype, const char *\)](#) internally to set the *label* of the widget, i.e. it stores a *pointer* to the [Fl_Multi_Label](#) object (*this*). An existing label that has been set using [Fl_Widget::copy_label\(\)](#) will be released prior to the assignment of the new label.

This sets the type of the widget's label to `_FL_MULTI_LABEL` - note the leading underscore ('_').

There is no way to use a method like [Fl_Widget::copy_label\(\)](#) that transfers ownership of the [Fl_Multi_Label](#) and its linked objects (images, text, and chained [Fl_Multi_Label](#)'s) to the widget.

The [Fl_Multi_Label](#) and all linked images, text labels, or chained [Fl_Multi_Label](#) objects must exist during the lifetime of the widget and will not be released when the widget is destroyed.

Note

The user's code is responsible for releasing the [Fl_Multi_Label](#) and all linked objects (images, text, chained [Fl_Multi_Label](#)'s) after the widget has been deleted. This may cause memory leaks if [Fl_Multi_Label](#) is used and reassigned w/o releasing the objects assigned to it.

12.89.3 Member Data Documentation

12.89.3.1 `labela`

```
const char* Fl_Multi_Label::labela
```

Holds the "leftmost" of the two elements in the composite label.

Typically this would be assigned either a text string (`const char*`), a (`Fl_Image*`) or a (`Fl_Multi_Label*`).

12.89.3.2 `labelb`

```
const char* Fl_Multi_Label::labelb
```

Holds the "rightmost" of the two elements in the composite label.

Typically this would be assigned either a text string (`const char*`), a (`Fl_Image*`) or a (`Fl_Multi_Label*`).

12.89.3.3 `typea`

```
uchar Fl_Multi_Label::typea
```

Holds the "type" of `labela`.

Typically this is set to `FL_NORMAL_LABEL` for a text label, `FL_IMAGE_LABEL` for an image (based on `Fl_image`) or `FL_MULTI_LABEL` if "chaining" multiple `Fl_Multi_Label` elements together.

12.89.3.4 `typeb`

```
uchar Fl_Multi_Label::typeb
```

Holds the "type" of `labelb`.

Typically this is set to `FL_NORMAL_LABEL` for a text label, `FL_IMAGE_LABEL` for an image (based on `Fl_image`) or `FL_MULTI_LABEL` if "chaining" multiple `Fl_Multi_Label` elements together.

The documentation for this struct was generated from the following files:

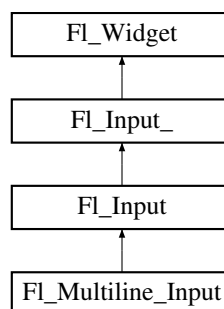
- `Fl_Multi_Label.H`
- `Fl_Multi_Label.cxx`

12.90 `Fl_Multiline_Input` Class Reference

This input field displays `\n` characters as new lines rather than `^J`, and accepts the Return, Tab, and up and down arrow keys.

```
#include <Fl_Multiline_Input.H>
```

Inheritance diagram for `Fl_Multiline_Input`:



Public Member Functions

- `Fl_Multiline_Input` (`int X`, `int Y`, `int W`, `int H`, `const char *l=0`)
Creates a new `Fl_Multiline_Input` widget using the given position, size, and label string.

Public Member Functions inherited from `Fl_Input`

- `Fl_Input` (`int`, `int`, `int`, `int`, `const char *l=0`)

Creates a new `FI_Input` widget using the given position, size, and label string.

- int `handle` (int) `FL_OVERRIDE`

Handles the specified event.

Public Member Functions inherited from `FI_Input_`

- int `append` (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool `can_redo` () const
Check if there is a redo action available.
- bool `can_undo` () const
Check if the last operation can be undone.
- int `copy` (int clipboard)
Put the current selection into the clipboard.
- int `copy_cuts` ()
Copies the yank buffer to the clipboard.
- `FI_Color` `cursor_color` () const
Gets the color of the cursor.
- void `cursor_color` (`FI_Color` n)
Sets the color of the cursor.
- int `cut` ()
Deletes the current selection.
- int `cut` (int a, int b)
Deletes all characters between index a and b.
- int `cut` (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double `dvalue` () const
Returns the widget text interpreted as a floating point number.
- `FI_Input_` (int, int, int, int, const char *s=0)
Creates a new `FI_Input_` widget.
- unsigned int `index` (int i) const
Returns the character at index i.
- int `input_type` () const
Gets the input field type.
- void `input_type` (int t)
Sets the input field type.
- int `insert` (const char *t, int l=0)
Inserts text at the cursor position.
- int `insert_position` () const
Gets the position of the text cursor.
- int `insert_position` (int p)
Sets the cursor position and mark.
- int `insert_position` (int p, int m)
Sets the index for the cursor and mark.
- int `ivalue` () const
Returns the widget text interpreted as a signed integer.
- int `mark` () const
Gets the current selection mark.
- int `mark` (int m)
Sets the current selection mark.
- int `maximum_size` () const

- Gets the maximum length of the input field in characters.*

 - void `maximum_size` (int m)
- Sets the maximum length of the input field in characters.*

 - int `position` () const
 - int `position` (int p)
 - int `position` (int p, int m)
 - int `readonly` () const
- Gets the read-only state of the input field.*

 - void `readonly` (int b)
- Sets the read-only state of the input field.*

 - int `redo` ()
- Redo previous undo operation.*

 - int `replace` (int b, int e, const char *text, int ilen=0)
- Deletes text from b to e and inserts the new string text.*

 - void `resize` (int, int, int, int) `FL_OVERRIDE`
- Changes the size of the widget.*

 - int `shortcut` () const
- Return the shortcut key associated with this widget.*

 - void `shortcut` (int s)
- Sets the shortcut key associated with this widget.*

 - int `size` () const
- Returns the number of bytes in value().*

 - void `size` (int W, int H)
- Sets the width and height of this widget.*

 - int `static_value` (const char *)
- Changes the widget text.*

 - int `static_value` (const char *, int)
- Changes the widget text.*

 - int `tab_nav` () const
- Gets whether the Tab key causes focus navigation in multiline input fields or not.*

 - void `tab_nav` (int val)
- Sets whether the Tab key does focus navigation, or inserts tab characters into [FL_Multiline_Input](#).*

 - `FL_Color` `textcolor` () const
- Gets the color of the text in the input field.*

 - void `textcolor` (`FL_Color` n)
- Sets the color of the text in the input field.*

 - `FL_Font` `textfont` () const
- Gets the font of the text in the input field.*

 - void `textfont` (`FL_Font` s)
- Sets the font of the text in the input field.*

 - `FL_Fontsize` `textsize` () const
- Gets the size of the text in the input field.*

 - void `textsize` (`FL_Fontsize` s)
- Sets the size of the text in the input field.*

 - int `undo` ()
- Undoes previous changes to the text buffer.*

 - const char * `value` () const
- Returns the text displayed in the widget.*

 - int `value` (const char *)
- Changes the widget text.*

 - int `value` (const char *, int)

- Changes the widget text.*
- int [value](#) (double value)
 - Changes the widget text to a floating point number ("%g").*
- int [value](#) (int value)
 - Changes the widget text to a signed integer number.*
- int [wrap](#) () const
 - Gets the word wrapping state of the input field.*
- void [wrap](#) (int b)
 - Sets the word wrapping state of the input field.*
- [~FI_Input_](#) ()
 - Destroys the widget.*

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
 - Activates the widget.*
- unsigned int [active](#) () const
 - Returns whether the widget is active.*
- int [active_r](#) () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align align](#) () const
 - Gets the label alignment.*
- void [align](#) ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long [argument](#) () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void [argument](#) (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype box](#) () const
 - Gets the box type of the widget.*
- void [box](#) ([FI_Boxtype](#) new_box)
 - Sets the box type for the widget.*

- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) ([uchar](#) c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.
- void [clear_visible](#) ()
Hides the widget.
- void [clear_visible_focus](#) ()
Disables keyboard focus navigation with this widget.
- [FI_Color color](#) () const
Gets the background color of the widget.
- void [color](#) ([FI_Color](#) bg)
Sets the background color of the widget.
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
Sets the background and selection color of the widget.
- [FI_Color color2](#) () const
For back compatibility only.
- void [color2](#) (unsigned a)
For back compatibility only.
- int [contains](#) (const [FI_Widget](#) *w) const
Checks if w is a child of this widget.
- void [copy_label](#) (const char *new_label)
Sets the current label.
- void [copy_tooltip](#) (const char *text)
Sets the current tooltip text.
- [uchar damage](#) () const
Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) ([uchar](#) c)
Sets the damage bits for the widget.
- void [damage](#) ([uchar](#) c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int [damage_resize](#) (int, int, int, int)
Internal use only.
- void [deactivate](#) ()

- Deactivates the widget.*

 - [FI_Image](#) * [deimage](#) ()

Gets the image that is used as part of the widget label when in the inactive state.

 - const [FI_Image](#) * [deimage](#) () const

Gets the image that is used as part of the widget label when in the inactive state.

 - void [deimage](#) ([FI_Image](#) &img)

Sets the image to use as part of the widget label when in the inactive state.

 - void [deimage](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.

 - int [deimage_bound](#) () const

Returns whether the inactive image is managed by the widget.

 - void [do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with default arguments.

 - void [do_callback](#) ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with arbitrary arguments.

 - void [do_callback](#) ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with arbitrary arguments.

 - void [draw_label](#) (int, int, int, int, [FI_Align](#)) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.

 - int [h](#) () const

Gets the widget height.

 - virtual void [hide](#) ()

Makes a widget invisible.

 - [FI_Image](#) * [image](#) ()

Gets the image that is used as part of the widget label when in the active state.

 - const [FI_Image](#) * [image](#) () const

Gets the image that is used as part of the widget label when in the active state.

 - void [image](#) ([FI_Image](#) &img)

Sets the image to use as part of the widget label when in the active state.

 - void [image](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.

 - int [image_bound](#) () const

Returns whether the image is managed by the widget.

 - int [inside](#) (const [FI_Widget](#) *wgt) const

Checks if this widget is a child of wgt.

 - int [is_label_copied](#) () const

Returns whether the current label was assigned with [copy_label\(\)](#).

 - const char * [label](#) () const

Gets the current label text.

 - void [label](#) (const char *text)

Sets the current label pointer.

 - void [label](#) ([FI_Labeltype](#) a, const char *b)

Shortcut to set the label text and type in one call.

 - [FI_Color](#) [labelcolor](#) () const

Gets the label color.

 - void [labelcolor](#) ([FI_Color](#) c)

Sets the label color.

 - [FI_Font](#) [labelfont](#) () const

Gets the font to use.

 - void [labelfont](#) ([FI_Font](#) f)

Sets the font to use.

- [FI_Fontsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype](#) [labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- [FI_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()
Makes a widget visible.
- void [size](#) (int W, int H)
Changes the size of the widget.
- int [take_focus](#) ()
Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

- Returns if the widget is able to take events.*

 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const

Gets the widget type.
- void `type` (`uchar` t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When` `when` () const

Returns the conditions under which the callback is called.
- void `when` (`uchar` i)

Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.
- int `y` () const

Gets the widget position in its window.
- virtual `~FI_Widget` ()

Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Static Public Attributes inherited from [FI_Input](#)

- static const char * [copy_menu_text](#) = "Copy"
[this text may be customized at run-time]
- static const char * [cut_menu_text](#) = "Cut"
[this text may be customized at run-time]
- static const char * [paste_menu_text](#) = "Paste"
[this text may be customized at run-time]

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Input](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- int [handle_key](#) ()
Handles a keystroke.
- int [handle_rmb](#) ()
Handle right mouse button down events.

Protected Member Functions inherited from [FI_Input_](#)

- int [apply_undo](#) ()
Apply the current undo/redo operation.
- void [drawtext](#) (int, int, int, int)
Draws the text in the passed bounding box.
- void [drawtext](#) (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.

- void **handle_mouse** (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int **handletext** (int e, int, int, int, int)
Handles all kinds of text field related events.
- int **line_end** (int i) const
Finds the end of a line.
- int **line_start** (int i) const
Finds the start of a line.
- int **linesPerPage** ()
- void **maybe_do_callback** (FI_Callback_Reason reason=FL_REASON_UNKNOWN)
- int **up_down_position** (int, int keepmark=0)
Moves the cursor to the column given by up_down_pos.
- int **word_end** (int i) const
Finds the end of a word.
- int **word_start** (int i) const
Finds the start of a word.
- int **xscroll** () const
- int **yscroll** () const
- void **yscroll** (int yOffset)

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.

- void `x` (int `v`)

Internal use only.

- void `y` (int `v`)

Internal use only.

12.90.1 Detailed Description

This input field displays `\n` characters as new lines rather than `^J`, and accepts the Return, Tab, and up and down arrow keys.

This is for editing multiline text.

This is far from the nirvana of text editors, and is probably only good for small bits of text, 10 lines at most. Note that this widget does not support scrollbars or per-character color control.

If you are presenting large amounts of text and need scrollbars or full color control of characters, you probably want [Fl_Text_Editor](#) instead.

In FLTK 1.3.x, the default behavior of the 'Tab' key was changed to support consistent focus navigation. To get the older FLTK 1.1.x behavior, set `Fl_Input_::tab_nav()` to 0. Newer programs should consider using [Fl_Text_Editor](#).

12.90.2 Constructor & Destructor Documentation

12.90.2.1 Fl_Multiline_Input()

```
Fl_Multiline_Input::Fl_Multiline_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Multiline_Input](#) widget using the given position, size, and label string.

The default boxtype is `FL_DOWN_BOX`.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

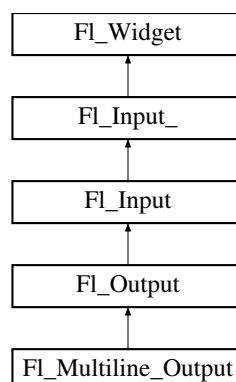
- `Fl_Multiline_Input.H`
- `Fl_Input.cxx`

12.91 Fl_Multiline_Output Class Reference

This widget is a subclass of [Fl_Output](#) that displays multiple lines of text.

```
#include <Fl_Multiline_Output.H>
```

Inheritance diagram for `Fl_Multiline_Output`:



Public Member Functions

- [FI_Multiline_Output](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Multiline_Output](#) widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Output](#)

- [FI_Output](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Output](#) widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Input](#)

- [FI_Input](#) (int, int, int, int, const char *l=0)
Creates a new [FI_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [FI_Input_](#)

- int [append](#) (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool [can_redo](#) () const
Check if there is a redo action available.
- bool [can_undo](#) () const
Check if the last operation can be undone.
- int [copy](#) (int clipboard)
Put the current selection into the clipboard.
- int [copy_cuts](#) ()
Copies the yank buffer to the clipboard.
- [FI_Color](#) [cursor_color](#) () const
Gets the color of the cursor.
- void [cursor_color](#) ([FI_Color](#) n)
Sets the color of the cursor.
- int [cut](#) ()
Deletes the current selection.
- int [cut](#) (int a, int b)
Deletes all characters between index a and b.
- int [cut](#) (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double [dvalue](#) () const
Returns the widget text interpreted as a floating point number.
- [FI_Input_](#) (int, int, int, int, const char *l=0)
Creates a new [FI_Input_](#) widget.
- unsigned int [index](#) (int i) const
Returns the character at index i.
- int [input_type](#) () const
Gets the input field type.
- void [input_type](#) (int t)
Sets the input field type.
- int [insert](#) (const char *t, int l=0)
Inserts text at the cursor position.
- int [insert_position](#) () const

- Gets the position of the text cursor.*
- int [insert_position](#) (int p)
 - Sets the cursor position and mark.*
- int [insert_position](#) (int p, int m)
 - Sets the index for the cursor and mark.*
- int [ivalue](#) () const
 - Returns the widget text interpreted as a signed integer.*
- int [mark](#) () const
 - Gets the current selection mark.*
- int [mark](#) (int m)
 - Sets the current selection mark.*
- int [maximum_size](#) () const
 - Gets the maximum length of the input field in characters.*
- void [maximum_size](#) (int m)
 - Sets the maximum length of the input field in characters.*
- int [position](#) () const
- int [position](#) (int p)
- int [position](#) (int p, int m)
- int [readonly](#) () const
 - Gets the read-only state of the input field.*
- void [readonly](#) (int b)
 - Sets the read-only state of the input field.*
- int [redo](#) ()
 - Redo previous undo operation.*
- int [replace](#) (int b, int e, const char *text, int ilen=0)
 - Deletes text from b to e and inserts the new string text.*
- void [resize](#) (int, int, int, int) [FL_OVERRIDE](#)
 - Changes the size of the widget.*
- int [shortcut](#) () const
 - Return the shortcut key associated with this widget.*
- void [shortcut](#) (int s)
 - Sets the shortcut key associated with this widget.*
- int [size](#) () const
 - Returns the number of bytes in [value\(\)](#).*
- void [size](#) (int W, int H)
 - Sets the width and height of this widget.*
- int [static_value](#) (const char *)
 - Changes the widget text.*
- int [static_value](#) (const char *, int)
 - Changes the widget text.*
- int [tab_nav](#) () const
 - Gets whether the Tab key causes focus navigation in multiline input fields or not.*
- void [tab_nav](#) (int val)
 - Sets whether the Tab key does focus navigation, or inserts tab characters into [Fl_Multiline_Input](#).*
- [Fl_Color](#) [textcolor](#) () const
 - Gets the color of the text in the input field.*
- void [textcolor](#) ([Fl_Color](#) n)
 - Sets the color of the text in the input field.*
- [Fl_Font](#) [textfont](#) () const
 - Gets the font of the text in the input field.*
- void [textfont](#) ([Fl_Font](#) s)

- Sets the font of the text in the input field.*
- `FI_Fontsize` `textsize` () const
 - Gets the size of the text in the input field.*
- void `textsize` (`FI_Fontsize` s)
 - Sets the size of the text in the input field.*
- int `undo` ()
 - Undoes previous changes to the text buffer.*
- const char * `value` () const
 - Returns the text displayed in the widget.*
- int `value` (const char *)
 - Changes the widget text.*
- int `value` (const char *, int)
 - Changes the widget text.*
- int `value` (double value)
 - Changes the widget text to a floating point number ("%g").*
- int `value` (int value)
 - Changes the widget text to a signed integer number.*
- int `wrap` () const
 - Gets the word wrapping state of the input field.*
- void `wrap` (int b)
 - Sets the word wrapping state of the input field.*
- `~FI_Input_` ()
 - Destroys the widget.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FI_Align` `align` () const
 - Gets the label alignment.*
- void `align` (`FI_Align` alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
 - Returns an `FI_Group` pointer if this widget is an `FI_Group`.*
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const

- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)

- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- virtual void `hide` ()

Makes a widget invisible.
- `FI_Image * image` ()

Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)

Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const

Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.

- void `label` (const char *text)
Sets the current label pointer.
- void `label` (FI_Labeltype a, const char *b)
Shortcut to set the label text and type in one call.
- FI_Color `labelcolor` () const
Gets the label color.
- void `labelcolor` (FI_Color c)
Sets the label color.
- FI_Font `labelfont` () const
Gets the font to use.
- void `labelfont` (FI_Font f)
Sets the font to use.
- FI_Fontsize `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (FI_Fontsize pix)
Sets the font size in pixels.
- FI_Labeltype `labeltype` () const
Gets the label type.
- void `labeltype` (FI_Labeltype a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- FI_Group * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (FI_Group *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- FI_Color `selection_color` () const
Gets the selection color.
- void `selection_color` (FI_Color a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()

- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
 - void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
 - virtual void `show` ()
Makes a widget visible.
 - void `size` (int W, int H)
Changes the size of the widget.
 - int `take_focus` ()
Gives the widget the keyboard focus.
 - unsigned int `takeevents` () const
Returns if the widget is able to take events.
 - int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
 - const char * `tooltip` () const
Gets the current tooltip text.
 - void `tooltip` (const char *text)
Sets the current tooltip text.
 - `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
 - `uchar` `type` () const
Gets the widget type.
 - void `type` (`uchar` t)
Sets the widget type.
 - int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
 - void * `user_data` () const
Gets the user data for this widget.
 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
 - void `user_data` (void *v)
Sets the user data for this widget.
 - unsigned int `visible` () const
Returns whether a widget is visible.
 - unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
 - void `visible_focus` (int v)
Modifies keyboard focus navigation.
 - int `visible_r` () const
Returns whether a widget and all its parents are visible.
 - int `w` () const
Gets the widget width.
 - `FI_When` `when` () const
Returns the conditions under which the callback is called.
 - void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
 - `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.

- int `x ()` const
Gets the widget position in its window.
- int `y ()` const
Gets the widget position in its window.
- virtual `~FI_Widget ()`
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Static Public Attributes inherited from `FI_Input`

- static const char * `copy_menu_text = "Copy"`
[this text may be customized at run-time]
- static const char * `cut_menu_text = "Cut"`
[this text may be customized at run-time]
- static const char * `paste_menu_text = "Paste"`
[this text may be customized at run-time]

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
, `OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
, `MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
, `GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,
`AUTO_DELETE_USER_DATA = 1<<23` ,
`MAXIMIZED = 1<<24` , `POPUP = 1<<25` , `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` ,
`USERFLAG1 = 1<<31` }
flags possible values enumeration.

Protected Member Functions inherited from `FI_Input`

- void `draw () FL_OVERRIDE`
Draws the widget.
- int `handle_key ()`
Handles a keystroke.
- int `handle_rmb ()`
Handle right mouse button down events.

Protected Member Functions inherited from FI_Input_

- int [apply_undo](#) ()
Apply the current undo/redo operation.
- void [drawtext](#) (int, int, int, int)
Draws the text in the passed bounding box.
- void [drawtext](#) (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.
- void [handle_mouse](#) (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int [handletext](#) (int e, int, int, int, int)
Handles all kinds of text field related events.
- int [line_end](#) (int i) const
Finds the end of a line.
- int [line_start](#) (int i) const
Finds the start of a line.
- int [linesPerPage](#) ()
- void [maybe_do_callback](#) (FI_Callback_Reason reason=FL_REASON_UNKNOWN)
- int [up_down_position](#) (int, int keepmark=0)
Moves the cursor to the column given by up_down_pos.
- int [word_end](#) (int i) const
Finds the end of a word.
- int [word_start](#) (int i) const
Finds the start of a word.
- int [xscroll](#) () const
- int [yscroll](#) () const
- void [yscroll](#) (int yOffset)

Protected Member Functions inherited from FI_Widget

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.

- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.91.1 Detailed Description

This widget is a subclass of [Fl_Output](#) that displays multiple lines of text.

It also displays tab characters as whitespace to the next column.

Note that this widget does not support scrollbars, or per-character color control.

If you are presenting large amounts of read-only text and need scrollbars, or full color control of characters, then use [Fl_Text_Display](#). If you want to display HTML text, use [Fl_Help_View](#).

A caret cursor (^) shows the keyboard navigation mark for keyboard selection of the output text, e.g. Arrow Keys to move the cursor, Shift + Arrow Keys to create a text selection, and '^C' to copy the selected text to the paste buffer. The caret cursor can be disabled by disabling the widget's "visible focus" using [clear_visible_focus\(\)](#), inherited from the [Fl_Widget](#) base class. Doing this also disables the widget's keyboard navigation.

12.91.2 Constructor & Destructor Documentation

12.91.2.1 Fl_Multiline_Output()

```
Fl_Multiline_Output::Fl_Multiline_Output (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Multiline_Output](#) widget using the given position, size, and label string. The default boxtype is FL_DOWN_BOX.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

- Fl_Multiline_Output.H
- Fl_Input.cxx

12.92 Fl_Native_File_Chooser Class Reference

This class lets an FLTK application easily and consistently access the operating system's native file chooser.

```
#include <Fl_Native_File_Chooser.H>
```

Public Types

- enum [Option](#) {
[NO_OPTIONS](#) = 0x0000 , [SAVEAS_CONFIRM](#) = 0x0001 , [NEW_FOLDER](#) = 0x0002 , [PREVIEW](#) = 0x0004 ,
[USE_FILTER_EXT](#) = 0x0008 }
- enum [Type](#) {
[BROWSE_FILE](#) = 0 , [BROWSE_DIRECTORY](#) , [BROWSE_MULTI_FILE](#) , [BROWSE_MULTI_DIRECTORY](#) ,
[BROWSE_SAVE_FILE](#) , [BROWSE_SAVE_DIRECTORY](#) }

Public Member Functions

- int `count` () const
Returns the number of filenames (or directory names) the user selected.
- const char * `directory` () const
Returns the current preset `directory()` value.
- void `directory` (const char *val)
Presets the directory the browser will show when opened.
- const char * `errmsg` () const
Returns a system dependent error message for the last method that failed.
- const char * `filename` () const
Return the filename the user chose.
- const char * `filename` (int i) const
Return one of the filenames the user selected.
- const char * `filter` () const
Returns the filter string last set.
- void `filter` (const char *f)
Sets the filename filters used for browsing.
- int `filter_value` () const
Returns which filter value was last selected by the user.
- void `filter_value` (int i)
Sets which filter will be initially selected.
- int `filters` () const
Gets how many filters were available, not including "All Files".
- `FI_Native_File_Chooser` (int val=`BROWSE_FILE`)
The constructor.
- int `options` () const
Gets the platform specific `FI_Native_File_Chooser::Option` flags.
- void `options` (int o)
Sets the platform specific chooser options to `val`.
- const char * `preset_file` () const
Get the preset filename.
- void `preset_file` (const char *f)
Sets the default filename for the chooser.
- int `show` ()
Post the chooser's dialog.
- const char * `title` () const
Get the title of the file chooser's dialog window.
- void `title` (const char *t)
Set the title of the file chooser's dialog window.
- int `type` () const
Gets the current `FI_Native_File_Chooser::Type` of browser.
- void `type` (int t)
Sets the current `FI_Native_File_Chooser::Type` of browser.
- `~FI_Native_File_Chooser` ()
Destructor.

Static Public Attributes

- static const char * `file_exists_message` = "File exists. Are you sure you want to overwrite?"
Localizable message.

12.92.1 Detailed Description

This class lets an FLTK application easily and consistently access the operating system's native file chooser. Some operating systems have very complex and specific file choosers that many users want access to specifically, instead of FLTK's default file chooser(s).

In cases where there is no native file browser, FLTK's own file browser is used instead.

To use this widget, use the following include in your code:

```
#include <FL/Fl_Native_File_Chooser.H>
```

The following example shows how to pick a single file:

```
// Create and post the local native file chooser
#include <FL/Fl_Native_File_Chooser.H>
[.]
Fl_Native_File_Chooser fnfc;
fnfc.title("Pick a file");
fnfc.type(Fl_Native_File_Chooser::BROWSE_FILE);
fnfc.filter("Text\t*.txt\n"
           "C Files\t*.{cxx,h,c}");
fnfc.directory("/var/tmp"); // default directory to use
// Show native chooser
switch ( fnfc.show() ) {
  case -1: printf("ERROR: %s\n", fnfc.errmsg()); break; // ERROR
  case 1: printf("CANCEL\n"); break; // CANCEL
  default: printf("PICKED: %s\n", fnfc.filename()); break; // FILE CHOSEN
}
```

The `Fl_Native_File_Chooser` widget transmits UTF-8 encoded filenames to its user. It is recommended to open files that may have non-ASCII names with the `fl_fopen()` or `fl_open()` utility functions that handle these names in a cross-platform way (whereas the standard `fopen()/open()` functions fail on the Windows platform to open files with a non-ASCII name).

Platform Specific Caveats

- Under X11/Wayland the dialog is chosen as follows:

1. If command `zenity` is available at run-time and if `Fl::option(OPTION_FNFC_USES_ZENITY)` is not turned off, the `zenity`-based dialog opens. This is expected to be more appropriate than other dialog forms for sandboxed apps.
2. Else if the app runs under the KDE desktop and if command `kdiallog` is available at run-time and if the library was not built with `cmake -D FLTK_USE_KDIALOG=OFF`, the `kdiallog`-based dialog opens.
3. Else if the GTK library is available at run-time on the computer and if `Fl::option(OPTION_FNFC_USES_GTK)` is not turned off, the GTK-styled dialog opens. Call `fl_register_images()` to add a "Preview" button to this dialog. Use the static public attributes of class `Fl_File_Chooser` to localize the browser.
4. Otherwise, FLTK's own dialog produced by the `Fl_File_Chooser` class opens. Call `fl_register_images()` to add a "Preview" button to it. It's best if you also call `Fl_File_Icon::load_system_icons()` at the start of `main()`, to enable the nicer looking file browser widgets. Use the static public attributes of class `Fl_File_Chooser` to localize the browser.

Todo Improve documentation about selection of native file choosers on X11/Wayland.

- Some operating systems support certain OS specific options; see `Fl_Native_File_Chooser::options()` for a list.



Figure 12.33 The Fl_Native_File_Chooser on different platforms

12.92.2 Member Enumeration Documentation

12.92.2.1 Option

```
enum Fl_Native_File_Chooser::Option
```

Enumerator

NO_OPTIONS	no options enabled
SAVEAS_CONFIRM	Show native 'Save As' overwrite confirm dialog.
NEW_FOLDER	Show 'New Folder' icon (if supported)
PREVIEW	enable preview mode (if supported)
USE_FILTER_EXT	Chooser filter presets the output file extension (if supported)

12.92.2.2 Type

```
enum Fl_Native_File_Chooser::Type
```

Enumerator

BROWSE_FILE	browse files (lets user choose one file)
BROWSE_DIRECTORY	browse directories (lets user choose one directory)
BROWSE_MULTI_FILE	browse files (lets user choose multiple files)
BROWSE_MULTI_DIRECTORY	browse directories (lets user choose multiple directories)
BROWSE_SAVE_FILE	browse to save a file
BROWSE_SAVE_DIRECTORY	browse to save a directory

12.92.3 Constructor & Destructor Documentation

12.92.3.1 Fl_Native_File_Chooser()

```
Fl_Native_File_Chooser::Fl_Native_File_Chooser (
    int val = BROWSE_FILE )
```

The constructor.

Internally allocates the native widgets. Optional `val` presets the type of browser this will be, which can also be changed with `type()`.

12.92.3.2 ~Fl_Native_File_Chooser()

```
Fl_Native_File_Chooser::~~Fl_Native_File_Chooser ( )
```

Destructor.

Deallocates any resources allocated to this widget.

12.92.4 Member Function Documentation

12.92.4.1 count()

```
int Fl_Native_File_Chooser::count ( ) const
```

Returns the number of filenames (or directory names) the user selected.

Example:

```
if ( fnfc->show() == 0 ) {
    // Print all filenames user selected
    for (int n=0; n<fnfc->count(); n++ ) {
        printf("%d) '%s'\n", n, fnfc->filename(n));
    }
}
```

12.92.4.2 directory()

```
void Fl_Native_File_Chooser::directory (
    const char * val )
```

Preset the directory the browser will show when opened.

If `val` is NULL, or no directory is specified, the chooser will attempt to use the last non-cancelled folder.

12.92.4.3 errmsg()

```
const char * Fl_Native_File_Chooser::errmsg ( ) const
```

Returns a system dependent error message for the last method that failed.

This message should at least be flagged to the user in a dialog box, or to some kind of error log. Contents will be valid only for methods that document `errmsg()` will have info on failures.

12.92.4.4 filename() [1/2]

```
const char * Fl_Native_File_Chooser::filename ( ) const
```

Return the filename the user chose.

Use this if only expecting a single filename. If more than one filename is expected, use `filename(int)` instead. Return value may be "" if no filename was chosen (eg. user cancelled).

12.92.4.5 filename() [2/2]

```
const char * Fl_Native_File_Chooser::filename (
    int i ) const
```

Return one of the filenames the user selected.

Use `count()` to determine how many filenames the user selected.

Example:

```
if ( fnfc->show() == 0 ) {
    // Print all filenames user selected
    for (int n=0; n<fnfc->count(); n++ ) {
        printf("%d) '%s'\n", n, fnfc->filename(n));
    }
}
```


12.92.4.6 filter() [1/2]

```
const char * Fl_Native_File_Chooser::filter ( ) const
```

Returns the filter string last set.
Can be NULL if no filter was set.

12.92.4.7 filter() [2/2]

```
void Fl_Native_File_Chooser::filter (
    const char * f )
```

Sets the filename filters used for browsing.
The default is NULL, which browses all files.
The filter string can be any of:

- A single wildcard (eg. "*.txt")
- Multiple wildcards (eg. "*.{cxx,h,H}")
- A descriptive name followed by a "\t" and a wildcard (eg. "Text Files\t*.txt")
- A list of separate wildcards with a "\n" between each (eg. "*.{cxx,H}\n*.txt")
- A list of descriptive names and wildcards (eg. "C++ Files\t*.{cxx,H}\nTxt Files\t*.txt")

The format of each filter is a wildcard, or an optional user description followed by '\t' and the wildcard.
On most platforms, each filter is available to the user via a pulldown menu in the file chooser. The 'All Files' option is always available to the user.

12.92.4.8 filter_value() [1/2]

```
int Fl_Native_File_Chooser::filter_value ( ) const
```

Returns which filter value was last selected by the user.
This is only valid if the chooser returns success and if the particular file chooser supports it. Otherwise the value is not changed.
Some "native" file choosers don't support returning the filter selection by the user, particularly the system dialog based browsers:

- kdialog (KDE system dialog)
- zenity (another system dialog based chooser).

Note: this list may not be complete.
These system file chooser dialogs don't return the filter value chosen by the user.

See also

[filter\(const char *f\)](#)

12.92.4.9 filter_value() [2/2]

```
void Fl_Native_File_Chooser::filter_value (
    int i )
```

Sets which filter will be initially selected.
The first filter is indexed as 0. If `filter_value() == filters()`, then "All Files" was chosen. If `filter_value() > filters()`, then a custom filter was set.
Some "native" file choosers don't support this way to set the initial filter type, particularly the system dialog based browsers:

- kdialog (KDE system dialog)
- zenity (another system dialog based chooser).

Note: this list may not be complete.
As far as we know these dialogs use the **first** item in the list of filter values as the initial filter presented to the user.

See also

[filter\(const char *f\)](#)

12.92.4.10 options()

```
void Fl_Native_File_Chooser::options (
    int o )
```

Sets the platform specific chooser options to `val`.

`val` is expected to be one or more [Fl_Native_File_Chooser::Option](#) flags ORed together. Some platforms have OS-specific functions that can be enabled/disabled via this method.

Flag	Description	Win	Mac	Other
NEW_FOLDER	Shows the 'New Folder' button.	Ignored	Used	Used
PREVIEW	Enables the 'Preview' mode by <code>default</code> .	Ignored	Ignored	Used
SAVEAS_CONFIRM	Confirm dialog <code>if</code> BROWSE_SAVE_FILE file exists.	Used	Used	Used
USE_FILTER_EXT	Chooser <code>filter</code> presets the output file extension.	Ignored	Used	Used (GTK)

12.92.4.11 preset_file()

```
void Fl_Native_File_Chooser::preset_file (
    const char * f )
```

Sets the default filename for the chooser.

Use [directory\(\)](#) to set the default directory. Mainly used to preset the filename for save dialogs, and on most platforms can be used for opening files as well.

12.92.4.12 show()

```
int Fl_Native_File_Chooser::show ( )
```

Post the chooser's dialog.

Blocks until dialog has been completed or cancelled.

Returns

- 0 – user picked a file
- 1 – user cancelled
- -1 – failed; [errmsg\(\)](#) has reason

12.92.4.13 title() [1/2]

```
const char * Fl_Native_File_Chooser::title ( ) const
```

Get the title of the file chooser's dialog window.

Return value may be NULL if no title was set.

12.92.4.14 title() [2/2]

```
void Fl_Native_File_Chooser::title (
    const char * t )
```

Set the title of the file chooser's dialog window.

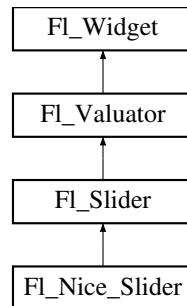
Can be NULL if no title desired. The default title varies according to the platform, so you are advised to set the title explicitly.

The documentation for this class was generated from the following files:

- [Fl_Native_File_Chooser.H](#)
- [Fl_Native_File_Chooser.cxx](#)
- [Fl_Native_File_Chooser_GTK.cxx](#)

12.93 FI_Nice_Slider Class Reference

Inheritance diagram for FI_Nice_Slider:



Public Member Functions

- **FI_Nice_Slider** (int X, int Y, int W, int H, const char *L=0)

Public Member Functions inherited from FI_Slider

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- **FI_Slider** (int X, int Y, int W, int H, const char *L=0)
Creates a new FI_Slider widget using the given position, size, and label string.
- **FI_Slider** (uchar t, int X, int Y, int W, int H, const char *L)
Creates a new FI_Slider widget using the given type, position, size, and label string.
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.
- int **scrollvalue** (int pos, int size, int first, int total)
Sets the size and position of the sliding knob in the box.
- **FI_Boxtype slider** () const
Gets the slider box type.
- void **slider** (FI_Boxtype c)
Sets the slider box type.
- float **slider_size** () const
Get the dimensions of the moving piece of slider.
- void **slider_size** (double v)
Set the dimensions of the moving piece of slider.

Public Member Functions inherited from FI_Valuator

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)

- Sets the maximum value for the valuator.*
- double **minimum** () const
 - Gets the minimum value for the valuator.*
- void **minimum** (double a)
 - Sets the minimum value for the valuator.*
- void **precision** (int digits)
 - Sets the step value to $1.0 / 10^{\text{digits}}$.*
- void **range** (double a, double b)
 - Sets the minimum and maximum values for the valuator.*
- double **round** (double)
 - Round the passed value to the nearest step increment.*
- double **step** () const
 - Gets or sets the step value.*
- void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
- void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
- void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double **value** () const
 - Gets the floating point(double) value.*
- int **value** (double)
 - Sets the current value.*

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) **align** () const
 - Gets the label alignment.*
- void **align** ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*

- virtual [FI_Window](#) const * **as_window** () const
- void [bind_deimage](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype](#) **box** () const
 - Gets the box type of the widget.*
- void [box](#) ([FI_Boxtype](#) new_box)
 - Sets the box type for the widget.*
- [FI_Callback_p](#) **callback** () const
 - Gets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void [callback](#) ([FI_Callback0](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int [changed](#) () const
 - Checks if the widget value changed since the last callback.*
- void [clear_active](#) ()
 - Marks the widget as inactive without sending events or changing focus.*
- void [clear_changed](#) ()
 - Marks the value of the widget as unchanged.*
- void [clear_damage](#) ([uchar](#) c=0)
 - Clears or sets the damage flags.*
- void [clear_output](#) ()
 - Sets a widget to accept input.*
- void [clear_visible](#) ()
 - Hides the widget.*
- void [clear_visible_focus](#) ()
 - Disables keyboard focus navigation with this widget.*
- [FI_Color](#) **color** () const
 - Gets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg)
 - Sets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
 - Sets the background and selection color of the widget.*
- [FI_Color](#) **color2** () const
 - For back compatibility only.*
- void [color2](#) (unsigned a)
 - For back compatibility only.*
- int [contains](#) (const [FI_Widget](#) *w) const
 - Checks if w is a child of this widget.*

- void [copy_label](#) (const char *new_label)
Sets the current label.
- void [copy_tooltip](#) (const char *text)
Sets the current tooltip text.
- [uchar damage](#) () const
Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) (uchar c)
Sets the damage bits for the widget.
- void [damage](#) (uchar c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int [damage_resize](#) (int, int, int, int)
Internal use only.
- void [deactivate](#) ()
Deactivates the widget.
- [FL_Image * deimage](#) ()
Gets the image that is used as part of the widget label when in the inactive state.
- const [FL_Image * deimage](#) () const
Gets the image that is used as part of the widget label when in the inactive state.
- void [deimage](#) ([FL_Image](#) &img)
Sets the image to use as part of the widget label when in the inactive state.
- void [deimage](#) ([FL_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- int [deimage_bound](#) () const
Returns whether the inactive image is managed by the widget.
- void [do_callback](#) ([FL_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with default arguments.
- void [do_callback](#) ([FL_Widget](#) *widget, long arg, [FL_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- void [do_callback](#) ([FL_Widget](#) *widget, void *arg=0, [FL_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- void [draw_label](#) (int, int, int, int, [FL_Align](#)) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int [h](#) () const
Gets the widget height.
- virtual void [hide](#) ()
Makes a widget invisible.
- [FL_Image * image](#) ()
Gets the image that is used as part of the widget label when in the active state.
- const [FL_Image * image](#) () const
Gets the image that is used as part of the widget label when in the active state.
- void [image](#) ([FL_Image](#) &img)
Sets the image to use as part of the widget label when in the active state.
- void [image](#) ([FL_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- int [image_bound](#) () const
Returns whether the image is managed by the widget.
- int [inside](#) (const [FL_Widget](#) *wgt) const
Checks if this widget is a child of wgt.
- int [is_label_copied](#) () const
Returns whether the current label was assigned with [copy_label\(\)](#).
- const char * [label](#) () const

- Gets the current label text.*

 - void `label` (const char *text)
- Sets the current label pointer.*

 - void `label` (FI_Labeltype a, const char *b)
- Shortcut to set the label text and type in one call.*

 - `FI_Color labelcolor` () const
- Gets the label color.*

 - void `labelcolor` (FI_Color c)
- Sets the label color.*

 - `FI_Font labelfont` () const
- Gets the font to use.*

 - void `labelfont` (FI_Font f)
- Sets the font to use.*

 - `FI_Fontsize labelsize` () const
- Gets the font size in pixels.*

 - void `labelsize` (FI_Fontsize pix)
- Sets the font size in pixels.*

 - `FI_Labeltype labeltype` () const
- Gets the label type.*

 - void `labeltype` (FI_Labeltype a)
- Sets the label type.*

 - void `measure_label` (int &ww, int &hh) const
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard` (bool needs)
- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group * parent` () const
- Returns a pointer to the parent widget.*

 - void `parent` (FI_Group *p)
- Internal use only - "for hacks only".*

 - void `position` (int X, int Y)
- Repositions the window or widget.*

 - void `redraw` ()
- Schedules the drawing of the widget.*

 - void `redraw_label` ()
- Schedules the drawing of the label.*

 - virtual void `resize` (int x, int y, int w, int h)
- Changes the size or position of the widget.*

 - `FI_Color selection_color` () const
- Gets the selection color.*

 - void `selection_color` (FI_Color a)
- Sets the selection color.*

 - void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()
- Marks the value of the widget as changed.*

 - void `set_output` ()
- Sets a widget to output only.*

- void `set_visible ()`
Makes the widget visible.
- void `set_visible_focus ()`
Enables keyboard focus navigation with this widget.
- int `shortcut_label () const`
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label (int value)`
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show ()`
Makes a widget visible.
- void `size (int W, int H)`
Changes the size of the widget.
- int `take_focus ()`
Gives the widget the keyboard focus.
- unsigned int `takeevents () const`
Returns if the widget is able to take events.
- int `test_shortcut ()`
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip () const`
Gets the current tooltip text.
- void `tooltip (const char *text)`
Sets the current tooltip text.
- `Fl_Window *` `top_window () const`
Returns a pointer to the top-level window for the widget.
- `Fl_Window *` `top_window_offset (int &xoff, int &yoff) const`
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type () const`
Gets the widget type.
- void `type (uchar t)`
Sets the widget type.
- int `use_accents_menu ()`
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data () const`
Gets the user data for this widget.
- void `user_data (Fl_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- void `user_data (void *v)`
Sets the user data for this widget.
- unsigned int `visible () const`
Returns whether a widget is visible.
- unsigned int `visible_focus () const`
Checks whether this widget has a visible focus.
- void `visible_focus (int v)`
Modifies keyboard focus navigation.
- int `visible_r () const`
Returns whether a widget and all its parents are visible.
- int `w () const`
Gets the widget width.
- `Fl_When when () const`
Returns the conditions under which the callback is called.
- void `when (uchar i)`

- Sets the flags used to decide when a callback is called.*
- `FI_Window * window () const`
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~FI_Widget ()`
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void `default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
`INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,`
`FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7`
`,`
`OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11`
`,`
`MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15`
`,`
`GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU`
`= 1<<19 ,`
`NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,`
`AUTO_DELETE_USER_DATA = 1<<23 ,`
`MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,`
`USERFLAG1 = 1<<31 }`
flags possible values enumeration.

Protected Member Functions inherited from FI_Slider

- void `draw () FL_OVERRIDE`
Draws the widget.
- void `draw (int, int, int, int)`
- int `handle (int, int, int, int, int)`

Protected Member Functions inherited from FI_Valuator

- `FI_Valuator (int X, int Y, int W, int H, const char *L)`
Creates a new FI_Valuator widget using the given position, size, and label string.
- void `handle_drag (double newvalue)`
Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.
- void `handle_push ()`
Stores the current value in the previous value.
- void `handle_release ()`

- Called after an FL_WHEN_RELEASE event is received and before the callback.*
- int **horizontal** () const

Tells if the valuator is an FL_HORIZONTAL one.
- double **previous_value** () const

Gets the previous floating point value before an event changed it.
- void **set_value** (double v)

Sets the current floating point value.
- double **softclamp** (double)

Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void **value_damage** ()

Asks for partial redraw.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)

Clears a flag in the flags mask.
- void **draw_backdrop** () const

If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const

Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const

Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const

Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const

Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int **flags** () const

Gets the widget flags mask.
- void **h** (int v)

Internal use only.
- void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.
- void **x** (int v)

Internal use only.
- void **y** (int v)

Internal use only.

The documentation for this class was generated from the following files:

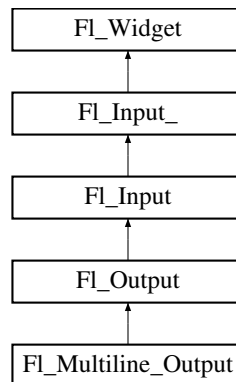
- [FI_Nice_Slider.H](#)
- [FI_Slider.cxx](#)

12.94 FI_Output Class Reference

This widget displays a piece of text.

```
#include <FI_Output.H>
```

Inheritance diagram for FI_Output:



Public Member Functions

- [FI_Output](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Output](#) widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Input](#)

- [FI_Input](#) (int, int, int, int, const char *l=0)
Creates a new [FI_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [FI_Input_](#)

- int [append](#) (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool [can_redo](#) () const
Check if there is a redo action available.
- bool [can_undo](#) () const
Check if the last operation can be undone.
- int [copy](#) (int clipboard)
Put the current selection into the clipboard.
- int [copy_cuts](#) ()
Copies the yank buffer to the clipboard.
- [FI_Color](#) [cursor_color](#) () const
Gets the color of the cursor.
- void [cursor_color](#) ([FI_Color](#) n)
Sets the color of the cursor.
- int [cut](#) ()
Deletes the current selection.
- int [cut](#) (int a, int b)
Deletes all characters between index a and b.
- int [cut](#) (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double [dvalue](#) () const

- Returns the widget text interpreted as a floating point number.*

 - `FL_Input_` (int, int, int, int, const char *=0)

Creates a new `FL_Input_` widget.
- unsigned int `index` (int i) const

Returns the character at index `i`.
- int `input_type` () const

Gets the input field type.
- void `input_type` (int t)

Sets the input field type.
- int `insert` (const char *t, int l=0)

Inserts text at the cursor position.
- int `insert_position` () const

Gets the position of the text cursor.
- int `insert_position` (int p)

Sets the cursor position and mark.
- int `insert_position` (int p, int m)

Sets the index for the cursor and mark.
- int `ivalue` () const

Returns the widget text interpreted as a signed integer.
- int `mark` () const

Gets the current selection mark.
- int `mark` (int m)

Sets the current selection mark.
- int `maximum_size` () const

Gets the maximum length of the input field in characters.
- void `maximum_size` (int m)

Sets the maximum length of the input field in characters.
- int `position` () const
- int `position` (int p)
- int `position` (int p, int m)
- int `readonly` () const

Gets the read-only state of the input field.
- void `readonly` (int b)

Sets the read-only state of the input field.
- int `redo` ()

Redo previous undo operation.
- int `replace` (int b, int e, const char *text, int ilen=0)

Deletes text from `b` to `e` and inserts the new string `text`.
- void `resize` (int, int, int, int) `FL_OVERRIDE`

Changes the size of the widget.
- int `shortcut` () const

Return the shortcut key associated with this widget.
- void `shortcut` (int s)

Sets the shortcut key associated with this widget.
- int `size` () const

Returns the number of bytes in `value()`.
- void `size` (int W, int H)

Sets the width and height of this widget.
- int `static_value` (const char *)

Changes the widget text.
- int `static_value` (const char *, int)

- Changes the widget text.*

 - int `tab_nav` () const

Gets whether the Tab key causes focus navigation in multiline input fields or not.
- void `tab_nav` (int val)

Sets whether the Tab key does focus navigation, or inserts tab characters into [FI_Multiline_Input](#).
- [FI_Color](#) `textcolor` () const

Gets the color of the text in the input field.
- void `textcolor` ([FI_Color](#) n)

Sets the color of the text in the input field.
- [FI_Font](#) `textfont` () const

Gets the font of the text in the input field.
- void `textfont` ([FI_Font](#) s)

Sets the font of the text in the input field.
- [FI_Fontsize](#) `textsize` () const

Gets the size of the text in the input field.
- void `textsize` ([FI_Fontsize](#) s)

Sets the size of the text in the input field.
- int `undo` ()

Undoes previous changes to the text buffer.
- const char * `value` () const

Returns the text displayed in the widget.
- int `value` (const char *)

Changes the widget text.
- int `value` (const char *, int)

Changes the widget text.
- int `value` (double value)

Changes the widget text to a floating point number ("%g").
- int `value` (int value)

Changes the widget text to a signed integer number.
- int `wrap` () const

Gets the word wrapping state of the input field.
- void `wrap` (int b)

Sets the word wrapping state of the input field.
- `~FI_Input` ()

Destroys the widget.

Public Member Functions inherited from [FI_Widget](#)

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
- Activates the widget.*
- unsigned int `active` () const
- Returns whether the widget is active.*
- int `active_r` () const
- Returns whether the widget and all of its parents are active.*
- [FI_Align](#) `align` () const
- Gets the label alignment.*
- void `align` ([FI_Align](#) alignment)
- Sets the label alignment.*
- long `argument` () const

- Gets the current user data (long) argument that is passed to the callback function.*

 - void [argument](#) (long v)

Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()

Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()

Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()

Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) [box](#) () const

Gets the box type of the widget.
- void [box](#) ([FI_Boxtype](#) new_box)

Sets the box type for the widget.
- [FI_Callback_p](#) [callback](#) () const

Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)

Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)

Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)

Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)

Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)

Sets the current callback function for the widget.
- unsigned int [changed](#) () const

Checks if the widget value changed since the last callback.
- void [clear_active](#) ()

Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()

Marks the value of the widget as unchanged.
- void [clear_damage](#) (uchar c=0)

Clears or sets the damage flags.
- void [clear_output](#) ()

Sets a widget to accept input.
- void [clear_visible](#) ()

Hides the widget.
- void [clear_visible_focus](#) ()

Disables keyboard focus navigation with this widget.
- [FI_Color](#) [color](#) () const

- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `draw_label` (int, int, int, int, `FI_Align`) const
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int `h` () const
- Gets the widget height.*

 - virtual void `hide` ()
- Makes a widget invisible.*

 - `FI_Image` * `image` ()
- Gets the image that is used as part of the widget label when in the active state.*

 - const `FI_Image` * `image` () const
- Gets the image that is used as part of the widget label when in the active state.*

- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group * parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group *p`)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color selection_color` () const

- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)
- Sets the selection color.*

 - void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()
- Marks the value of the widget as changed.*

 - void `set_output` ()
- Sets a widget to output only.*

 - void `set_visible` ()
- Makes the widget visible.*

 - void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void `show` ()
- Makes a widget visible.*

 - void `size` (int W, int H)
- Changes the size of the widget.*

 - int `take_focus` ()
- Gives the widget the keyboard focus.*

 - unsigned int `takeevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)
- Sets the current tooltip text.*

 - `FI_Window` * `top_window` () const
- Returns a pointer to the top-level window for the widget.*

 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - `uchar` `type` () const
- Gets the widget type.*

 - void `type` (`uchar` t)
- Sets the widget type.*

 - int `use_accents_menu` ()
- Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.*

 - void * `user_data` () const
- Gets the user data for this widget.*

 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
- Sets the user data for this widget.*

 - void `user_data` (void *v)
- Sets the user data for this widget.*

 - unsigned int `visible` () const
- Returns whether a widget is visible.*

 - unsigned int `visible_focus` () const
- Checks whether this widget has a visible focus.*

- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FL_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FL_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FL_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FL_Widget`

- static void `default_callback` (`FL_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Static Public Attributes inherited from `FL_Input`

- static const char * `copy_menu_text` = "Copy"
[this text may be customized at run-time]
- static const char * `cut_menu_text` = "Cut"
[this text may be customized at run-time]
- static const char * `paste_menu_text` = "Paste"
[this text may be customized at run-time]

Protected Types inherited from `FL_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Input](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- int [handle_key](#) ()
Handles a keystroke.
- int [handle_rmb](#) ()
Handle right mouse button down events.

Protected Member Functions inherited from [FI_Input_](#)

- int [apply_undo](#) ()
Apply the current undo/redo operation.
- void [drawtext](#) (int, int, int, int)
Draws the text in the passed bounding box.
- void [drawtext](#) (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.
- void [handle_mouse](#) (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int [handletext](#) (int e, int, int, int, int)
Handles all kinds of text field related events.
- int [line_end](#) (int i) const
Finds the end of a line.
- int [line_start](#) (int i) const
Finds the start of a line.
- int [linesPerPage](#) ()
- void [maybe_do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- int [up_down_position](#) (int, int keepmark=0)
Moves the cursor to the column given by `up_down_pos`.
- int [word_end](#) (int i) const
Finds the end of a word.
- int [word_start](#) (int i) const
Finds the start of a word.
- int [xscroll](#) () const
- int [yscroll](#) () const
- void [yscroll](#) (int yOffset)

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const

- Draws a focus rectangle around the widget.*

 - void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const

Draws a focus box for the widget at the given position and size.
- void `draw_label` () const

Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int `flags` () const

Gets the widget flags mask.
- void `h` (int v)

Internal use only.
- void `set_flag` (unsigned int c)

Sets a flag in the flags mask.
- void `w` (int v)

Internal use only.
- void `x` (int v)

Internal use only.
- void `y` (int v)

Internal use only.

12.94.1 Detailed Description

This widget displays a piece of text.

When you set the `value()`, `FI_Output` does a `strcpy()` to its own storage, which is useful for program-generated values. The user may select portions of the text using the mouse and paste the contents into other fields or programs.

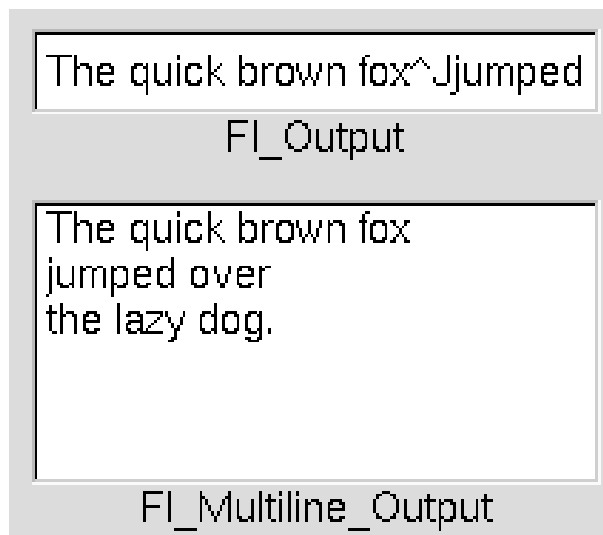


Figure 12.34 `FI_Output`

There is a single subclass, `FI_Multiline_Output`, which allows you to display multiple lines of text. `FI_Multiline_Output` does not provide scroll bars. If a more complete text editing widget is needed, use `FI_Text_Display` instead.

The text may contain any characters except `\0`, and will correctly display anything, using `^X` notation for unprintable control characters and `\nnn` notation for unprintable characters with the high bit set. It assumes the font can draw any characters in the ISO-Latin1 character set.

12.94.2 Constructor & Destructor Documentation

12.94.2.1 Fl_Output()

```
Fl_Output::Fl_Output (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Output](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

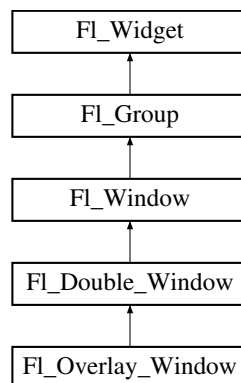
- [Fl_Output.H](#)
- [Fl_Input.cxx](#)

12.95 Fl_Overlay_Window Class Reference

This window provides double buffering and also the ability to draw the "overlay" which is another picture placed on top of the main image.

```
#include <Fl_Overlay_Window.H>
```

Inheritance diagram for `Fl_Overlay_Window`:



Public Member Functions

- [Fl_Overlay_Window * as_overlay_window \(\) FL_OVERRIDE](#)
Return non-null if this is an [Fl_Overlay_Window](#) object.
- `int can_do_overlay ()`
Returns non-zero if there's hardware overlay support.
- `virtual void draw_overlay ()=0`
You must subclass [Fl_Overlay_Window](#) and provide this method.
- `void flush () FL_OVERRIDE`
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- `void hide () FL_OVERRIDE`
Makes a widget invisible.
- `void redraw_overlay ()`
Call this to indicate that the overlay data has changed and needs to be redrawn.
- `void resize (int, int, int, int) FL_OVERRIDE`
Changes the size or position of the widget.
- `void show () FL_OVERRIDE`
Makes a widget visible.

- void **show** (int a, char **b)
Same as [FI_Window::show\(int a, char **b\)](#)
- **~FI_Overlay_Window** ()
Destroys the window and all child widgets.

Public Member Functions inherited from [FI_Double_Window](#)

- [FI_Double_Window](#) * **as_double_window** () [FL_OVERRIDE](#)
Return non-null if this is an [FI_Overlay_Window](#) object.
- **FI_Double_Window** (int W, int H, const char *l=0)
Creates a new [FI_Double_Window](#) widget using the given position, size, and label (title) string.
- **FI_Double_Window** (int X, int Y, int W, int H, const char *l=0)
See [FI_Double_Window::FI_Double_Window\(int w, int h, const char *label = 0\)](#)
- void **show** (int a, char **b)
Same as [FI_Window::show\(int a, char **b\)](#)
- **~FI_Double_Window** ()
The destructor also deletes all the children.

Public Member Functions inherited from [FI_Window](#)

- [FI_Window](#) const * **as_window** () const [FL_OVERRIDE](#)
- [FI_Window](#) * **as_window** () [FL_OVERRIDE](#)
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- unsigned int **border** () const
Returns whether the window possesses a border.
- void **border** (int b)
Sets whether or not the window manager border is around the window.
- void **clear_border** ()
Fast inline function to turn the window manager border off.
- void **clear_modal_states** ()
Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.
- void **copy_label** (const char *a)
Sets the window titlebar label to a copy of a character string.
- void **cursor** (const [FI_RGB_Image](#) *, int, int)
Changes the cursor for this window using the provided image as cursor's shape.
- void **cursor** ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void **cursor** ([FI_Cursor](#))
Changes the cursor for this window.
- int **decorated_h** () const
Returns the window height including any window title bar and any frame added by the window manager.
- int **decorated_w** () const
Returns the window width including any frame added by the window manager.
- void **default_cursor** ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void **default_cursor** ([FI_Cursor](#))
Sets the default window cursor.
- void **draw_backdrop** ()
Draw the background image if one is set and is aligned inside.
- [FI_Window](#) (int w, int h, const char *title=0)
Creates a window from the given width w, height h, and title.
- [FI_Window](#) (int x, int y, int w, int h, const char *title=0)

- Creates a window from the given position (x, y), size (w, h) and title.*

 - void [free_position](#) ()
 - Undoes the effect of a previous [resize\(\)](#) or [show\(\)](#) so that the next time [show\(\)](#) is called the window manager is free to position the window.*
 - void [fullscreen](#) ()
 - Makes the window completely fill one or more screens, without any window manager border visible.*
 - unsigned int [fullscreen_active](#) () const
 - Returns non zero if FULLSCREEN flag is set, 0 otherwise.*
 - void [fullscreen_off](#) ()
 - Turns off any side effects of [fullscreen\(\)](#)*
 - void [fullscreen_off](#) (int X, int Y, int W, int H)
 - Turns off any side effects of [fullscreen\(\)](#) and does [resize\(x,y,w,h\)](#).*
 - void [fullscreen_screens](#) (int top, int bottom, int left, int right)
 - Sets which screens should be used when this window is in fullscreen mode.*
 - int [handle](#) (int) [FL_OVERRIDE](#)
 - Handles the specified event.*
 - void [hide](#) () [FL_OVERRIDE](#)
 - Removes the window from the screen.*
 - void [hotspot](#) (const [FL_Widget](#) &p, int offscreen=0)
 - See void [FL_Window::hotspot](#)(int x, int y, int offscreen = 0)*
 - void [hotspot](#) (const [FL_Widget](#) *, int offscreen=0)
 - See void [FL_Window::hotspot](#)(int x, int y, int offscreen = 0)*
 - void [hotspot](#) (int x, int y, int offscreen=0)
 - Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.*
 - const void * [icon](#) () const
 - Gets the current icon window target dependent data.*
 - void [icon](#) (const [FL_RGB_Image](#) *)
 - Sets or resets a single window icon.*
 - void [icon](#) (const void *ic)
 - Platform-specific method to set the window icon usable on Windows and X11 only.*
 - void [iconize](#) ()
 - Iconifies the window.*
 - const char * [iconlabel](#) () const
 - See void [FL_Window::iconlabel](#)(const char*)*
 - void [iconlabel](#) (const char *)
 - Sets the icon label.*
 - void [icons](#) (const [FL_RGB_Image](#) *[], int)
 - Sets the window icons.*
 - void [icons](#) (HICON big_icon, HICON small_icon)
 - Sets the window icons using HICON handles (Windows platform only).*
 - const char * [label](#) () const
 - See void [FL_Window::label](#)(const char*)*
 - void [label](#) (const char *)
 - Sets the window title bar label.*
 - void [label](#) (const char *label, const char *[iconlabel](#))
 - Sets the icon label.*
 - void [make_current](#) ()
 - Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.*

- void `maximize` ()
Maximizes a top-level window to its current screen.
- unsigned int `maximize_active` () const
Returns whether the window is currently maximized.
- unsigned int `menu_window` () const
Returns true if this window is a menu window.
- unsigned int `modal` () const
Returns true if this window is modal.
- unsigned int `non_modal` () const
Returns true if this window is modal or non-modal.
- `fl_uintptr_t os_id` ()
Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int `override` () const
Returns non zero if `OVERVERRIDE` flag is set, 0 otherwise.
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`
Changes the size and position of the window.
- int `screen_num` ()
The number of the screen containing the mapped window.
- void `screen_num` (int screen_num)
Set the number of the screen where to map the window.
- void `set_menu_window` ()
Marks the window as a menu window.
- void `set_modal` ()
A "modal" window, when `shown()`, will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void `set_non_modal` ()
A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a `modal()` one in that it remains on top, but it has no effect on event delivery.
- void `set_override` ()
Activates the flags `NOBORDER|OVERVERRIDE`.
- void `set_tooltip_window` ()
Marks the window as a tooltip window.
- const `FI_Image * shape` ()
Returns the image controlling the window shape or `NULL`.
- void `shape` (const `FI_Image &b`)
Set the window's shape with an `FI_Image`.
- void `shape` (const `FI_Image *img`)
Assigns a non-rectangular shape to the window.
- void `show` () `FL_OVERRIDE`
Puts the window on the screen.
- void `show` (int argc, char **argv)
Puts the window on the screen with `show()` and parses command-line arguments.
- int `shown` ()
Returns non-zero if `show()` has been called (but not `hide()`).
- void `size_range` (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)
Sets the allowable range the user can resize this window to.
- unsigned int `tooltip_window` () const
Returns true if this window is a tooltip window.
- void `un_maximize` ()
Returns a previously maximized top-level window to its previous size.
- void `wait_for_expose` ()

- Waits for the window to be displayed after calling [show\(\)](#).*
- int **x_root** () const
 - Gets the x position of the window on the screen.*
- const char * **xclass** () const
 - Returns the xclass for this window, or a default.*
- void **xclass** (const char *c)
 - Sets the xclass for this window.*
- int **y_root** () const
 - Gets the y position of the window on the screen.*
- virtual **~FL_Window** ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from [FL_Group](#)

- [FL_Widget](#) * & **_ddfdesign_kludge** ()
 - This is for forms compatibility only.*
- void **add** ([FL_Widget](#) &)
 - The widget is removed from its current group (if any) and then added to the end of this group.*
- void **add** ([FL_Widget](#) *o)
 - See void [FL_Group::add\(FL_Widget &w\)](#)*
- void **add_resizable** ([FL_Widget](#) &o)
 - Adds a widget to the group and makes it the resizable widget.*
- [FL_Widget](#) *const * **array** () const
 - Returns a pointer to the array of children.*
- [FL_Group](#) const * **as_group** () const [FL_OVERRIDE](#)
- [FL_Group](#) * **as_group** () [FL_OVERRIDE](#)
 - Returns an [FL_Group](#) pointer if this widget is an [FL_Group](#).*
- void **begin** ()
 - Sets the current group so you can build the widget tree by just constructing the widgets.*
- [FL_Widget](#) * **child** (int n) const
 - Returns [array\(\)\[n\]](#).*
- int **children** () const
 - Returns how many child widgets the group has.*
- void **clear** ()
 - Deletes all child widgets from memory recursively.*
- unsigned int **clip_children** ()
 - Returns the current clipping mode.*
- void **clip_children** (int c)
 - Controls whether the group widget clips the drawing of child widgets to its bounding box.*
- virtual int **delete_child** (int n)
 - Removes the widget at *index* from the group and deletes it.*
- void **end** ()
 - Exactly the same as [current\(this->parent\(\)\)](#).*
- int **find** (const [FL_Widget](#) &o) const
 - See int [FL_Group::find\(const FL_Widget *w\) const](#).*
- int **find** (const [FL_Widget](#) *) const
 - Searches the child array for the widget and returns the index.*
- [FL_Group](#) (int, int, int, int, const char *s=0)
 - Creates a new [FL_Group](#) widget using the given position, size, and label string.*
- void **focus** ([FL_Widget](#) *W)
- void **forms_end** ()

- This is for forms compatibility only.*

 - void `init_sizes` ()

Resets the internal array of widget sizes and positions.
- void `insert` (`FI_Widget` &, int i)
- The widget is removed from its current group (if any) and then inserted into this group.*
- void `insert` (`FI_Widget` &o, `FI_Widget` *before)
- This does insert(w, find(before)).*
- void `remove` (`FI_Widget` &)
- Removes a widget from the group but does not delete it.*
- void `remove` (`FI_Widget` *o)
- Removes the widget o from the group.*
- void `remove` (int index)
- Removes the widget at index from the group but does not delete it.*
- `FI_Widget` * `resizable` () const
- Returns the group's resizable widget.*
- void `resizable` (`FI_Widget` &o)
- Sets the group's resizable widget.*
- void `resizable` (`FI_Widget` *o)
- The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- virtual `~FI_Group` ()
- The destructor also deletes all the children.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
- Activates the widget.*
- unsigned int `active` () const
- Returns whether the widget is active.*
- int `active_r` () const
- Returns whether the widget and all of its parents are active.*
- `FI_Align` `align` () const
- Gets the label alignment.*
- void `align` (`FI_Align` alignment)
- Sets the label alignment.*
- long `argument` () const
- Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
- Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
- Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- void `bind_deimage` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
- Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
- Bind the image to the widget, so the widget will delete the image when it is no longer needed.*

- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) ([uchar](#) c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.
- void [clear_visible](#) ()
Hides the widget.
- void [clear_visible_focus](#) ()
Disables keyboard focus navigation with this widget.
- [FI_Color color](#) () const
Gets the background color of the widget.
- void [color](#) ([FI_Color](#) bg)
Sets the background color of the widget.
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
Sets the background and selection color of the widget.
- [FI_Color color2](#) () const
For back compatibility only.
- void [color2](#) (unsigned a)
For back compatibility only.
- int [contains](#) (const [FI_Widget](#) *w) const
Checks if w is a child of this widget.
- void [copy_label](#) (const char *new_label)
Sets the current label.
- void [copy_tooltip](#) (const char *text)
Sets the current tooltip text.
- [uchar damage](#) () const
Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) ([uchar](#) c)
Sets the damage bits for the widget.
- void [damage](#) ([uchar](#) c, int x, int y, int w, int h)

- Sets the damage bits for an area inside the widget.*

 - int **damage_resize** (int, int, int, int)

Internal use only.
- void **deactivate** ()

Deactivates the widget.
- **FI_Image * deimage** ()

Gets the image that is used as part of the widget label when in the inactive state.
- const **FI_Image * deimage** () const

Gets the image that is used as part of the widget label when in the inactive state.
- void **deimage** (**FI_Image** &img)

Sets the image to use as part of the widget label when in the inactive state.
- void **deimage** (**FI_Image** *img)

Sets the image to use as part of the widget label when in the inactive state.
- int **deimage_bound** () const

Returns whether the inactive image is managed by the widget.
- void **do_callback** (**FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)

Calls the widget callback function with default arguments.
- void **do_callback** (**FI_Widget** *widget, long arg, **FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)

Calls the widget callback function with arbitrary arguments.
- void **do_callback** (**FI_Widget** *widget, void *arg=0, **FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)

Calls the widget callback function with arbitrary arguments.
- void **draw_label** (int, int, int, int, **FI_Align**) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int **h** () const

Gets the widget height.
- **FI_Image * image** ()

Gets the image that is used as part of the widget label when in the active state.
- const **FI_Image * image** () const

Gets the image that is used as part of the widget label when in the active state.
- void **image** (**FI_Image** &img)

Sets the image to use as part of the widget label when in the active state.
- void **image** (**FI_Image** *img)

Sets the image to use as part of the widget label when in the active state.
- int **image_bound** () const

Returns whether the image is managed by the widget.
- int **inside** (const **FI_Widget** *wgt) const

Checks if this widget is a child of wgt.
- int **is_label_copied** () const

Returns whether the current label was assigned with [copy_label\(\)](#).
- const char * **label** () const

Gets the current label text.
- void **label** (const char *text)

Sets the current label pointer.
- void **label** (**FI_Labeltype** a, const char *b)

Shortcut to set the label text and type in one call.
- **FI_Color labelcolor** () const

Gets the label color.
- void **labelcolor** (**FI_Color** c)

Sets the label color.
- **FI_Font labelfont** () const

Gets the font to use.

- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

- Returns if the widget is able to take events.*

 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `Fl_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.
- `Fl_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- uchar `type` () const

Gets the widget type.
- void `type` (uchar t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (`Fl_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `Fl_When` `when` () const

Returns the conditions under which the callback is called.
- void `when` (uchar i)

Sets the flags used to decide when a callback is called.
- `Fl_Window` * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.
- int `y` () const

Gets the widget position in its window.
- virtual `~Fl_Widget` ()

Destroys the widget.

Protected Member Functions

- `Fl_Overlay_Window` (int W, int H, const char *l=0)

*See `Fl_Overlay_Window::Fl_Overlay_Window(int X, int Y, int W, int H, const char *l=0)`*
- `Fl_Overlay_Window` (int X, int Y, int W, int H, const char *l=0)

Creates a new `Fl_Overlay_Window` widget using the given position, size, and label (title) string.

Protected Member Functions inherited from FI_Window

- void `default_size_range` ()
Protected method to calculate the default size range of a window.
- void `draw` () `FL_OVERRIDE`
Draws the widget.
- int `force_position` () const
Returns the internal state of the window's FORCE_POSITION flag.
- void `force_position` (int force)
Sets an internal flag that tells FLTK and the window manager to honor position requests.
- void `free_icons` ()
Deletes all icons previously attached to the window.
- int `is_resizable` ()
Protected method to determine whether a window is resizable.

Protected Member Functions inherited from FI_Group

- `FI_Rect` * `bounds` ()
Returns the internal array of widget sizes and positions.
- void `draw_child` (`FI_Widget` &widget) const
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (const `FI_Widget` &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int `on_insert` (`FI_Widget` *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int `on_move` (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void `on_remove` (int)
Allow derived groups to act when a child widget is removed from the group.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`FI_Widget` &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.

- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Public Types inherited from `FI_Window`

- typedef struct HICON__ * `HICON`

Static Public Member Functions inherited from `FI_Window`

- static `FI_Window` * `current` ()
Returns the last window that was made current.
- static void `default_callback` (`FI_Window` *, void *v)
Back compatibility: Sets the default callback v for win to call on close event.
- static void `default_icon` (const `FI_RGB_Image` *)
Sets a single default window icon.
- static void `default_icons` (const `FI_RGB_Image` *[], int)
Sets the default window icons.
- static void `default_icons` (HICON big_icon, HICON small_icon)
Sets the default window icons (Windows platform only).
- static const char * `default_xclass` ()
Returns the default xclass.
- static void `default_xclass` (const char *)
Sets the default window xclass.
- static bool `is_a_rescale` ()
Returns true when a window is being rescaled.
- static char `show_next_window_iconic` ()
Returns the static flag whether the next window should be opened iconified.
- static void `show_next_window_iconic` (char stat)
Sets a static flag whether the next window should be opened iconified.

Static Public Member Functions inherited from Fl_Group

- static [Fl_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([Fl_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from Fl_Widget

- static void [default_callback](#) ([Fl_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from Fl_Widget

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Static Protected Attributes inherited from Fl_Window

- static [Fl_Window](#) * [current_](#)
Stores the last window that was made current.

12.95.1 Detailed Description

This window provides double buffering and also the ability to draw the "overlay" which is another picture placed on top of the main image.

The overlay is designed to be a rapidly-changing but simple graphic such as a mouse selection box. [Fl_Overlay_Window](#) uses the overlay planes provided by your graphics hardware if they are available.

If no hardware support is found the overlay is simulated by drawing directly into the on-screen copy of the double-buffered window, and "erased" by copying the backbuffer over it again. This means the overlay will blink if you change the image in the window.

12.95.2 Constructor & Destructor Documentation

12.95.2.1 Fl_Overlay_Window()

```
Fl_Overlay_Window::Fl_Overlay_Window (
    int X,
    int Y,
    int W,
```

```

    int H,
    const char * l = 0 ) [protected]

```

Creates a new [Fl_Overlay_Window](#) widget using the given position, size, and label (title) string. If the positions (x,y) are not given, then the window manager will choose them.

12.95.3 Member Function Documentation

12.95.3.1 as_overlay_window()

```
Fl_Overlay_Window * Fl_Overlay_Window::as_overlay_window ( ) [inline], [virtual]
```

Return non-null if this is an [Fl_Overlay_Window](#) object.

Reimplemented from [Fl_Window](#).

12.95.3.2 draw_overlay()

```
virtual void Fl_Overlay_Window::draw_overlay ( ) [pure virtual]
```

You must subclass [Fl_Overlay_Window](#) and provide this method.

It is just like a [draw\(\)](#) method, except it draws the overlay. The overlay will have already been "cleared" when this is called. You can use any of the routines described in [<FL/fl_draw.H>](#).

12.95.3.3 flush()

```
void Fl_Overlay_Window::flush ( ) [virtual]
```

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

Reimplemented from [Fl_Double_Window](#).

12.95.3.4 hide()

```
void Fl_Overlay_Window::hide ( ) [virtual]
```

Makes a widget invisible.

See also

[show\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented from [Fl_Double_Window](#).

12.95.3.5 redraw_overlay()

```
void Fl_Overlay_Window::redraw_overlay ( )
```

Call this to indicate that the overlay data has changed and needs to be redrawn.

The overlay will be clear until the first time this is called, so if you want an initial display you must call this after calling [show\(\)](#).

12.95.3.6 resize()

```

void Fl_Overlay_Window::resize (
    int x,
    int y,
    int w,
    int h ) [virtual]

```

Changes the size or position of the widget.

This is a virtual function so that the widget may implement its own handling of resizing. The default version does *not* call the [redraw\(\)](#) method, but instead relies on the parent widget to do so because the parent may know a faster way to update the display, such as scrolling from the old position.

Some window managers under X11 call [resize\(\)](#) a lot more often than needed. Please verify that the position or size of a widget did actually change before doing any extensive calculations.

[position\(X, Y\)](#) is a shortcut for [resize\(X, Y, w\(\), h\(\)\)](#), and [size\(W, H\)](#) is a shortcut for [resize\(x\(\), y\(\), W, H\)](#).

Parameters

in	<i>x,y</i>	new position relative to the parent window
in	<i>w,h</i>	new size

See also

[position\(int,int\)](#), [size\(int,int\)](#)

Reimplemented from [Fl_Double_Window](#).

12.95.3.7 show()

```
void Fl_Overlay_Window::show ( ) [virtual]
```

Makes a widget visible.

An invisible widget never gets redrawn and does not get keyboard or mouse events, but can receive a few other events like FL_SHOW.

The [visible\(\)](#) method returns true if the widget is set to be visible. The [visible_r\(\)](#) method returns true if the widget and all of its parents are visible. A widget is only visible if [visible\(\)](#) is true on it *and all of its parents*.

Changing it will send FL_SHOW or FL_HIDE events to the widget. *Do not change it if the parent is not visible, as this will send false FL_SHOW or FL_HIDE events to the widget.* [redraw\(\)](#) is called if necessary on this or the parent.

See also

[hide\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented from [Fl_Double_Window](#).

The documentation for this class was generated from the following files:

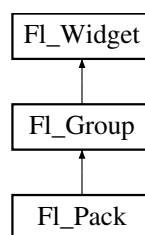
- Fl_Overlay_Window.H
- Fl_Overlay_Window.cxx

12.96 Fl_Pack Class Reference

This widget was designed to add the functionality of compressing and aligning widgets.

```
#include <Fl_Pack.H>
```

Inheritance diagram for Fl_Pack:

**Public Types**

- enum { **VERTICAL** = 0 , **HORIZONTAL** = 1 }

Public Member Functions

- [Fl_Pack](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Pack](#) widget using the given position, size, and label string.
- [uchar horizontal](#) () const
Returns non-zero if [Fl_Pack](#) alignment is horizontal.
- void [resize](#) (int X, int Y, int W, int H) [FL_OVERRIDE](#)

- *Override `FL_Group` resize behavior.*
- int **spacing** () const
Gets the number of extra pixels of blank space that are added between the children.
- void **spacing** (int i)
Sets the number of extra pixels of blank space that are added between the children.

Public Member Functions inherited from `FL_Group`

- `FL_Widget * &_ddfdesign_kludge` ()
This is for forms compatibility only.
- void **add** (`FL_Widget &`)
The widget is removed from its current group (if any) and then added to the end of this group.
- void **add** (`FL_Widget *o`)
See void `FL_Group::add(FL_Widget &w)`
- void **add_resizable** (`FL_Widget &o`)
Adds a widget to the group and makes it the resizable widget.
- `FL_Widget *const * array` () const
Returns a pointer to the array of children.
- `FL_Group const * as_group` () const `FL_OVERRIDE`
- `FL_Group * as_group` () `FL_OVERRIDE`
Returns an `FL_Group` pointer if this widget is an `FL_Group`.
- void **begin** ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- `FL_Widget * child` (int n) const
Returns `array()[n]`.
- int **children** () const
Returns how many child widgets the group has.
- void **clear** ()
Deletes all child widgets from memory recursively.
- unsigned int **clip_children** ()
Returns the current clipping mode.
- void **clip_children** (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int **delete_child** (int n)
Removes the widget at `index` from the group and deletes it.
- void **end** ()
Exactly the same as `current(this->parent())`.
- int **find** (const `FL_Widget &o`) const
*See int `FL_Group::find(const FL_Widget *w) const`.*
- int **find** (const `FL_Widget *`) const
Searches the child array for the widget and returns the index.
- `FL_Group` (int, int, int, int, const char * = 0)
Creates a new `FL_Group` widget using the given position, size, and label string.
- void **focus** (`FL_Widget *W`)
- void **forms_end** ()
This is for forms compatibility only.
- int **handle** (int) `FL_OVERRIDE`
Handles the specified event.
- void **init_sizes** ()
Resets the internal array of widget sizes and positions.
- void **insert** (`FL_Widget &`, int i)

- The widget is removed from its current group (if any) and then inserted into this group.*

 - void **insert** (FI_Widget &o, FI_Widget *before)
 - This does insert(w, find(before)).*
 - void **remove** (FI_Widget &)
 - Removes a widget from the group but does not delete it.*
 - void **remove** (FI_Widget *o)
 - Removes the widget o from the group.*
 - void **remove** (int index)
 - Removes the widget at index from the group but does not delete it.*
 - FI_Widget * **resizable** () const
 - Returns the group's resizable widget.*
 - void **resizable** (FI_Widget &o)
 - Sets the group's resizable widget.*
 - void **resizable** (FI_Widget *o)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
 - virtual **~FI_Group** ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
- Activates the widget.*
- unsigned int **active** () const
- Returns whether the widget is active.*
- int **active_r** () const
- Returns whether the widget and all of its parents are active.*
- FI_Align **align** () const
- Gets the label alignment.*
- void **align** (FI_Align alignment)
- Sets the label alignment.*
- long **argument** () const
- Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
- Sets the current user data (long) argument that is passed to the callback function.*
- virtual class FI_Gl_Window * **as_gl_window** ()
- Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.*
- virtual class FI_Gl_Window const * **as_gl_window** () const
- virtual FI_Window * **as_window** ()
- Returns an FI_Window pointer if this widget is an FI_Window.*
- virtual FI_Window const * **as_window** () const
- void **bind_deimage** (FI_Image *img)
- Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
- Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** (FI_Image *img)
- Sets the image to use as part of the widget label when in the active state.*
- void **bind_image** (int f)
- Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- FI_Boxtype **box** () const

- Gets the box type of the widget.*

 - void `box` (`FI_Boxtype` new_box)
- Sets the box type for the widget.*

 - `FI_Callback_p` `callback` () const
- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback` *cb, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1` *cb, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar` c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if draw() needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

- int **damage_resize** (int, int, int, int)
Internal use only.
- void **deactivate** ()
Deactivates the widget.
- **FI_Image * deimage** ()
Gets the image that is used as part of the widget label when in the inactive state.
- const **FI_Image * deimage** () const
Gets the image that is used as part of the widget label when in the inactive state.
- void **deimage** (**FI_Image** &img)
Sets the image to use as part of the widget label when in the inactive state.
- void **deimage** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the inactive state.
- int **deimage_bound** () const
Returns whether the inactive image is managed by the widget.
- void **do_callback** (**FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)
Calls the widget callback function with default arguments.
- void **do_callback** (**FI_Widget** *widget, long arg, **FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)
Calls the widget callback function with arbitrary arguments.
- void **do_callback** (**FI_Widget** *widget, void *arg=0, **FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)
Calls the widget callback function with arbitrary arguments.
- void **draw_label** (int, int, int, int, **FI_Align**) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int **h** () const
Gets the widget height.
- virtual void **hide** ()
Makes a widget invisible.
- **FI_Image * image** ()
Gets the image that is used as part of the widget label when in the active state.
- const **FI_Image * image** () const
Gets the image that is used as part of the widget label when in the active state.
- void **image** (**FI_Image** &img)
Sets the image to use as part of the widget label when in the active state.
- void **image** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the active state.
- int **image_bound** () const
Returns whether the image is managed by the widget.
- int **inside** (const **FI_Widget** *wgt) const
Checks if this widget is a child of wgt.
- int **is_label_copied** () const
Returns whether the current label was assigned with [copy_label\(\)](#).
- const char * **label** () const
Gets the current label text.
- void **label** (const char *text)
Sets the current label pointer.
- void **label** (**FI_Labeltype** a, const char *b)
Shortcut to set the label text and type in one call.
- **FI_Color labelcolor** () const
Gets the label color.
- void **labelcolor** (**FI_Color** c)
Sets the label color.
- **FI_Font labelfont** () const

- Gets the font to use.*
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.

- `int take_focus ()`
Gives the widget the keyboard focus.
- `unsigned int takeevents () const`
Returns if the widget is able to take events.
- `int test_shortcut ()`
Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip () const`
Gets the current tooltip text.
- `void tooltip (const char *text)`
Sets the current tooltip text.
- `Fl_Window * top_window () const`
Returns a pointer to the top-level window for the widget.
- `Fl_Window * top_window_offset (int &xoff, int &yoff) const`
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.
- `int use_accents_menu ()`
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- `void * user_data () const`
Gets the user data for this widget.
- `void user_data (Fl_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- `void user_data (void *v)`
Sets the user data for this widget.
- `unsigned int visible () const`
Returns whether a widget is visible.
- `unsigned int visible_focus () const`
Checks whether this widget has a visible focus.
- `void visible_focus (int v)`
Modifies keyboard focus navigation.
- `int visible_r () const`
Returns whether a widget and all its parents are visible.
- `int w () const`
Gets the widget width.
- `Fl_When when () const`
Returns the conditions under which the callback is called.
- `void when (uchar i)`
Sets the flags used to decide when a callback is called.
- `Fl_Window * window () const`
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~Fl_Widget ()`
Destroys the widget.

Protected Member Functions

- void `draw ()` `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from `FI_Group`

- `FI_Rect * bounds ()`
Returns the internal array of widget sizes and positions.
- void `draw_child (FI_Widget &widget) const`
Forces a child to redraw.
- void `draw_children ()`
Draws all children of the group.
- void `draw_outside_label (const FI_Widget &widget) const`
Parents normally call this to draw outside labels of child widgets.
- virtual int `on_insert (FI_Widget *, int)`
Allow derived groups to act when a widget is added as a child.
- virtual int `on_move (int, int)`
Allow derived groups to act when a widget is moved within the group.
- virtual void `on_remove (int)`
Allow derived groups to act when a child widget is removed from the group.
- int * `sizes ()`
Returns the internal array of widget sizes and positions.
- void `update_child (FI_Widget &widget) const`
Draws a child only if it needs it.

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag (unsigned int c)`
Clears a flag in the flags mask.
- void `draw_backdrop () const`
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box () const`
Draws the widget box according its box style.
- void `draw_box (FI_Boxtype t, FI_Color c) const`
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const`
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus () const`
Draws a focus rectangle around the widget.
- void `draw_focus (FI_Boxtype t, int X, int Y, int W, int H) const`
Draws a focus rectangle around the widget.
- void `draw_focus (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const`
Draws a focus box for the widget at the given position and size.
- void `draw_label () const`
Draws the widget's label at the defined label position.
- void `draw_label (int, int, int, int) const`
Draws the label in an arbitrary bounding box.
- `FI_Widget (int x, int y, int w, int h, const char *label=0L)`
Creates a widget at the given position and size.
- unsigned int `flags () const`
Gets the widget flags mask.

- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Group

- static FI_Group * **current** ()
Returns the currently active group.
- static void **current** (FI_Group *g)
Sets the current group.

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
,
OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
,
MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
,
GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

12.96.1 Detailed Description

This widget was designed to add the functionality of compressing and aligning widgets.

If `type()` is `FI_Pack::HORIZONTAL` all the children are resized to the height of the `FI_Pack`, and are moved next to each other horizontally. If `type()` is not `FI_Pack::HORIZONTAL` then the children are resized to the width and are stacked below each other. Then the `FI_Pack` resizes itself to surround the child widgets.

You may want to put the `FI_Pack` inside an `FI_Scroll`.

The '`resizable()`' for `FI_Pack` is set to `NULL` by default. Its behavior is slightly different than in a normal `FI_Group` widget: only if the `resizable()` widget is the last widget in the group it is extended to take the full available width or height, respectively, of the `FI_Pack` group.

Note

You can nest [Fl_Pack](#) widgets or put them inside [Fl_Scroll](#) widgets or inside other group widgets but their behavior can sometimes be *"surprising"*. This is partly due to the fact that [Fl_Pack](#) widgets resize themselves during their [draw\(\)](#) operation, trying to react on their child widgets resizing themselves during **their** [draw\(\)](#) operations which can be confusing. If you want to achieve special resize behavior of nested group widgets it can sometimes be easier to derive your own specialized group widget than to try to make nested [Fl_Pack](#) widgets behave as expected.

See also

[Fl_Group::resizable\(\)](#)

12.96.2 Constructor & Destructor Documentation**12.96.2.1 Fl_Pack()**

```
Fl_Pack::Fl_Pack (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Pack](#) widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

The default [type\(\)](#) is `Fl_Pack::VERTICAL`.

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [Fl_Pack](#) and all of its children can be automatic (local) variables, but you must declare the [Fl_Pack](#) *first*, so that it is destroyed last.

Parameters

in	<i>X,Y</i>	X and Y coordinates (position)
in	<i>W,H</i>	width and height, respectively
in	<i>L</i>	label (optional)

12.96.3 Member Function Documentation**12.96.3.1 draw()**

```
void Fl_Pack::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Group](#).

12.96.3.2 horizontal()

```
uchar Fl_Pack::horizontal ( ) const [inline]
```

Returns non-zero if [Fl_Pack](#) alignment is horizontal.

Returns

non-zero if [Fl_Pack](#) alignment is horizontal (`Fl_Pack::HORIZONTAL`)

Note

Currently the return value is the same as `Fl_Group::type()`, but this may change in the future. Do not set any other values than the following with `Fl_Pack::type()`:

- `Fl_Pack::VERTICAL` (Default)
- `Fl_Pack::HORIZONTAL`

See class [Fl_Pack](#) documentation for details.

12.96.3.3 resize()

```
void Fl_Pack::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Override [Fl_Group](#) `resize` behavior.

Resizing an [Fl_Pack](#) will not resize any of its children, but trigger a redraw, which in turn recalculates the dimensions of all children.

Parameters

<code>in</code>	<code>X,Y,W,H</code>	new position and size of the Fl_Pack widget
-----------------	----------------------	---

Reimplemented from [Fl_Group](#).

The documentation for this class was generated from the following files:

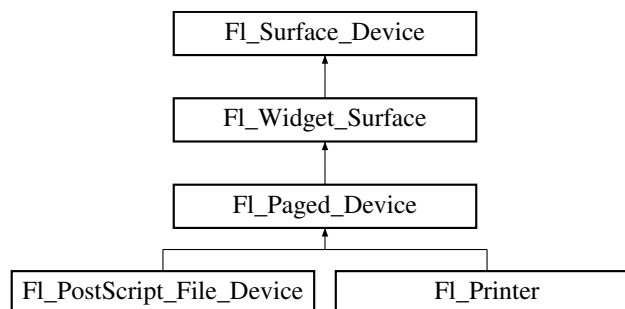
- `Fl_Pack.H`
- `Fl_Pack.cxx`

12.97 Fl_Paged_Device Class Reference

Represents page-structured drawing surfaces.

```
#include <Fl_Paged_Device.H>
```

Inheritance diagram for `Fl_Paged_Device`:

**Classes**

- struct [page_format](#)
width, height and name of a page format

Public Types

- enum [Page_Format](#) {
 A0 = 0, A1, A2, A3,
 A4, A5, A6, A7,

A8 , A9 , B0 , B1 ,
 B2 , B3 , B4 , B5 ,
 B6 , B7 , B8 , B9 ,
 B10 , C5E , DLE , EXECUTIVE ,
 FOLIO , LEDGER , LEGAL , LETTER ,
 TABLOID , ENVELOPE , MEDIA = 0x1000 }

Possible page formats.

- enum `Page_Layout` { `PORTRAIT` = 0 , `LANDSCAPE` = 0x100 , `REVERSED` = 0x200 , `ORIENTATION` = 0x300 }

Possible page layouts.

Public Member Functions

- virtual int `begin_job` (int pagecount=0, int *frompage=NULL, int *topage=NULL, char **perr_↵ message=NULL)
Begins a print job.
- virtual int `begin_page` (void)
Begins a new printed page.
- virtual void `end_job` (void)
To be called at the end of a print job.
- virtual int `end_page` (void)
To be called at the end of each page.
- virtual void `margins` (int *left, int *top, int *right, int *bottom)
Computes the dimensions of margins that lie between the printable page area and the full page.
- void `print_widget` (`FI_Widget` *widget, int delta_x=0, int delta_y=0)
Synonym of `draw(FI_Widget, int, int)`*
- void `print_window` (`FI_Window` *win, int x_offset=0, int y_offset=0)
Synonym of `draw_decorated_window(FI_Window, int, int)`*
- virtual void `rotate` (float angle)
Rotates the graphics operations relatively to paper.
- virtual void `scale` (float scale_x, float scale_y=0.)
Changes the scaling of page coordinates.
- int `start_job` (int pagecount=0, int *frompage=NULL, int *topage=NULL, char **perr_message=NULL)
*Synonym of `begin_job(int pagecount, int *frompage, int *topage, char **perr_message)`.*
- int `start_page` ()
Synonym of `begin_page()`.
- virtual ~`FI_Paged_Device` ()
The destructor.

Public Member Functions inherited from `FI_Widget_Surface`

- void `draw` (`FI_Widget` *widget, int delta_x=0, int delta_y=0)
Draws the widget on the drawing surface.
- void `draw_decorated_window` (`FI_Window` *win, int x_offset=0, int y_offset=0)
Draws a window with its title bar and frame if any.
- virtual void `origin` (int *x, int *y)
Computes the coordinates of the current origin of graphics functions.
- virtual void `origin` (int x, int y)
Sets the position of the origin of graphics in the drawable part of the drawing surface.
- void `print_window_part` (`FI_Window` *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Draws a rectangular part of an on-screen window.
- virtual int `printable_rect` (int *w, int *h)

- *Computes the width and height of the drawable area of the drawing surface.*
- virtual void [translate](#) (int x, int y)
 - *Translates the current graphics origin accounting for the current rotation.*
- virtual void [untranslate](#) ()
 - *Undoes the effect of a previous [translate\(\)](#) call.*

Public Member Functions inherited from [FI_Surface_Device](#)

- [FI_Graphics_Driver](#) * **driver** ()
 - *Returns the graphics driver of this drawing surface.*
- virtual bool [is_current](#) ()
 - *Is this surface the current drawing surface?*
- virtual void [set_current](#) (void)
 - *Make this surface the current drawing surface.*
- virtual [~FI_Surface_Device](#) ()
 - *The destructor.*

Static Public Attributes

- static const [page_format](#) **page_formats** [[NO_PAGE_FORMATS](#)]
 - *width, height and name of all elements of the enum [Page_Format](#).*

Protected Member Functions

- [FI_Paged_Device](#) ()
 - *The constructor.*

Protected Member Functions inherited from [FI_Widget_Surface](#)

- [FI_Widget_Surface](#) ([FI_Graphics_Driver](#) *d)
 - *The constructor.*

Protected Member Functions inherited from [FI_Surface_Device](#)

- void **driver** ([FI_Graphics_Driver](#) *graphics_driver)
 - *Sets the graphics driver of this drawing surface.*
- virtual void [end_current](#) ()
 - *FLTK calls this each time a surface ceases to be the current drawing surface.*
- [FI_Surface_Device](#) ([FI_Graphics_Driver](#) *graphics_driver)
 - *Constructor that sets the graphics driver to use for the created surface.*

Additional Inherited Members

Static Public Member Functions inherited from [FI_Surface_Device](#)

- static [FI_Surface_Device](#) * [pop_current](#) ()
 - *Removes the top element from the current drawing surface stack, and makes the new top element current.*
- static void [push_current](#) ([FI_Surface_Device](#) *new_current)
 - *Pushes `new_current` on top of the stack of current drawing surfaces, and makes it current.*
- static [FI_Surface_Device](#) * [surface](#) ()
 - *The current drawing surface.*

Protected Attributes inherited from [Fl_Widget_Surface](#)

- `int x_offset`
horizontal offset to the origin of graphics coordinates
- `int y_offset`
vertical offset to the origin of graphics coordinates

12.97.1 Detailed Description

Represents page-structured drawing surfaces.

This class has no public constructor: don't instantiate it; use [Fl_Printer](#) or [Fl_PostScript_File_Device](#) instead.

12.97.2 Member Enumeration Documentation

12.97.2.1 Page_Format

enum [Fl_Paged_Device::Page_Format](#)

Possible page formats.

All paper formats with pre-defined width and height. The [Fl_Paged_Device::page_formats](#) array gives these widths and heights.

Enumerator

A0	A0 format.
A1	A1 format.
A2	A2 format.
A3	A3 format.
A4	A4 format.
A5	A5 format.
A6	A6 format.
A7	A7 format.
A8	A8 format.
A9	A9 format.
B0	B0 format.
B1	B1 format.
B2	B2 format.
B3	B3 format.
B4	B4 format.
B5	B5 format.
B6	B6 format.
B7	B7 format.
B8	B8 format.
B9	B9 format.
B10	B10 format.
EXECUTIVE	Executive format.
FOLIO	Folio format.
LEDGER	Ledger format.
LEGAL	Legal format.
LETTER	Letter format.
TABLOID	Tabloid format.

12.97.2.2 Page_Layout

enum [Fl_Paged_Device::Page_Layout](#)

Possible page layouts.

Enumerator

PORTRAIT	Portrait orientation.
LANDSCAPE	Landscape orientation.
REVERSED	Reversed orientation.
ORIENTATION	orientation

12.97.3 Member Function Documentation

12.97.3.1 begin_job()

```
int Fl_Paged_Device::begin_job (
    int pagecount = 0,
    int * frompage = NULL,
    int * topage = NULL,
    char ** perr_message = NULL ) [virtual]
```

Begins a print job.

Parameters

in	<i>pagecount</i>	the total number of pages of the job (or 0 if you don't know the number of pages)
out	<i>frompage</i>	if non-null, *frompage is set to the first page the user wants printed
out	<i>topage</i>	if non-null, *topage is set to the last page the user wants printed
out	<i>perr_message</i>	if non-null and if the returned value is 2, *perr_message is set to a string describing the error. That string can be delete[]'d after use.

Returns

0 if OK, 1 if user cancelled the job, 2 if any error.

Reimplemented in [FI_PostScript_File_Device](#), and [FI_Printer](#).

12.97.3.2 begin_page()

```
int Fl_Paged_Device::begin_page (
    void ) [virtual]
```

Begins a new printed page.

The page coordinates are initially in points, i.e., 1/72 inch, and with origin at the top left of the printable page area. This function also makes this surface the current drawing surface with [FI_Surface_Device::push_current\(\)](#).

Note

[begin_page\(\)](#) calls [FI_Surface_Device::push_current\(\)](#) and leaves this device as the active surface. If any calls between [begin_page\(\)](#) and [end_page\(\)](#) open dialog boxes or will otherwise draw into FLTK windows, those calls must be put between a call to [FI_Surface_Device::pop_current\(\)](#) and a call to [FI_Surface_Device::push_current\(\)](#), or the content of the dialog box will be rendered to the printer instead of the screen.

Returns

0 if OK, non-zero if any error

Reimplemented in [FI_PostScript_File_Device](#), and [FI_Printer](#).

12.97.3.3 end_job()

```
void Fl_Paged_Device::end_job (
    void ) [virtual]
```

To be called at the end of a print job.

Reimplemented in [Fl_PostScript_File_Device](#), and [Fl_Printer](#).

12.97.3.4 end_page()

```
int Fl_Paged_Device::end_page (
    void ) [virtual]
```

To be called at the end of each page.

This function also stops this surface from being the current drawing surface with [Fl_Surface_Device::pop_current\(\)](#).

Note

[end_page\(\)](#) calls [Fl_Surface_Device::pop_current\(\)](#). If any calls between [begin_page\(\)](#) and [end_page\(\)](#) open dialog boxes or will otherwise draw into FLTK windows, those calls must be put between a call to [Fl_Surface_Device::pop_current\(\)](#) and a call to [Fl_Surface_Device::push_current\(\)](#).

Returns

0 if OK, non-zero if any error.

Reimplemented in [Fl_PostScript_File_Device](#), and [Fl_Printer](#).

12.97.3.5 margins()

```
void Fl_Paged_Device::margins (
    int * left,
    int * top,
    int * right,
    int * bottom ) [virtual]
```

Computes the dimensions of margins that lie between the printable page area and the full page.

Values are in the same unit as that used by FLTK drawing functions. They are changed by [scale\(\)](#) calls.

Parameters

out	<i>left</i>	If non-null, *left is set to the left margin size.
out	<i>top</i>	If non-null, *top is set to the top margin size.
out	<i>right</i>	If non-null, *right is set to the right margin size.
out	<i>bottom</i>	If non-null, *bottom is set to the bottom margin size.

Reimplemented in [Fl_PostScript_File_Device](#), and [Fl_Printer](#).

12.97.3.6 rotate()

```
void Fl_Paged_Device::rotate (
    float angle ) [virtual]
```

Rotates the graphics operations relatively to paper.

The rotation is centered on the current graphics origin. Successive [rotate\(\)](#) calls don't combine their effects.

Parameters

<i>angle</i>	Rotation angle in counter-clockwise degrees.
--------------	--

Reimplemented in [Fl_PostScript_File_Device](#), and [Fl_Printer](#).

12.97.3.7 scale()

```
void Fl_Paged_Device::scale (
    float scale_x,
    float scale_y = 0. ) [virtual]
```

Changes the scaling of page coordinates.

This function also resets the origin of graphics functions at top left of printable page area. After a [scale\(\)](#) call, do a [printable_rect\(\)](#) call to get the new dimensions of the printable page area. Successive [scale\(\)](#) calls don't combine their effects.

Parameters

<code>scale_x</code>	Horizontal dimensions of plot are multiplied by this quantity.
<code>scale_y</code>	Same as above, vertically. The value 0. is equivalent to setting <code>scale_y = scale_x</code> . Thus, <code>scale(factor)</code> ; is equivalent to <code>scale(factor, factor)</code> ;

Reimplemented in [Fl_PostScript_File_Device](#), and [Fl_Printer](#).

12.97.3.8 start_job()

```
int Fl_Paged_Device::start_job (
    int pagecount = 0,
    int * frompage = NULL,
    int * topage = NULL,
    char ** perr_message = NULL ) [inline]
```

Synonym of [begin_job\(int pagecount, int *frompage, int *topage, char **perr_message\)](#).

For API compatibility with FLTK 1.3.x

12.97.3.9 start_page()

```
int Fl_Paged_Device::start_page ( ) [inline]
```

Synonym of [begin_page\(\)](#).

For API compatibility with FLTK 1.3.x

The documentation for this class was generated from the following files:

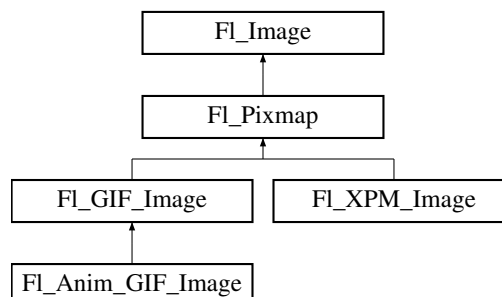
- [Fl_Paged_Device.H](#)
- [Fl_Paged_Device.cxx](#)

12.98 Fl_Pixmap Class Reference

The [Fl_Pixmap](#) class supports caching and drawing of colormap (pixmap) images, including transparency.

```
#include <Fl_Pixmap.H>
```

Inheritance diagram for [Fl_Pixmap](#):



Public Member Functions

- int **cache_h** ()
- int **cache_w** ()
- void **color_average** (FI_Color c, float i) **FL_OVERRIDE**
The `color_average()` method averages the colors in the image with the provided FLTK color value.
- **FI_Image** * **copy** () const
- **FI_Image** * **copy** (int W, int H) const **FL_OVERRIDE**
Creates a resized copy of the image.
- void **desaturate** () **FL_OVERRIDE**
The `desaturate()` method converts an image to grayscale.
- void **draw** (int X, int Y)
- void **draw** (int X, int Y, int W, int H, int cx=0, int cy=0) **FL_OVERRIDE**
Draws the image to the current drawing surface with a bounding box.
- **FI_Pixmap** (char *const *D)
The constructors create a new pixmap from the specified XPM data.
- **FI_Pixmap** (const char *const *D)
The constructors create a new pixmap from the specified XPM data.
- **FI_Pixmap** (const uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- **FI_Pixmap** (uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- void **label** (FI_Menu_Item *m) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a menu item.
- void **label** (FI_Widget *w) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a widget or menu item.
- void **uncache** () **FL_OVERRIDE**
If the image has been cached for display, delete the cache data.
- virtual ~**FI_Pixmap** ()
The destructor frees all memory and server resources that are used by the pixmap.

Public Member Functions inherited from **FI_Image**

- virtual class **FI_Shared_Image** * **as_shared_image** ()
Returns whether an image is an `FI_Shared_Image` or not.
- **FI_Image** * **copy** () const
Creates a copy of the image in the same size.
- int **count** () const
Returns the number of data values associated with the image.
- int **d** () const
Returns the image depth.
- const char *const * **data** () const
Returns a pointer to the current image data array.
- int **data_h** () const
Returns the height of the image data.
- int **data_w** () const
Returns the width of the image data.
- void **draw** (int X, int Y)
Draws the image to the current drawing surface.
- int **fail** () const
Returns a value that is not 0 if there is currently no image available.
- **FI_Image** (int W, int H, int D)

- The constructor creates an empty image with the specified width, height, and depth.*

 - int **h** () const

Returns the current image drawing height in FLTK units.
 - void **inactive** ()

The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
 - int **ld** () const

Returns the current line data size in bytes.
 - virtual void **release** ()

Releases an `FI_Image` - the same as `'delete this'`.
 - virtual void **scale** (int width, int height, int proportional=1, int can_expand=0)

Sets the drawing size of the image.
 - int **w** () const

Returns the current image drawing width in FLTK units.
 - virtual ~**FI_Image** ()

The destructor is a virtual method that frees all memory used by the image.

Public Attributes

- int **alloc_data**

Protected Member Functions

- void **measure** ()

Protected Member Functions inherited from [FI_Image](#)

- void **d** (int D)

Sets the current image depth.
- void **data** (const char *const *p, int c)

Sets the current data pointer and count of pointers in the array.
- void **draw_empty** (int X, int Y)

The protected method `draw_empty()` draws a box with an X in it.
- int **draw_scaled** (int X, int Y, int W, int H)

Draw the image to the current drawing surface rescaled to a given width and height.
- void **h** (int H)

Sets the height of the image data.
- void **ld** (int LD)

Sets the current line data size in bytes.
- void **w** (int W)

Sets the width of the image data.

Friends

- class **FI_Graphics_Driver**

Additional Inherited Members

Static Public Member Functions inherited from [FI_Image](#)

- static [FI_Labeltype](#) **define_FL_IMAGE_LABEL** ()
- static [FI_RGB_Scaling](#) **RGB_scaling** ()

Returns the currently used RGB image scaling method.
- static void **RGB_scaling** ([FI_RGB_Scaling](#))

Sets the RGB image scaling method used for copy(int, int).

- static `FI_RGB_Scaling` `scaling_algorithm` ()

Gets what algorithm is used when resizing a source image to draw it.

- static void `scaling_algorithm` (`FI_RGB_Scaling` algorithm)

Sets what algorithm is used when resizing a source image to draw it.

Static Public Attributes inherited from `FI_Image`

- static const int `ERR_FILE_ACCESS` = -2
- static const int `ERR_FORMAT` = -3
- static const int `ERR_MEMORY_ACCESS` = -4
- static const int `ERR_NO_IMAGE` = -1
- static bool `register_images_done` = false

True after `fl_register_images()` was called, false before.

Static Protected Member Functions inherited from `FI_Image`

- static void `labeltype` (const `FI_Label` *lo, int lx, int ly, int lw, int lh, `FI_Align` la)
- static void `measure` (const `FI_Label` *lo, int &lw, int &lh)

12.98.1 Detailed Description

The `FI_Pixmap` class supports caching and drawing of colormap (pixmap) images, including transparency.

12.98.2 Constructor & Destructor Documentation

12.98.2.1 `FI_Pixmap()` [1/4]

```
FI_Pixmap::FI_Pixmap (
    char *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

12.98.2.2 `FI_Pixmap()` [2/4]

```
FI_Pixmap::FI_Pixmap (
    uchar *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

12.98.2.3 `FI_Pixmap()` [3/4]

```
FI_Pixmap::FI_Pixmap (
    const char *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

12.98.2.4 `FI_Pixmap()` [4/4]

```
FI_Pixmap::FI_Pixmap (
    const uchar *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

12.98.3 Member Function Documentation

12.98.3.1 color_average()

```
void Fl_Pixmap::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The `color_average()` method averages the colors in the image with the provided FLTK color value.

The first argument specifies the FLTK color to be used.

The second argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_Image](#).

12.98.3.2 copy()

```
Fl_Image * Fl_Pixmap::copy (
    int W,
    int H ) const [virtual]
```

Creates a resized copy of the image.

The new image should be released when you are done with it.

Note: since FLTK 1.4.0 you can use [Fl_Image::release\(\)](#) for all types of images (i.e. all subclasses of [Fl_Image](#)) instead of operator `delete` for [Fl_Image](#)'s and [Fl_Image::release\(\)](#) for [Fl_Shared_Image](#)'s.

The new image data will be converted to the requested size. RGB images are resized using the algorithm set by [Fl_Image::RGB_scaling\(\)](#).

For the new image the following equations are true:

- $w() == \text{data_}w() == \bar{W}$
- $h() == \text{data_}h() == H$

Parameters

in	<i>W,H</i>	Requested width and height of the new image
----	------------	---

Note

The returned image can be safely cast to the same image type as that of the source image provided this type is one of [Fl_RGB_Image](#), [Fl_SVG_Image](#), [Fl_Pixmap](#), [Fl_Bitmap](#), [Fl_Tiled_Image](#), [Fl_Anim_GIF_Image](#) and [Fl_Shared_Image](#). Returned objects copied from images of other, derived, image classes belong to the parent class appearing in this list. For example, the copy of an [Fl_GIF_Image](#) is an object of class [Fl_Pixmap](#).

Since FLTK 1.4.0 this method is 'const'. If you derive your own class from [Fl_Image](#) or any subclass your overridden methods of '[Fl_Image::copy\(\) const](#)' and '[Fl_Image::copy\(int, int\) const](#)' **must** also be 'const' for inheritance to work properly. This is different than in FLTK 1.3.x and earlier where these methods have not been 'const'.

Reimplemented from [Fl_Image](#).

12.98.3.3 desaturate()

```
void Fl_Pixmap::desaturate ( ) [virtual]
```

The `desaturate()` method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_Image](#).

12.98.3.4 draw()

```
void Fl_Pixmap::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image to the current drawing surface with a bounding box.

Arguments *X*, *Y*, *W*, *H* specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the *cx* and *cy* arguments.

In other words: `fl_push_clip(X,Y,W,H)` is applied, the image is drawn with its upper-left corner at *X-cx*, *Y-cy* and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from [Fl_Image](#).

12.98.3.5 label() [1/2]

```
void Fl_Pixmap::label (
    Fl_Menu_Item * m ) [virtual]
```

This method is an obsolete way to set the image attribute of a menu item.

Deprecated Please use [Fl_Menu_Item::image\(\)](#) instead.

Reimplemented from [Fl_Image](#).

12.98.3.6 label() [2/2]

```
void Fl_Pixmap::label (
    Fl_Widget * widget ) [virtual]
```

This method is an obsolete way to set the image attribute of a widget or menu item.

Deprecated Please use [Fl_Widget::image\(\)](#) or [Fl_Widget::deimage\(\)](#) instead.

Reimplemented from [Fl_Image](#).

12.98.3.7 uncache()

```
void Fl_Pixmap::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented from [Fl_Image](#).

The documentation for this class was generated from the following files:

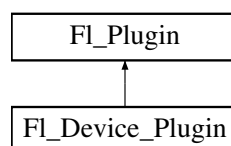
- [Fl_Pixmap.H](#)
- [Fl_Pixmap.cxx](#)

12.99 FI_Plugin Class Reference

[Fl_Plugin](#) allows link-time and run-time integration of binary modules.

```
#include <Fl_Plugin.H>
```

Inheritance diagram for [Fl_Plugin](#):



Public Member Functions

- [FI_Plugin](#) (const char *class, const char *name)
Create a plugin.
- virtual `~FI_Plugin ()`
Clear the plugin and remove it from the database.

12.99.1 Detailed Description

[FI_Plugin](#) allows link-time and run-time integration of binary modules.

[FI_Plugin](#) and [FI_Plugin_Manager](#) provide a small and simple solution for linking C++ classes at run-time, or optionally linking modules at compile time without the need to change the main application.

[FI_Plugin_Manager](#) uses static initialization to create the plugin interface early during startup. Plugins are stored in a temporary database, organized in classes.

Plugins should derive a new class from [FI_Plugin](#) as a base:

```
class My_Plugin : public FI_Plugin {
public:
    My_Plugin() : FI_Plugin("effects", "blur") { }
    void do_something(...);
};
My_Plugin blur_plugin();
```

Plugins can be put into modules and either linked before distribution, or loaded from dynamically linkable files. An

[FI_Plugin_Manager](#) is used to list and access all currently loaded plugins.

```
FI_Plugin_Manager mgr("effects");
int i, n = mgr.plugins();
for (i=0; i<n; i++) {
    My_Plugin *pin = (My_Plugin*)mgr.plugin(i);
    pin->do_something();
}
```

12.99.2 Constructor & Destructor Documentation

12.99.2.1 FI_Plugin()

```
FI_Plugin::FI_Plugin (
    const char * class,
    const char * name )
```

Create a plugin.

Parameters

in	<i>class</i>	plugins are grouped in classes
in	<i>name</i>	every plugin should have a unique name

The documentation for this class was generated from the following files:

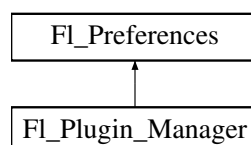
- FI_Plugin.H
- FI_Preferences.cxx

12.100 FI_Plugin_Manager Class Reference

[FI_Plugin_Manager](#) manages link-time and run-time plugin binaries.

```
#include <FI_Plugin.H>
```

Inheritance diagram for [FI_Plugin_Manager](#):



Public Member Functions

- [FI_Preferences::ID addPlugin](#) (const char *name, [FI_Plugin](#) *plugin)

This function adds a new plugin to the database.
- [FI_Plugin_Manager](#) (const char *klass)

Manage all plugins belonging to one class.
- [FI_Plugin](#) * **plugin** (const char *name)

Return the address of a plugin by name.
- [FI_Plugin](#) * **plugin** (int index)

Return the address of a plugin by index.
- int **plugins** ()

Return the number of plugins in the klass.
- [~FI_Plugin_Manager](#) ()

Remove the plugin manager.

Public Member Functions inherited from [FI_Preferences](#)

- char **clear** ()

Delete all groups and all entries.
- char **delete_all_entries** ()

Delete all entries.
- char **delete_all_groups** ()

Delete all groups.
- char [delete_entry](#) (const char *entry)

Deletes a single name/value pair.
- char [delete_group](#) (const char *group)

Deletes a group.
- int **dirty** ()

Check if there were changes to the database that need to be written to disk.
- int [entries](#) ()

Returns the number of entries (name/value pairs) in a group.
- const char * [entry](#) (int index)

Returns the name of an entry.
- char [entry_exists](#) (const char *key)

Returns non-zero if an entry with this name exists.
- [Root filename](#) (char *buffer, size_t buffer_size)

Return the file name and path to the preference file.
- [FI_Preferences](#) (const char *path, const char *vendor, const char *application)

Deprecated: Use this constructor to create or read a preference file at an arbitrary position in the file system.
- [FI_Preferences](#) (const char *path, const char *vendor, const char *application, [Root](#) flags)

Use this constructor to create or read a preference file at an arbitrary position in the file system.
- [FI_Preferences](#) (const [FI_Preferences](#) &)

Create another reference to a Preferences group.
- [FI_Preferences](#) ([FI_Preferences](#) &parent, const char *group)

Generate or read a new group of entries within another group.
- [FI_Preferences](#) ([FI_Preferences](#) &parent, int groupIndex)

Open a child group using a given index.
- [FI_Preferences](#) ([FI_Preferences](#) *parent, const char *group)

Create or access a group of preferences using a name.
- [FI_Preferences](#) ([FI_Preferences](#) *parent, int groupIndex)
- [FI_Preferences](#) (ID id)

Create a new dataset access point using a dataset ID.

- [FI_Preferences](#) ([Root](#) root, const char *vendor, const char *application)
The constructor creates a group that manages key/value pairs and child groups.
- int [flush](#) ()
Writes preferences to disk if they were modified.
- char [get](#) (const char *entry, char *&value, const char *defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, char *value, const char *defaultValue, int maxSize)
Reads an entry from the group.
- char [get](#) (const char *entry, double &value, double defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, float &value, float defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, int &value, int defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, void *&value, const void *defaultValue, int defaultSize)
Reads an entry from the group.
- char [get](#) (const char *entry, void *value, const void *defaultValue, int defaultSize, int *size)
Reads a binary entry from the group, encoded in hexadecimal blocks.
- char [get](#) (const char *entry, void *value, const void *defaultValue, int defaultSize, int maxSize)
Reads a binary entry from the group, encoded in hexadecimal blocks.
- char [get_userdata_path](#) (char *path, int pathlen)
Creates a path that is related to the preference file and that is usable for additional application data.
- const char * [group](#) (int num_group)
Returns the name of the Nth (num_group) group.
- char [group_exists](#) (const char *key)
Returns non-zero if a group with this name exists.
- int [groups](#) ()
Returns the number of groups that are contained within a group.
- ID [id](#) ()
Return an ID that can later be reused to open more references to this dataset.
- const char * [name](#) ()
Return the name of this entry.
- const char * [path](#) ()
Return the full path to this entry.
- char [set](#) (const char *entry, const char *value)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, const void *value, int size)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, double value)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, double value, int precision)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, float value)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, float value, int precision)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, int value)
Sets an entry (name/value pair).
- int [size](#) (const char *entry)
Returns the size of the value part of an entry.
- virtual [~FI_Preferences](#) ()
The destructor removes allocated resources.

Static Public Member Functions

- static int [load](#) (const char *filename)
Load a module from disk.
- static int [loadAll](#) (const char *dirpath, const char *pattern=0)
Use this function to load a whole directory full of modules.
- static void [removePlugin](#) ([FI_Preferences::ID](#) id)
Remove any plugin.

Static Public Member Functions inherited from [FI_Preferences](#)

- static unsigned int [file_access](#) ()
Return the current file access permissions for the FLTK preferences system.
- static void [file_access](#) (unsigned int flags)
Tell the FLTK preferences system which files in the file system it may read, create, or write.
- static [Root filename](#) (char *buffer, size_t buffer_size, [Root](#) root, const char *vendor, const char *application)
Determine the file name and path to preferences that would be opened with these parameters.
- static const char * [new_UUID](#) ()
Returns a UUID as generated by the system.
- static char [remove](#) ([ID](#) id_)
Remove the group with this ID from a database.

Additional Inherited Members

Public Types inherited from [FI_Preferences](#)

- typedef void * [ID](#)
Every [FI_Preferences-Group](#) has a unique ID.
- enum [Root](#) {
[UNKNOWN_ROOT_TYPE](#) = -1 , [SYSTEM](#) = 0 , [USER](#) , [MEMORY](#) ,
[ROOT_MASK](#) = 0x00FF , [CORE](#) = 0x0100 , [C_LOCALE](#) = 0x1000 , [CLEAR](#) = 0x2000 ,
[SYSTEM_L](#) = [SYSTEM](#) | [C_LOCALE](#) , [USER_L](#) = [USER](#) | [C_LOCALE](#) , [CORE_SYSTEM_L](#) = [CORE](#) |
[SYSTEM_L](#) , [CORE_USER_L](#) = [CORE](#) | [USER_L](#) ,
[CORE_SYSTEM](#) = [CORE](#) | [SYSTEM](#) , [CORE_USER](#) = [CORE](#) | [USER](#) }
Define the scope of the preferences.

Static Public Attributes inherited from [FI_Preferences](#)

- static const unsigned int [ALL](#) = [ALL_READ_OK](#) | [ALL_WRITE_OK](#)
Set this to give FLTK and applications permission to read, write, and create preference files.
- static const unsigned int [ALL_READ_OK](#) = [USER_READ_OK](#) | [SYSTEM_READ_OK](#) | [CORE_READ_OK](#)
Set this to allow FLTK and applications to read preference files.
- static const unsigned int [ALL_WRITE_OK](#) = [USER_WRITE_OK](#) | [SYSTEM_WRITE_OK](#) | [CORE_WRITE_OK](#)
Set this to allow FLTK and applications to create and write preference files.
- static const unsigned int [APP_OK](#) = [SYSTEM_OK](#) | [USER_OK](#)
Set this if it is OK for applications to read, create, and write any kind of preference files.
- static const unsigned int [CORE_OK](#) = [CORE_READ_OK](#) | [CORE_WRITE_OK](#)
Set this if it is OK for FLTK to read, create, or write preference files.
- static const unsigned int [CORE_READ_OK](#) = 0x0010
Set this if it is OK for FLTK to read preference files.
- static const unsigned int [CORE_WRITE_OK](#) = 0x0020
Set this if it is OK for FLTK to create or write preference files.
- static const unsigned int [NONE](#) = 0x0000
Set this if no call to [FI_Preferences](#) shall access the file system.

- static const unsigned int **SYSTEM_OK** = **SYSTEM_READ_OK** | **SYSTEM_WRITE_OK**
Set this if it is OK for applications to read, create, and write system wide preference files.
- static const unsigned int **SYSTEM_READ_OK** = 0x0004
Set this if it is OK for applications to read system wide preference files.
- static const unsigned int **SYSTEM_WRITE_OK** = 0x0008
Set this if it is OK for applications to create and write system wide preference files.
- static const unsigned int **USER_OK** = **USER_READ_OK** | **USER_WRITE_OK**
Set this if it is OK for applications to read, create, and write user preference files.
- static const unsigned int **USER_READ_OK** = 0x0001
Set this if it is OK for applications to read user preference files.
- static const unsigned int **USER_WRITE_OK** = 0x0002
Set this if it is OK for applications to create and write user preference files.

Protected Attributes inherited from [FI_Preferences](#)

- [Node](#) * node
- [RootNode](#) * rootNode

12.100.1 Detailed Description

[FI_Plugin_Manager](#) manages link-time and run-time plugin binaries.

See also

[FI_Plugin](#)

12.100.2 Constructor & Destructor Documentation

12.100.2.1 ~FI_Plugin_Manager()

```
FI_Plugin_Manager::~FI_Plugin_Manager ( )
```

Remove the plugin manager.

Calling this does not remove the database itself or any plugins. It just removes the reference to the database.

12.100.3 Member Function Documentation

12.100.3.1 addPlugin()

```
FI_Preferences::ID FI_Plugin_Manager::addPlugin (
    const char * name,
    FI_Plugin * plugin )
```

This function adds a new plugin to the database.

There is no need to call this function explicitly. Every [FI_Plugin](#) constructor will call this function at initialization time.

12.100.3.2 load()

```
int FI_Plugin_Manager::load (
    const char * filename ) [static]
```

Load a module from disk.

A module must be a dynamically linkable file for the given operating system. When loading a module, its +init function will be called which in turn calls the constructor of all statically initialized [FI_Plugin](#) classes and adds them to the database.

12.100.3.3 loadAll()

```
int Fl_Plugin_Manager::loadAll (
    const char * dirpath,
    const char * pattern = 0 ) [static]
```

Use this function to load a whole directory full of modules.

Parameters

<i>dirpath</i>	Pathname of a directory. It must end with the platform's directory separator character (i.e., '\' under Windows, '/' otherwise).
<i>pattern</i>	A filename pattern to catch all modules of interest in the targeted directory (e.g., "{*.so,*.dll,*.dylib}"), or NULL to catch all files in the directory.

12.100.3.4 removePlugin()

```
void Fl_Plugin_Manager::removePlugin (
    Fl_Preferences::ID id ) [static]
```

Remove any plugin.

There is no need to call this function explicitly. Every `Fl_Plugin` destructor will call this function at destruction time. The documentation for this class was generated from the following files:

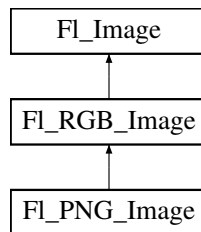
- `Fl_Plugin.H`
- `Fl_Preferences.cxx`

12.101 FI_PNG_Image Class Reference

The `FI_PNG_Image` class supports loading, caching, and drawing of Portable Network Graphics (PNG) image files.

```
#include <FI_PNG_Image.H>
```

Inheritance diagram for `FI_PNG_Image`:



Public Member Functions

- `FI_PNG_Image` (const char *filename)
The constructor loads the named PNG image from the given png filename.
- `FI_PNG_Image` (const char *name_png, const unsigned char *buffer, int datasize)
Constructor that reads a PNG image from memory.

Public Member Functions inherited from `FI_RGB_Image`

- virtual `FI_SVG_Image * as_svg_image ()`
Returns whether an image is an `FI_SVG_Image` or not.
- int `cache_h ()`
- int `cache_w ()`
- void `color_average` (`FI_Color` c, float i) `FL_OVERRIDE`
The `color_average()` method averages the colors in the image with the provided FLTK color value.
- `FI_Image * copy ()` const
- `FI_Image * copy` (int W, int H) const `FL_OVERRIDE`
Creates a resized copy of the image.
- void `desaturate ()` `FL_OVERRIDE`
The `desaturate()` method converts an image to grayscale.
- void `draw` (int X, int Y)

- void **draw** (int X, int Y, int W, int H, int cx=0, int cy=0) **FL_OVERRIDE**
Draws the image to the current drawing surface with a bounding box.
- **FI_RGB_Image** (const **FI_Pixmap** *pxm, **FI_Color** bg=FL_GRAY)
*The constructor creates a new RGBA image from the specified **FI_Pixmap**.*
- **FI_RGB_Image** (const **uchar** *bits, int bits_length, int W, int H, int D, int LD)
The constructor creates a new image from the specified data.
- **FI_RGB_Image** (const **uchar** *bits, int W, int H, int D=3, int LD=0)
The constructor creates a new image from the specified data.
- void **label** (**FI_Menu_Item** *m) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a menu item.
- void **label** (**FI_Widget** *w) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a widget or menu item.
- virtual void **normalize** ()
Makes sure the object is fully initialized.
- void **uncache** () **FL_OVERRIDE**
If the image has been cached for display, delete the cache data.
- **~FI_RGB_Image** () **FL_OVERRIDE**
The destructor frees all memory and server resources that are used by the image.

Public Member Functions inherited from **FI_Image**

- virtual class **FI_Shared_Image** * **as_shared_image** ()
*Returns whether an image is an **FI_Shared_Image** or not.*
- **FI_Image** * **copy** () const
Creates a copy of the image in the same size.
- int **count** () const
Returns the number of data values associated with the image.
- int **d** () const
Returns the image depth.
- const char *const * **data** () const
Returns a pointer to the current image data array.
- int **data_h** () const
Returns the height of the image data.
- int **data_w** () const
Returns the width of the image data.
- void **draw** (int X, int Y)
Draws the image to the current drawing surface.
- int **fail** () const
Returns a value that is not 0 if there is currently no image available.
- **FI_Image** (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int **h** () const
Returns the current image drawing height in FLTK units.
- void **inactive** ()
*The **inactive()** method calls **color_average(FL_BACKGROUND_COLOR, 0.33f)** to produce an image that appears grayed out.*
- int **ld** () const
Returns the current line data size in bytes.
- virtual void **release** ()
*Releases an **FI_Image** - the same as 'delete this'.*
- virtual void **scale** (int width, int height, int proportional=1, int can_expand=0)

- Sets the drawing size of the image.*
- int **w** () const
 - Returns the current image drawing width in FLTK units.*
- virtual ~**FI_Image** ()
 - The destructor is a virtual method that frees all memory used by the image.*

Friends

- class **FI_ICO_Image**

Additional Inherited Members

Static Public Member Functions inherited from **FI_RGB_Image**

- static size_t **max_size** ()
 - Returns the maximum allowed image size in bytes when creating an **FI_RGB_Image** object.*
- static void **max_size** (size_t size)
 - Sets the maximum allowed image size in bytes when creating an **FI_RGB_Image** object.*

Static Public Member Functions inherited from **FI_Image**

- static **FI_Labeltype** **define_FL_IMAGE_LABEL** ()
- static **FI_RGB_Scaling** **RGB_scaling** ()
 - Returns the currently used RGB image scaling method.*
- static void **RGB_scaling** (**FI_RGB_Scaling**)
 - Sets the RGB image scaling method used for copy(int, int).*
- static **FI_RGB_Scaling** **scaling_algorithm** ()
 - Gets what algorithm is used when resizing a source image to draw it.*
- static void **scaling_algorithm** (**FI_RGB_Scaling** algorithm)
 - Sets what algorithm is used when resizing a source image to draw it.*

Public Attributes inherited from **FI_RGB_Image**

- int **alloc_array**
 - If non-zero, the object's data array is delete[]'d when deleting the object.*
- const uchar * **array**
 - Points to the start of the object's data array.*

Static Public Attributes inherited from **FI_Image**

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
 - True after **fl_register_images()** was called, false before.*

Protected Member Functions inherited from **FI_Image**

- void **d** (int D)
 - Sets the current image depth.*
- void **data** (const char *const *p, int c)
 - Sets the current data pointer and count of pointers in the array.*
- void **draw_empty** (int X, int Y)

- The protected method `draw_empty()` draws a box with an X in it.
- int `draw_scaled` (int X, int Y, int W, int H)
 - Draw the image to the current drawing surface rescaled to a given width and height.
- void `h` (int H)
 - Sets the height of the image data.
- void `ld` (int LD)
 - Sets the current line data size in bytes.
- void `w` (int W)
 - Sets the width of the image data.

Static Protected Member Functions inherited from [FI_Image](#)

- static void `labeltype` (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void `measure` (const [FI_Label](#) *lo, int &lw, int &lh)

12.101.1 Detailed Description

The [FI_PNG_Image](#) class supports loading, caching, and drawing of Portable Network Graphics (PNG) image files. The class loads color-mapped and full-color images and handles color- and alpha-based transparency.

12.101.2 Constructor & Destructor Documentation

12.101.2.1 [FI_PNG_Image\(\)](#) [1/2]

```
FI_PNG_Image::FI_PNG_Image (
    const char * filename )
```

The constructor loads the named PNG image from the given png filename.

The destructor frees all memory and server resources that are used by the image.

Use [FI_Image::fail\(\)](#) to check if [FI_PNG_Image](#) failed to load. `fail()` returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the PNG format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

Parameters

in	<i>filename</i>	Name of PNG file to read
----	-----------------	--------------------------

12.101.2.2 [FI_PNG_Image\(\)](#) [2/2]

```
FI_PNG_Image::FI_PNG_Image (
    const char * name_png,
    const unsigned char * buffer,
    int maxsize )
```

Constructor that reads a PNG image from memory.

Construct an image from a block of memory inside the application. Fluid offers "binary Data" chunks as a great way to add image data into the C++ source code. `name_png` can be NULL. If a name is given, the image is added to the list of shared images (see: [FI_Shared_Image](#)) and will be available by that name.

Parameters

<i>name_png</i>	A name given to this image or NULL
<i>buffer</i>	Pointer to the start of the PNG image in memory
<i>maxsize</i>	Size in bytes of the memory buffer containing the PNG image

The documentation for this class was generated from the following files:

- [FI_PNG_Image.H](#)

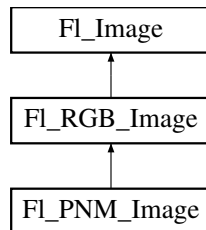
- FI_PNG_Image.cxx

12.102 FI_PNM_Image Class Reference

The [FI_PNM_Image](#) class supports loading, caching, and drawing of Portable Anymap (PNM, PBM, PGM, PPM) image files.

```
#include <FI_PNM_Image.H>
```

Inheritance diagram for FI_PNM_Image:



Public Member Functions

- [FI_PNM_Image](#) (const char *filename)
The constructor loads the named PNM image.

Public Member Functions inherited from [FI_RGB_Image](#)

- virtual [FI_SVG_Image](#) * [as_svg_image](#) ()
Returns whether an image is an [FI_SVG_Image](#) or not.
- int **cache_h** ()
- int **cache_w** ()
- void [color_average](#) (FI_Color c, float i) **FL_OVERRIDE**
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [FI_Image](#) * **copy** () const
- [FI_Image](#) * [copy](#) (int W, int H) const **FL_OVERRIDE**
Creates a resized copy of the image.
- void [desaturate](#) () **FL_OVERRIDE**
The [desaturate\(\)](#) method converts an image to grayscale.
- void **draw** (int X, int Y)
- void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0) **FL_OVERRIDE**
Draws the image to the current drawing surface with a bounding box.
- [FI_RGB_Image](#) (const [FI_Pixmap](#) *pxm, FI_Color bg=FL_GRAY)
The constructor creates a new RGBA image from the specified [FI_Pixmap](#).
- [FI_RGB_Image](#) (const uchar *bits, int bits_length, int W, int H, int D, int LD)
The constructor creates a new image from the specified data.
- [FI_RGB_Image](#) (const uchar *bits, int W, int H, int D=3, int LD=0)
The constructor creates a new image from the specified data.
- void [label](#) (FI_Menu_Item *m) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a menu item.
- void [label](#) (FI_Widget *w) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a widget or menu item.
- virtual void [normalize](#) ()
Makes sure the object is fully initialized.
- void [uncache](#) () **FL_OVERRIDE**
If the image has been cached for display, delete the cache data.
- ~[FI_RGB_Image](#) () **FL_OVERRIDE**
The destructor frees all memory and server resources that are used by the image.

Public Member Functions inherited from [FI_Image](#)

- virtual class [FI_Shared_Image](#) * [as_shared_image](#) ()
Returns whether an image is an [FI_Shared_Image](#) or not.
- [FI_Image](#) * [copy](#) () const
Creates a copy of the image in the same size.
- int [count](#) () const
Returns the number of data values associated with the image.
- int [d](#) () const
Returns the image depth.
- const char *const * [data](#) () const
Returns a pointer to the current image data array.
- int [data_h](#) () const
Returns the height of the image data.
- int [data_w](#) () const
Returns the width of the image data.
- void [draw](#) (int X, int Y)
Draws the image to the current drawing surface.
- int [fail](#) () const
Returns a value that is not 0 if there is currently no image available.
- [FI_Image](#) (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int [h](#) () const
Returns the current image drawing height in FLTK units.
- void [inactive](#) ()
The [inactive\(\)](#) method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- int [ld](#) () const
Returns the current line data size in bytes.
- virtual void [release](#) ()
Releases an [FI_Image](#) - the same as 'delete this'.
- virtual void [scale](#) (int width, int height, int proportional=1, int can_expand=0)
Sets the drawing size of the image.
- int [w](#) () const
Returns the current image drawing width in FLTK units.
- virtual ~[FI_Image](#) ()
The destructor is a virtual method that frees all memory used by the image.

Additional Inherited Members

Static Public Member Functions inherited from [FI_RGB_Image](#)

- static size_t [max_size](#) ()
Returns the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.
- static void [max_size](#) (size_t size)
Sets the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.

Static Public Member Functions inherited from FI_Image

- static [FI_Labeltype](#) [define_FL_IMAGE_LABEL](#) ()
- static [FI_RGB_Scaling](#) [RGB_scaling](#) ()
Returns the currently used RGB image scaling method.
- static void [RGB_scaling](#) ([FI_RGB_Scaling](#))
Sets the RGB image scaling method used for copy(int, int).
- static [FI_RGB_Scaling](#) [scaling_algorithm](#) ()
Gets what algorithm is used when resizing a source image to draw it.
- static void [scaling_algorithm](#) ([FI_RGB_Scaling](#) algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Public Attributes inherited from FI_RGB_Image

- int [alloc_array](#)
If non-zero, the object's data array is delete[]'d when deleting the object.
- const [uchar](#) * [array](#)
Points to the start of the object's data array.

Static Public Attributes inherited from FI_Image

- static const int [ERR_FILE_ACCESS](#) = -2
- static const int [ERR_FORMAT](#) = -3
- static const int [ERR_MEMORY_ACCESS](#) = -4
- static const int [ERR_NO_IMAGE](#) = -1
- static bool [register_images_done](#) = false
True after [fl_register_images\(\)](#) was called, false before.

Protected Member Functions inherited from FI_Image

- void [d](#) (int D)
Sets the current image depth.
- void [data](#) (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void [draw_empty](#) (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int [draw_scaled](#) (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void [h](#) (int H)
Sets the height of the image data.
- void [ld](#) (int LD)
Sets the current line data size in bytes.
- void [w](#) (int W)
Sets the width of the image data.

Static Protected Member Functions inherited from FI_Image

- static void [labeltype](#) (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void [measure](#) (const [FI_Label](#) *lo, int &lw, int &lh)

12.102.1 Detailed Description

The [FI_PNM_Image](#) class supports loading, caching, and drawing of Portable Anymap (PNM, PBM, PGM, PPM) image files.

The class loads bitmap, grayscale, and full-color images in both ASCII and binary formats.

12.102.2 Constructor & Destructor Documentation

12.102.2.1 Fl_PNM_Image()

```
Fl_PNM_Image::Fl_PNM_Image (
    const char * filename )
```

The constructor loads the named PNM image.

The destructor frees all memory and server resources that are used by the image.

Use `Fl_Image::fail()` to check if `Fl_PNM_Image` failed to load. `fail()` returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the PNM format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

Parameters

in	<i>filename</i>	a full path and name pointing to a valid jpeg file.
----	-----------------	---

The documentation for this class was generated from the following files:

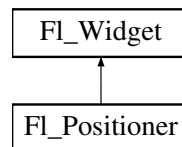
- `Fl_PNM_Image.H`
- `Fl_PNM_Image.cxx`

12.103 Fl_Positioner Class Reference

This class is provided for Forms compatibility.

```
#include <Fl_Positioner.H>
```

Inheritance diagram for `Fl_Positioner`:



Public Member Functions

- `Fl_Positioner` (int *x*, int *y*, int *w*, int *h*, const char **l*=0)
 - Creates a new Fl_Positioner widget using the given position, size, and label string.*
- int `handle` (int) `FL_OVERRIDE`
 - Handles the specified event.*
- int `value` (double, double)
 - Returns the current position in x and y.*
- void `xbounds` (double, double)
 - Sets the X axis bounds.*
- double `xmaximum` () const
 - Gets the X axis maximum.*
- void `xmaximum` (double *a*)
 - Same as xbounds(xminimum(), a)*
- double `xminimum` () const
 - Gets the X axis minimum.*
- void `xminimum` (double *a*)
 - Same as xbounds(a, xmaximum())*
- void `xstep` (double *a*)
 - Sets the stepping value for the X axis.*
- double `xvalue` () const
 - Gets the X axis coordinate.*

- int **xvalue** (double)
Sets the X axis coordinate.
- void **ybounds** (double, double)
Sets the Y axis bounds.
- double **ymaximum** () const
Gets the Y axis maximum.
- void **ymaximum** (double a)
Same as ybounds(yminimum(), a)
- double **yminimum** () const
Gets the Y axis minimum.
- void **yminimum** (double a)
Same as ybounds(a, ymaximum())
- void **ystep** (double a)
Sets the stepping value for the Y axis.
- double **yvalue** () const
Gets the Y axis coordinate.
- int **yvalue** (double)
Sets the Y axis coordinate.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** ([FI_Image](#) *img)

- Sets the image to use as part of the widget label when in the active state.*

 - void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
 - `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
 - void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
 - `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
 - void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
 - void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
 - unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
 - void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
 - void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
 - void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
 - void `clear_output` ()
 - Sets a widget to accept input.*
 - void `clear_visible` ()
 - Hides the widget.*
 - void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
 - `FI_Color` `color` () const
 - Gets the background color of the widget.*
 - void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
 - void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
 - `FI_Color` `color2` () const
 - For back compatibility only.*
 - void `color2` (unsigned a)
 - For back compatibility only.*
 - int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
 - void `copy_label` (const char *new_label)
 - Sets the current label.*
 - void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*

- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FL_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FL_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FL_Widget *widget`, `long arg`, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FL_Widget *widget`, `void *arg=0`, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FL_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FL_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FL_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FL_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FL_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FL_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FL_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `FL_Color labelcolor` () const

- Gets the label color.*
- void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
- [FI_Font](#) [labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype](#) [labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.

- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- void **draw** () [FL_OVERRIDE](#)
Draws the widget.
- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int, int)

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from Fl_Widget

- enum {
 - INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,
 - FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7
 - ,
 - OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11
 - ,
 - MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15
 - ,
 - GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU = 1<<19 ,
 - NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
 - AUTO_DELETE_USER_DATA = 1<<23 ,
 - MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
 - USERFLAG1 = 1<<31 }

flags possible values enumeration.

12.103.1 Detailed Description

This class is provided for Forms compatibility.

It provides 2D input. It would be useful if this could be put atop another widget so that the crosshairs are on top, but this is not implemented. The color of the crosshairs is [selection_color\(\)](#).

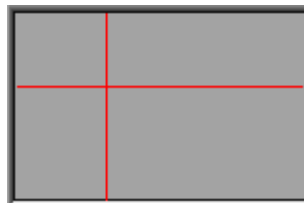


Figure 12.35 Fl_Positioner

12.103.2 Constructor & Destructor Documentation

12.103.2.1 Fl_Positioner()

```
Fl_Positioner::Fl_Positioner (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Positioner](#) widget using the given position, size, and label string. The default boxtype is FL_NO_BOX.

12.103.3 Member Function Documentation

12.103.3.1 draw()

```
void Fl_Positioner::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.103.3.2 handle()

```
int Fl_Positioner::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited handle() method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your handle() method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the handle() method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

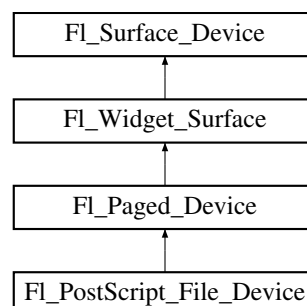
- [Fl_Positioner.H](#)
- [Fl_Positioner.cxx](#)

12.104 Fl_PostScript_File_Device Class Reference

To send graphical output to a PostScript file.

```
#include <Fl_PostScript.H>
```

Inheritance diagram for Fl_PostScript_File_Device:



Public Member Functions

- `int begin_job (FILE *ps_output, int pagecount=0, enum Fl_Paged_Device::Page_Format format=Fl_Paged_Device::A4, enum Fl_Paged_Device::Page_Layout layout=Fl_Paged_Device::PORTRAIT)`

- Begins the session where all graphics requests will go to FILE pointer.*

 - int **begin_job** (int pagecount, int *from, int *to, char **perr_message) [FL_OVERRIDE](#)

Don't use with this class.
- int **begin_job** (int pagecount=0, enum [FI_Paged_Device::Page_Format](#) format=[FI_Paged_Device::A4](#), enum [FI_Paged_Device::Page_Layout](#) layout=[FI_Paged_Device::PORTRAIT](#))

Begins the session where all graphics requests will go to a local PostScript file.
- int **begin_page** (void) [FL_OVERRIDE](#)

Begins a new printed page.
- void **close_command** ([FI_PostScript_Close_Command](#) cmd)

Sets the function `end_job()` calls to close the file()
- void **end_current** () [FL_OVERRIDE](#)

FLTK calls this each time a surface ceases to be the current drawing surface.
- void **end_job** (void) [FL_OVERRIDE](#)

Completes all PostScript output.
- int **end_page** (void) [FL_OVERRIDE](#)

To be called at the end of each page.
- FILE * **file** ()

Returns the underlying FILE receiving all PostScript data.*
- **FI_PostScript_File_Device** ()

The constructor.
- void **margins** (int *left, int *top, int *right, int *bottom) [FL_OVERRIDE](#)

Computes the dimensions of margins that lie between the printable page area and the full page.
- void **origin** (int *x, int *y) [FL_OVERRIDE](#)

Computes the coordinates of the current origin of graphics functions.
- void **origin** (int x, int y) [FL_OVERRIDE](#)

Sets the position of the origin of graphics in the drawable part of the drawing surface.
- int **printable_rect** (int *w, int *h) [FL_OVERRIDE](#)

Computes the width and height of the drawable area of the drawing surface.
- void **rotate** (float angle) [FL_OVERRIDE](#)

Rotates the graphics operations relatively to paper.
- void **scale** (float scale_x, float scale_y=0.) [FL_OVERRIDE](#)

Changes the scaling of page coordinates.
- void **set_current** () [FL_OVERRIDE](#)

Make this surface the current drawing surface.
- int **start_job** (FILE *ps_output, int pagecount=0, enum [FI_Paged_Device::Page_Format](#) format=[FI_Paged_Device::A4](#), enum [FI_Paged_Device::Page_Layout](#) layout=[FI_Paged_Device::PORTRAIT](#))

Synonym of `begin_job()`.
- int **start_job** (int pagecount=0, enum [FI_Paged_Device::Page_Format](#) format=[FI_Paged_Device::A4](#), enum [FI_Paged_Device::Page_Layout](#) layout=[FI_Paged_Device::PORTRAIT](#))

Synonym of `begin_job()`.
- void **translate** (int x, int y) [FL_OVERRIDE](#)

Translates the current graphics origin accounting for the current rotation.
- void **untranslate** (void) [FL_OVERRIDE](#)

Undoes the effect of a previous `translate()` call.
- ~**FI_PostScript_File_Device** ()

The destructor.

Public Member Functions inherited from [FI_Paged_Device](#)

- void **print_widget** ([FI_Widget](#) *widget, int delta_x=0, int delta_y=0)
Synonym of [draw\(FI_Widget, int, int\)](#)*
- void **print_window** ([FI_Window](#) *win, int x_offset=0, int y_offset=0)
Synonym of [draw_decorated_window\(FI_Window, int, int\)](#)*
- int **start_job** (int pagecount=0, int *frompage=NULL, int *topage=NULL, char **perr_message=NULL)
*Synonym of [begin_job\(int pagecount, int *frompage, int *topage, char **perr_message\)](#).*
- int **start_page** ()
Synonym of [begin_page\(\)](#).
- virtual ~**FI_Paged_Device** ()
The destructor.

Public Member Functions inherited from [FI_Widget_Surface](#)

- void **draw** ([FI_Widget](#) *widget, int delta_x=0, int delta_y=0)
Draws the widget on the drawing surface.
- void **draw_decorated_window** ([FI_Window](#) *win, int x_offset=0, int y_offset=0)
Draws a window with its title bar and frame if any.
- void **print_window_part** ([FI_Window](#) *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Draws a rectangular part of an on-screen window.

Public Member Functions inherited from [FI_Surface_Device](#)

- [FI_Graphics_Driver](#) * **driver** ()
Returns the graphics driver of this drawing surface.
- virtual bool **is_current** ()
Is this surface the current drawing surface?
- virtual ~**FI_Surface_Device** ()
The destructor.

Static Public Attributes

- static const char * **file_chooser_title**
Label of the PostScript file chooser window.

Static Public Attributes inherited from [FI_Paged_Device](#)

- static const [page_format](#) **page_formats** [[NO_PAGE_FORMATS](#)]
width, height and name of all elements of the enum [Page_Format](#).

Protected Member Functions

- [FI_PostScript_Graphics_Driver](#) * **driver** ()
Returns the PostScript driver of this drawing surface.

Protected Member Functions inherited from [FI_Paged_Device](#)

- **FI_Paged_Device** ()
The constructor.

Protected Member Functions inherited from [FI_Widget_Surface](#)

- [FI_Widget_Surface](#) ([FI_Graphics_Driver](#) *d)
The constructor.

Protected Member Functions inherited from FI_Surface_Device

- void **driver** (FI_Graphics_Driver *graphics_driver)
Sets the graphics driver of this drawing surface.
- **FI_Surface_Device** (FI_Graphics_Driver *graphics_driver)
Constructor that sets the graphics driver to use for the created surface.

Additional Inherited Members

Public Types inherited from FI_Paged_Device

- enum **Page_Format** {
A0 = 0 , A1 , A2 , A3 ,
A4 , A5 , A6 , A7 ,
A8 , A9 , B0 , B1 ,
B2 , B3 , B4 , B5 ,
B6 , B7 , B8 , B9 ,
B10 , C5E , DLE , EXECUTIVE ,
FOLIO , LEDGER , LEGAL , LETTER ,
TABLOID , ENVELOPE , MEDIA = 0x1000 }
 - enum **Page_Layout** { PORTRAIT = 0 , LANDSCAPE = 0x100 , REVERSED = 0x200 , ORIENTATION = 0x300 }
- Possible page formats.*
- Possible page layouts.*

Static Public Member Functions inherited from FI_Surface_Device

- static **FI_Surface_Device * pop_current** ()
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void **push_current** (FI_Surface_Device *new_current)
Pushes new_current on top of the stack of current drawing surfaces, and makes it current.
- static **FI_Surface_Device * surface** ()
The current drawing surface.

Protected Attributes inherited from FI_Widget_Surface

- int **x_offset**
horizontal offset to the origin of graphics coordinates
- int **y_offset**
vertical offset to the origin of graphics coordinates

12.104.1 Detailed Description

To send graphical output to a PostScript file.

This class is used exactly as the [FI_Printer](#) class except for the [begin_job\(\)](#) call, two variants of which are usable and allow to specify what page format and layout are desired.

Processing of text: Text uses vectorial fonts under the X11 + Pango and the Wayland platforms. With other platforms, only text restricted to the Latin alphabet (and a few other characters listed in the table below) and to FLTK standard fonts is vectorized. All other unicode characters or all other fonts (FL_FREE_FONT and above) are output as a bitmap. FLTK standard fonts are output using the corresponding PostScript standard fonts. The latin alphabet means all unicode characters between U+0020 and U+017F, or, in other words, the ASCII, Latin-1 Supplement and Latin Extended-A charts.

Char	Codepoint	Name	Char	Codepoint	Name	Char	Codepoint	Name
<i>f</i>	U+0192	florin	,	U+201A	quotesinglbase	™	U+2122	trademark
^	U+02C6	circumflex	“	U+201C	quotedblleft	∂	U+2202	partialdiff
ˇ	U+02C7	caron	”	U+201D	quotedblright	Δ	U+2206	Delta
˘	U+02D8	breve	„	U+201E	quotedblbase	Σ	U+2211	summation
·	U+02D9	dotaccent	†	U+2020	dagger	√	U+221A	radical
°	U+02DA	ring	‡	U+2021	daggerdbl	∞	U+221E	infinity
˙	U+02DB	ogonek	•	U+2022	bullet	≠	U+2260	notequal
˜	U+02DC	tilde	…	U+2026	ellipsis	≤	U+2264	lessequal
˝	U+02DD	hungarumlaut	‰	U+2030	perthousand	≥	U+2265	greaterequal
–	U+2013	endash	◀	U+2039	guilsinglleft	◊	U+25CA	lozenge
—	U+2014	emdash	▶	U+203A	guilsinglright	fi	U+FB01	fi
‘	U+2018	quoteleft	/	U+2044	fraction	fl	U+FB02	fl
’	U+2019	quoteright	€	U+20AC	Euro	🍏	U+F8FF	apple (macOS only)

Figure 12.36 Extra characters supported by standard PostScript fonts

Processing of transparent `Fl_RGB_Image` objects: Under the X11 + Pango and the Wayland platforms, these objects are output with their exact transparency. With other platforms, these objects are drawn blended to white color. Class `Fl_EPS_File_Surface`'s constructor allows to set another background color for blending.

12.104.2 Member Function Documentation

12.104.2.1 `begin_job()` [1/3]

```
int Fl_PostScript_File_Device::begin_job (
    FILE * ps_output,
    int pagecount = 0,
    enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
    enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT )
```

Begins the session where all graphics requests will go to FILE pointer.

This member function prevents `end_job()` from closing `ps_output`, so the user can check with `ferror(ps_output)` for output errors.

Parameters

<i>ps_output</i>	A writable FILE pointer that will receive PostScript output and that should not be closed until after <code>end_job()</code> has been called.
<i>pagecount</i>	The total number of pages to be created. Use 0 if this number is unknown when this function is called.
<i>format</i>	Desired page format.
<i>layout</i>	Desired page layout.

Returns

always 0.

12.104.2.2 `begin_job()` [2/3]

```
int Fl_PostScript_File_Device::begin_job (
    int pagecount,
    int * from,
```

```
int * to,
char ** perr_message ) [virtual]
```

Don't use with this class.

Reimplemented from [FI_Paged_Device](#).

12.104.2.3 begin_job() [3/3]

```
int Fl_PostScript_File_Device::begin_job (
    int pagecount = 0,
    enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
    enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT )
```

Begins the session where all graphics requests will go to a local PostScript file.

Opens a file dialog to select an output PostScript file. This member function makes [end_job\(\)](#) close the resulting PostScript file and display an alert message with [fl_alert\(\)](#) in case of any output error.

Parameters

<i>pagecount</i>	The total number of pages to be created. Use 0 if this number is unknown when this function is called.
<i>format</i>	Desired page format.
<i>layout</i>	Desired page layout.

Returns

0 if OK, 1 if user cancelled the file dialog, 2 if fopen failed on user-selected output file.

12.104.2.4 begin_page()

```
int Fl_PostScript_File_Device::begin_page (
    void ) [virtual]
```

Begins a new printed page.

The page coordinates are initially in points, i.e., 1/72 inch, and with origin at the top left of the printable page area.

This function also makes this surface the current drawing surface with [FI_Surface_Device::push_current\(\)](#).

Note

[begin_page\(\)](#) calls [FI_Surface_Device::push_current\(\)](#) and leaves this device as the active surface. If any calls between [begin_page\(\)](#) and [end_page\(\)](#) open dialog boxes or will otherwise draw into FLTK windows, those calls must be put between a call to [FI_Surface_Device::pop_current\(\)](#) and a call to [FI_Surface_Device::push_current\(\)](#), or the content of the dialog box will be rendered to the printer instead of the screen.

Returns

0 if OK, non-zero if any error

Reimplemented from [FI_Paged_Device](#).

12.104.2.5 end_current()

```
void Fl_PostScript_File_Device::end_current ( ) [virtual]
```

FLTK calls this each time a surface ceases to be the current drawing surface.

This member function is mostly of interest to developers of new [FI_Surface_Device](#) derived classes. It allows to perform surface-specific operations necessary when this surface ceases to be current. Each implementation should end with a call to [FI_Surface_Device::end_current\(\)](#).

Reimplemented from [FI_Surface_Device](#).

12.104.2.6 end_job()

```
void Fl_PostScript_File_Device::end_job (
    void ) [virtual]
```

Completes all PostScript output.

This also closes with `fclose()` the underlying `file()` unless `close_command()` was used to set another function.

Reimplemented from [Fl_Paged_Device](#).

12.104.2.7 end_page()

```
int Fl_PostScript_File_Device::end_page (
    void ) [virtual]
```

To be called at the end of each page.

This function also stops this surface from being the current drawing surface with [Fl_Surface_Device::pop_current\(\)](#).

Note

`end_page()` calls [Fl_Surface_Device::pop_current\(\)](#). If any calls between `begin_page()` and `end_page()` open dialog boxes or will otherwise draw into FLTK windows, those calls must be put between a call to [Fl_Surface_Device::pop_current\(\)](#) and a call to [Fl_Surface_Device::push_current\(\)](#).

Returns

0 if OK, non-zero if any error.

Reimplemented from [Fl_Paged_Device](#).

12.104.2.8 margins()

```
void Fl_PostScript_File_Device::margins (
    int * left,
    int * top,
    int * right,
    int * bottom ) [virtual]
```

Computes the dimensions of margins that lie between the printable page area and the full page.

Values are in the same unit as that used by FLTK drawing functions. They are changed by [scale\(\)](#) calls.

Parameters

out	<i>left</i>	If non-null, *left is set to the left margin size.
out	<i>top</i>	If non-null, *top is set to the top margin size.
out	<i>right</i>	If non-null, *right is set to the right margin size.
out	<i>bottom</i>	If non-null, *bottom is set to the bottom margin size.

Reimplemented from [Fl_Paged_Device](#).

12.104.2.9 origin() [1/2]

```
void Fl_PostScript_File_Device::origin (
    int * x,
    int * y ) [virtual]
```

Computes the coordinates of the current origin of graphics functions.

Parameters

out	<i>x,y</i>	If non-null, *x and *y are set to the horizontal and vertical coordinates of the graphics origin.
-----	------------	---

Reimplemented from [Fl_Widget_Surface](#).

12.104.2.10 origin() [2/2]

```
void Fl_PostScript_File_Device::origin (
    int x,
    int y ) [virtual]
```

Sets the position of the origin of graphics in the drawable part of the drawing surface.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the drawable area. Successive [origin\(\)](#) calls don't combine their effects. [Origin\(\)](#) calls are not affected by [rotate\(\)](#) calls (for classes derived from [Fl_Paged_Device](#)).

Parameters

in	<i>x,y</i>	Horizontal and vertical positions in the drawing surface of the desired origin of graphics.
----	------------	---

Reimplemented from [Fl_Widget_Surface](#).

12.104.2.11 printable_rect()

```
int Fl_PostScript_File_Device::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the drawable area of the drawing surface.

Values are in the same unit as that used by FLTK drawing functions and are unchanged by calls to [origin\(\)](#). If the object is derived from class [Fl_Paged_Device](#), values account for the user-selected paper type and print orientation and are changed by [scale\(\)](#) calls.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Widget_Surface](#).

12.104.2.12 rotate()

```
void Fl_PostScript_File_Device::rotate (
    float angle ) [virtual]
```

Rotates the graphics operations relatively to paper.

The rotation is centered on the current graphics origin. Successive [rotate\(\)](#) calls don't combine their effects.

Parameters

<i>angle</i>	Rotation angle in counter-clockwise degrees.
--------------	--

Reimplemented from [Fl_Paged_Device](#).

12.104.2.13 scale()

```
void Fl_PostScript_File_Device::scale (
    float scale_x,
    float scale_y = 0. ) [virtual]
```

Changes the scaling of page coordinates.

This function also resets the origin of graphics functions at top left of printable page area. After a [scale\(\)](#) call, do a [printable_rect\(\)](#) call to get the new dimensions of the printable page area. Successive [scale\(\)](#) calls don't combine their effects.

Parameters

<i>scale_x</i>	Horizontal dimensions of plot are multiplied by this quantity.
----------------	--

Parameters

<code>scale↔ _y</code>	Same as above, vertically. The value 0. is equivalent to setting <code>scale_y = scale_x</code> . Thus, <code>scale(factor)</code> ; is equivalent to <code>scale(factor, factor)</code> ;
----------------------------	--

Reimplemented from [Fl_Paged_Device](#).

12.104.2.14 set_current()

```
void Fl_PostScript_File_Device::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests. Starting from FLTK 1.4.0, the preferred API to change the current drawing surface is [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Note

It's recommended to use this function only as follows :

- The current drawing surface is the display;
- make current another surface, e.g., an [Fl_Printer](#) or an [Fl_Image_Surface](#) object, calling [set_current\(\)](#) on this object;
- draw to that surface;
- make the display current again with [Fl_Display_Device::display_device\(\)->set_current\(\)](#); . Don't do any other call to [set_current\(\)](#) before this one.

Other scenarios of drawing surface changes should be performed via [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Reimplemented from [Fl_Surface_Device](#).

12.104.2.15 start_job() [1/2]

```
int Fl_PostScript_File_Device::start_job (
    FILE * ps_output,
    int pagecount = 0,
    enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
    enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT ) [inline]
```

Synonym of [begin_job\(\)](#).

For API compatibility with FLTK 1.3.x

12.104.2.16 start_job() [2/2]

```
int Fl_PostScript_File_Device::start_job (
    int pagecount = 0,
    enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
    enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT ) [inline]
```

Synonym of [begin_job\(\)](#).

For API compatibility with FLTK 1.3.x

12.104.2.17 translate()

```
void Fl_PostScript_File_Device::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call. Successive [translate\(\)](#) calls add up their effects.

Reimplemented from [Fl_Widget_Surface](#).

12.104.2.18 untranslate()

```
void Fl_PostScript_File_Device::untranslate (
    void ) [virtual]
```

Undoes the effect of a previous [translate\(\)](#) call.

Reimplemented from [Fl_Widget_Surface](#).

The documentation for this class was generated from the following file:

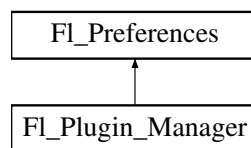
- [Fl_PostScript.H](#)

12.105 FI_Preferences Class Reference

[Fl_Preferences](#) store user settings between application starts.

```
#include <Fl_Preferences.H>
```

Inheritance diagram for [Fl_Preferences](#):



Classes

- struct [Entry](#)
- class [Name](#)

'Name' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly.

- class [Node](#)
- class [RootNode](#)

Public Types

- typedef void * [ID](#)

Every Fl_Preferences-Group has a unique ID.

- enum [Root](#) {
[UNKNOWN_ROOT_TYPE](#) = -1 , [SYSTEM](#) = 0 , [USER](#) , [MEMORY](#) ,
[ROOT_MASK](#) = 0x00FF , [CORE](#) = 0x0100 , [C_LOCALE](#) = 0x1000 , [CLEAR](#) = 0x2000 ,
[SYSTEM_L](#) = SYSTEM | C_LOCALE , [USER_L](#) = USER | C_LOCALE , [CORE_SYSTEM_L](#) = CORE |
SYSTEM_L , [CORE_USER_L](#) = CORE | USER_L ,
[CORE_SYSTEM](#) = CORE | SYSTEM , [CORE_USER](#) = CORE | USER }

Define the scope of the preferences.

Public Member Functions

- char [clear](#) ()
Delete all groups and all entries.
- char [delete_all_entries](#) ()
Delete all entries.
- char [delete_all_groups](#) ()
Delete all groups.
- char [delete_entry](#) (const char *[entry](#))
Deletes a single name/value pair.
- char [delete_group](#) (const char *[group](#))
Deletes a group.
- int [dirty](#) ()

- Check if there were changes to the database that need to be written to disk.*

 - int [entries](#) ()
 - Returns the number of entries (name/value pairs) in a group.*
 - const char * [entry](#) (int index)
 - Returns the name of an entry.*
 - char [entry_exists](#) (const char *key)
 - Returns non-zero if an entry with this name exists.*
 - [Root filename](#) (char *buffer, size_t buffer_size)
 - Return the file name and path to the preference file.*
 - [FI_Preferences](#) (const char *path, const char *vendor, const char *application)
 - Deprecated: Use this constructor to create or read a preference file at an arbitrary position in the file system.*
 - [FI_Preferences](#) (const char *path, const char *vendor, const char *application, [Root](#) flags)
 - Use this constructor to create or read a preference file at an arbitrary position in the file system.*
 - [FI_Preferences](#) (const [FI_Preferences](#) &)
 - Create another reference to a Preferences group.*
 - [FI_Preferences](#) ([FI_Preferences](#) &parent, const char *group)
 - Generate or read a new group of entries within another group.*
 - [FI_Preferences](#) ([FI_Preferences](#) &parent, int groupIndex)
 - Open a child group using a given index.*
 - [FI_Preferences](#) ([FI_Preferences](#) *parent, const char *group)
 - Create or access a group of preferences using a name.*
 - [FI_Preferences](#) ([FI_Preferences](#) *parent, int groupIndex)
 - [FI_Preferences](#) (ID id)
 - Create a new dataset access point using a dataset ID.*
 - [FI_Preferences](#) ([Root](#) root, const char *vendor, const char *application)
 - The constructor creates a group that manages key/value pairs and child groups.*
 - int [flush](#) ()
 - Writes preferences to disk if they were modified.*
 - char [get](#) (const char *entry, char *&value, const char *defaultValue)
 - Reads an entry from the group.*
 - char [get](#) (const char *entry, char *value, const char *defaultValue, int maxSize)
 - Reads an entry from the group.*
 - char [get](#) (const char *entry, double &value, double defaultValue)
 - Reads an entry from the group.*
 - char [get](#) (const char *entry, float &value, float defaultValue)
 - Reads an entry from the group.*
 - char [get](#) (const char *entry, int &value, int defaultValue)
 - Reads an entry from the group.*
 - char [get](#) (const char *entry, void *&value, const void *defaultValue, int defaultSize)
 - Reads an entry from the group.*
 - char [get](#) (const char *entry, void *value, const void *defaultValue, int defaultSize, int *size)
 - Reads a binary entry from the group, encoded in hexadecimal blocks.*
 - char [get](#) (const char *entry, void *value, const void *defaultValue, int defaultSize, int maxSize)
 - Reads a binary entry from the group, encoded in hexadecimal blocks.*
 - char [get_userdata_path](#) (char *path, int pathlen)
 - Creates a path that is related to the preference file and that is usable for additional application data.*
 - const char * [group](#) (int num_group)
 - Returns the name of the Nth (num_group) group.*
 - char [group_exists](#) (const char *key)
 - Returns non-zero if a group with this name exists.*
 - int [groups](#) ()

- Returns the number of groups that are contained within a group.*
- **ID** `id ()`

Return an ID that can later be reused to open more references to this dataset.
- `const char * name ()`

Return the name of this entry.
- `const char * path ()`

Return the full path to this entry.
- `char set (const char *entry, const char *value)`

Sets an entry (name/value pair).
- `char set (const char *entry, const void *value, int size)`

Sets an entry (name/value pair).
- `char set (const char *entry, double value)`

Sets an entry (name/value pair).
- `char set (const char *entry, double value, int precision)`

Sets an entry (name/value pair).
- `char set (const char *entry, float value)`

Sets an entry (name/value pair).
- `char set (const char *entry, float value, int precision)`

Sets an entry (name/value pair).
- `char set (const char *entry, int value)`

Sets an entry (name/value pair).
- `int size (const char *entry)`

Returns the size of the value part of an entry.
- `virtual ~Fl_Preferences ()`

The destructor removes allocated resources.

Static Public Member Functions

- `static unsigned int file_access ()`

Return the current file access permissions for the FLTK preferences system.
- `static void file_access (unsigned int flags)`

Tell the FLTK preferences system which files in the file system it may read, create, or write.
- `static Root filename (char *buffer, size_t buffer_size, Root root, const char *vendor, const char *application)`

Determine the file name and path to preferences that would be opened with these parameters.
- `static const char * new_UUID ()`

Returns a UUID as generated by the system.
- `static char remove (ID id_)`

Remove the group with this ID from a database.

Static Public Attributes

- `static const unsigned int ALL = ALL_READ_OK | ALL_WRITE_OK`

Set this to give FLTK and applications permission to read, write, and create preference files.
- `static const unsigned int ALL_READ_OK = USER_READ_OK | SYSTEM_READ_OK | CORE_READ_OK`

Set this to allow FLTK and applications to read preference files.
- `static const unsigned int ALL_WRITE_OK = USER_WRITE_OK | SYSTEM_WRITE_OK | CORE_WRITE_OK`

Set this to allow FLTK and applications to create and write preference files.
- `static const unsigned int APP_OK = SYSTEM_OK | USER_OK`

Set this if it is OK for applications to read, create, and write any kind of preference files.
- `static const unsigned int CORE_OK = CORE_READ_OK | CORE_WRITE_OK`

Set this if it is OK for FLTK to read, create, or write preference files.
- `static const unsigned int CORE_READ_OK = 0x0010`

- Set this if it is OK for FLTK to read preference files.*

 - static const unsigned int `CORE_WRITE_OK` = 0x0020

Set this if it is OK for FLTK to create or write preference files.

 - static const unsigned int `NONE` = 0x0000

Set this if no call to [Fl_Preferences](#) shall access the file system.

 - static const unsigned int `SYSTEM_OK` = `SYSTEM_READ_OK` | `SYSTEM_WRITE_OK`

Set this if it is OK for applications to read, create, and write system wide preference files.

 - static const unsigned int `SYSTEM_READ_OK` = 0x0004

Set this if it is OK for applications to read system wide preference files.

 - static const unsigned int `SYSTEM_WRITE_OK` = 0x0008

Set this if it is OK for applications to create and write system wide preference files.

 - static const unsigned int `USER_OK` = `USER_READ_OK` | `USER_WRITE_OK`

Set this if it is OK for applications to read, create, and write user preference files.

 - static const unsigned int `USER_READ_OK` = 0x0001

Set this if it is OK for applications to read user preference files.

 - static const unsigned int `USER_WRITE_OK` = 0x0002

Set this if it is OK for applications to create and write user preference files.

Protected Attributes

- `Node` * `node`
- `RootNode` * `rootNode`

Friends

- class `Node`
- class `RootNode`

12.105.1 Detailed Description

[Fl_Preferences](#) store user settings between application starts.

[Fl_Preferences](#) are similar to the Registry on Windows and Preferences on MacOS, providing a simple method to store customizable user settings between app launches, for instance the previous window position or a history of previously used documents.

Preferences are organized in a hierarchy of groups. Every group can contain more groups and any number of key/value pairs. Keys can be text strings containing ASCII letters, digits, periods, and underscores. Forward slashes in a key name are treated as subgroups, i.e. the key 'window/width' would actually refer to the key 'width' inside the group 'window'.

Keys usually have a unique name within their group. Duplicate keys are possible though and can be accessed using the index based functions.

A value can be an UTF-8 string. Control characters and UTF-8 sequences are stored as octal values. Long strings are wrapped at the line ending and will be reassembled when reading the file back.

Several methods allow setting and getting numerical values and binary data.

Preferences are stored in text files that can be edited manually if needed. The file format is easy to read and relatively forgiving. Preference files are the same on all platforms. User comments in preference files are preserved. Filenames are unique for each application by using a vendor/application naming scheme. The user must provide default values for all entries to ensure proper operation should preferences be corrupted or not yet exist.

FLTK preferences are not meant to replace a fully features database. No merging of data takes place. If several instances of an app access the same database at the same time, only the most recent changes will persist.

Preferences should no be used to store document data. The .prefs file should be kept small for performance reasons. One application can have multiple preference files. Extensive binary data however should be stored in separate files: see [Fl_Preferences::get_userdata_path\(\)](#).

[Fl_Preferences](#) are not thread-safe. They can temporarily change the locale on some platforms during read and write access, which also changes it temporarily in other threads of the same app.

Typically a preferences database is read at startup, and then reopened and written at app shutdown:

```

int appWindowWidth, appWindowHeight;

void launch() {
    Fl_Preferences app(Fl_Preferences::USER_L, "matthiasm.com", "hello");
    // 'app' constructor will be called, reading data from .prefs file
    Fl_Preferences window(app, "window");
    window.get("width", appWindowWidth, 800);
    window.get("height", appWindowHeight, 600);
    // 'app' destructor will be called. This will write data to the
    // .prefs file if any preferences were changed or added
}

void quit() {
    Fl_Preferences app(Fl_Preferences::USER_L, "matthiasm.com", "hello");
    Fl_Preferences window(app, "window");
    window.set("width", appWindowWidth);
    window.set("height", appWindowHeight);
}

```

See also

[Fl_Preferences::Fl_Preferences\(Root root, const char *vendor, const char *application\)](#)

As a special case, [Fl_Preferences](#) can be memory mapped and not be associated with a file on disk.

See also

[Fl_Preferences::Fl_Preferences\(Fl_Preferences *parent, const char *group\)](#) for more details on memory mapped preferences.

Note

Starting with FLTK 1.3, preference databases are expected to be in UTF-8 encoding. Previous databases were stored in the current character set or code page which renders them incompatible for text entries using international characters.

Starting with FLTK 1.4, searching a valid path to store the preference files has changed slightly. Please see [Fl_Preferences::Fl_Preferences\(Root, const char*, const char*\)](#) for details.

Starting with FLTK 1.4, preference files should be created with `SYSTEM_L` or `USER_L` to be interchangeable between computers with differing locale settings. The legacy modes, `LOCAL` and `SYSTEM`, will read and write floating point values using the decimal point of the current locale. As a result, a fp-value would be written '3,1415' on a German machine, and would be read back as '3.0' on a US machine because the comma would not be recognized as an alternative decimal point.

12.105.2 Member Typedef Documentation

12.105.2.1 ID

```
typedef void* Fl_Preferences::ID
```

Every `Fl_Preferences-Group` has a unique ID.

ID's can be retrieved from an `Fl_Preferences-Group` and can then be used to create more `Fl_Preference` references to the same data set, as long as the database remains open.

12.105.3 Member Enumeration Documentation

12.105.3.1 Root

```
enum Fl_Preferences::Root
```

Define the scope of the preferences.

Enumerator

UNKNOWN_ROOT_TYPE	Returned if storage could not be determined.
SYSTEM	Preferences are used system-wide. Deprecated, see <code>SYSTEM_L</code> .
USER	Preferences apply only to the current user. Deprecated, see <code>USER_L</code> .
MEMORY	Returned if querying memory mapped preferences.
ROOT_MASK	Mask for the values above.

Enumerator

CORE	OR'd by FLTK to read and write core library preferences and options.
C_LOCALE	This flag should always be set, it makes sure that floating point.
CLEAR	Don't read a possibly existing database. Instead, start with an empty set of preferences. values are written correctly independently of the current locale
SYSTEM_L	Preferences are used system-wide, locale independent.
USER_L	Preferences apply only to the current user, locale independent.
CORE_SYSTEM_L	Same as CORE SYSTEM C_LOCALE.
CORE_USER_L	Same as CORE USER C_LOCALE.
CORE_SYSTEM	Deprecated, same as CORE SYSTEM. Use CORE_SYSTEM_L instead.
CORE_USER	Deprecated, same as CORE USER. Use CORE_USER_L instead.

12.105.4 Constructor & Destructor Documentation

12.105.4.1 Fl_Preferences() [1/8]

```
Fl_Preferences::Fl_Preferences (
    Root root,
    const char * vendor,
    const char * application )
```

The constructor creates a group that manages key/value pairs and child groups.

Preferences can be stored per user using the root type `Fl_Preferences::USER_L`, or stored system-wide using `Fl_Preferences::SYSTEM_L`.

Groups and key/value pairs can be read and written randomly. Reading undefined values will return the default value. Writing undefined values will create all required groups and key/value pairs.

This constructor creates the *base* instance for all following entries and reads the database from disk into memory if it exists. The vendor argument is a unique text string identifying the development team or vendor of an application. A domain name or an EMail address (replacing the '@' with a '.') are great unique names, e.g. "research.matthiasm.com" or "fluid.fltk.org". The application argument can be the working title or final name of your application. Both vendor and application must be valid UNIX path segments as they become parts of the preference file path and may contain forward slashes to create deeper file structures.

Note

On **Windows**, the directory is constructed by querying the *Common AppData* or *AppData* key of the `Software\Microsoft\Windows\CurrentVersion\Explorer\Shell Folders` registry entry. The filename and path is then constructed as `$(query)/$(vendor)/$(application).prefs`. If the query call fails, data will be stored in RAM only. It will be lost when the app exits.

In FLTK versions before 1.4.0, if querying the registry failed,

preferences would be written to `C:\FLTK\$(vendor)\$(application).prefs`.

Note

On **Linux**, the `USER` directory is constructed by reading `$HOME`. If `$HOME` is not set or not pointing to an existing directory, FLTK will check the path member of the `passwd` struct returned by `getpwuid(getuid())`. If all attempts fail, data will be stored in RAM only and be lost when the app exits.

The `SYSTEM` preference filename is hardcoded as `/etc/fltk/$(vendor)/$(application).prefs`.

For backward compatibility, the old `USER` .prefs file naming scheme `$(directory)/.fltk/$(vendor)/$(application)` is checked first. If that file does not exist, the environment variable `$XDG_CONFIG_HOME` is read as a base directory. If `$XDG_CONFIG_HOME` not set, the base directory defaults to `$HOME/.config/`.

The user preferences will be stored in `$(directory)/$(vendor)/$(application).prefs`. The user data path will be `$(directory)/$(vendor)/$(application)/`.

In FLTK versions before 1.4.0, if `$HOME` was not set, the `USER` path would be empty, generating `$(vendor)/$(application).prefs`, which was used relative to the current working directory.

Note

On **macOS**, the `USER` directory is constructed by reading `$HOME`. If `$HOME` is not set or not pointing to an existing directory, we check the path returned by `NSHomeDirectory()`, and finally checking the path member of the `passwd` struct returned by `getpwuid(getuid())`. If all attempts fail, data will be stored in RAM only and be lost when the app exits. The filename and path is then constructed as `$(directory)/Library/Preferences/$(vendor)/$(application).prefs`. The `SYSTEM` directory is hard-coded as `/Library/Preferences/$(vendor)/$(application).prefs`.

In **FLTK versions before 1.4.0**, if `$HOME` was not set, the `USER` path

would be `NULL`, generating `<null>/Library/Preferences/$(vendor)/$(application).prefs`, which would silently fail to create a preference file.

Parameters

in	<i>root</i>	can be <code>USER_L</code> or <code>SYSTEM_L</code> for user specific or system wide preferences, add the <code>CLEAR</code> flag to start with a clean set of preferences instead of reading them from a preexisting database
in	<i>vendor</i>	unique text describing the company or author of this file, must be a valid filepath segment
in	<i>application</i>	unique text describing the application, must be a valid filepath segment

See also

[Fl_Preferences\(Fl_Preferences *parent, const char *group\)](#) with `parent` set to `NULL`

12.105.4.2 Fl_Preferences() [2/8]

```
Fl_Preferences::Fl_Preferences (
    const char * path,
    const char * vendor,
    const char * application,
    Root flags )
```

Use this constructor to create or read a preference file at an arbitrary position in the file system.

The file name is generated in the form `$(path)/$(application).prefs`. If `application` is `NULL`, `path` is taken literally as the file path and name.

```
// Example: read from an existing database and write modifications when flushed
// or destructor is called
Fl_Preferences database("/user/matt/test.prefs", "org.fltk.test", NULL,
    Fl_Preferences::C_LOCALE);
```

```
// Example: create a new preferences file with an empty data set
Fl_Preferences database("/user/matt/test.prefs", "org.fltk.test", NULL,
    (Fl_Preferences::Root) (Fl_Preferences::C_LOCALE|Fl_Preferences::CLEAR));
```

Note

the `C_LOCALE` flag is not set by default for backward compatibility, but it is highly recommended to set it when opening a database.

Parameters

in	<i>path</i>	path to the directory that contains the preference file
in	<i>vendor</i>	unique text describing the company or author of this file, must be a valid file path segment
in	<i>application</i>	unique text describing the application, must be a valid filename or <code>NULL</code>
in	<i>flags</i>	<code>C_LOCALE</code> to make the preferences file independent of the current locale, add the <code>CLEAR</code> flag to start with a clean set of preferences instead of reading from the database

12.105.4.3 Fl_Preferences() [3/8]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences & parent,
    const char * group )
```

Generate or read a new group of entries within another group.

Use the `group` argument to name the group that you would like to access. `Group` can also contain a path to a group further down the hierarchy by separating group names with a forward slash '/'.

Parameters

in	<i>parent</i>	reference object for the new group
in	<i>group</i>	name of the group to access (may contain '/'s)

12.105.4.4 Fl_Preferences() [4/8]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences * parent,
    const char * group )
```

Create or access a group of preferences using a name.

Parent should point to a previously created parent preferences group to create a preferences hierarchy.

If `parent` is set to `NULL`, an unnamed database will be accessed that exists only in local memory and is not associated with a file on disk. The root type of this database is set to `Fl_Preferences::MEMORY`.

- the memory database is *not* shared among multiple instances of the same app
- memory databases are *not* thread safe
- all data will be lost when the app quits

```
void some_function() {
    Fl_Preferences guide( NULL, "Guide" );
    guide.set("answer", 42);
}
void other_function() {
    int x;
    Fl_Preferences guide( NULL, "Guide" );
    guide.get("answer", x, -1);
}
```

FLTK uses the memory database to manage plugins. See [Fl_Plugin](#).

Parameters

in	<i>parent</i>	the parameter <code>parent</code> is a pointer to the parent group. If <code>parent</code> is <code>NULL</code> , the new preferences item refers to an application internal database ("runtime prefs") which exists only once, and remains in RAM only until the application quits. This database is used to manage plugins and other data indexes by strings. Runtime prefs are <i>not</i> thread-safe.
in	<i>group</i>	a group name that is used as a key into the database

See also

[Fl_Preferences\(Fl_Preferences&, const char *group \)](#)

12.105.4.5 Fl_Preferences() [5/8]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences & parent,
    int groupIndex )
```

Open a child group using a given index.

Use the `groupIndex` argument to find the group that you would like to access. If the given index is invalid (negative or too high), a new group is created with a UUID as a name.

The index needs to be fixed. It is currently backward. Index 0 points to the last member in the 'list' of preferences.

Parameters

in	<i>parent</i>	reference object for the new group
in	<i>groupIndex</i>	zero based index into child groups

12.105.4.6 FI_Preferences() [6/8]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences * parent,
    int groupIndex )
```

See also

[FI_Preferences\(Fl_Preferences&, int groupIndex \)](#)

12.105.4.7 FI_Preferences() [7/8]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences::ID id )
```

Create a new dataset access point using a dataset ID.

ID's are a great way to remember shortcuts to database entries that are deeply nested in a preferences database, as long as the database root is not deleted. An ID can be retrieved from any [FI_Preferences](#) dataset, and can then be used to create multiple new references to the same dataset.

ID's can be very helpful when put into the `user_data()` field of widget callbacks.

12.105.4.8 ~FI_Preferences()

```
Fl_Preferences::~~Fl_Preferences ( ) [virtual]
```

The destructor removes allocated resources.

When used on the *base* preferences group, the destructor flushes all changes to the preference file and deletes all internal databases.

The destructor does not remove any data from the database. It merely deletes your reference to the database.

12.105.4.9 FI_Preferences() [8/8]

```
Fl_Preferences::Fl_Preferences (
    const char * path,
    const char * vendor,
    const char * application )
```

Deprecated: Use this constructor to create or read a preference file at an arbitrary position in the file system.

Deprecated "in 1.4.0 - use [FI_Preferences\(path, vendor, application, flags\)](#) instead"

This constructor should no longer be used because the generated database uses the current locale, making it impossible to exchange floating point settings between machines with different language settings.

Use [Fl_Preferences\(path, vendor, application, Fl_Preferences::C_LOCALE\)](#) in new projects and [Fl_Preferences\(path, vendor, application, 0\)](#) if you must keep backward compatibility.

See also

[FI_Preferences\(const char *path, const char *vendor, const char *application, Root flags \)](#)

12.105.5 Member Function Documentation

12.105.5.1 delete_entry()

```
char Fl_Preferences::delete_entry (
    const char * key )
```

Deletes a single name/value pair.

This function removes the entry `key` from the database.

Parameters

in	<i>key</i>	name of entry to delete
----	------------	-------------------------

Returns

0 if deleting the entry failed

12.105.5.2 delete_group()

```
char Fl_Preferences::delete_group (
    const char * group )
```

Deletes a group.

Removes a group and all keys and groups within that group from the database.

Parameters

in	<i>group</i>	name of the group to delete
----	--------------	-----------------------------

Returns

0 if call failed

12.105.5.3 dirty()

```
int Fl_Preferences::dirty ( )
```

Check if there were changes to the database that need to be written to disk.

Returns

1 if the database will be written to disk by `flush` or destructor.

0 if the database is unchanged since the last write operation.

-1 if there is an internal database error.

12.105.5.4 entries()

```
int Fl_Preferences::entries ( )
```

Returns the number of entries (name/value pairs) in a group.

Returns

number of entries

12.105.5.5 entry()

```
const char * Fl_Preferences::entry (
    int index )
```

Returns the name of an entry.

There is no guaranteed order of entry names. The index must be within the range given by [entries\(\)](#).

Parameters

in	<i>index</i>	number indexing the requested entry
----	--------------	-------------------------------------

Returns

pointer to value cstring

12.105.5.6 entry_exists()

```
char Fl_Preferences::entry_exists (
    const char * key )
```

Returns non-zero if an entry with this name exists.

Parameters

in	<i>key</i>	name of entry that is searched for
----	------------	------------------------------------

Returns

0 if entry was not found

12.105.5.7 file_access() [1/2]

```
unsigned int Fl_Preferences::file_access ( ) [static]
```

Return the current file access permissions for the FLTK preferences system.

See also

[Fl_Preferences::file_access\(unsigned int\)](#)

12.105.5.8 file_access() [2/2]

```
void Fl_Preferences::file_access (
    unsigned int flags ) [static]
```

Tell the FLTK preferences system which files in the file system it may read, create, or write.

The FLTK core library will try to read or even create or write preference files when calling [Fl::option\(\)](#), [Fl_File_Chooser](#), the printing panel, and possibly some other internal functions. If your application wants to keep FLTK from touching the file system, call this function before making any other FLTK calls:

```
// neither FLTK nor the app may read, create, or write preference files
Fl_Preferences::file_access( Fl_Preferences::NONE );
```

or

```
// FLTK may not read, create, or write preference files, but the application may
Fl_Preferences::file_access( Fl_Preferences::APP_OK );
```

All flags can be combined using an OR operator. If flags are not set, that specific access to the file system will not be allowed. By default, all access is granted. To clear one or more flags from the default setting, use:

```
Fl_Preferences::file_access( Fl_Preferences::file_access()
    &~ Fl_Preferences::SYSTEM_WRITE );
```

If preferences are created using a filename (instead of [Fl_Preferences::USER](#) or [Fl_Preferences::SYSTEM](#)), file access is handled as if the [Fl_Preferences::USER](#) flag was set.

See also

[Fl_Preferences::NONE](#) and others for a list of flags.

[Fl_Preferences::file_access\(\)](#)

12.105.5.9 filename() [1/2]

```
Fl_Preferences::Root Fl_Preferences::filename (
    char * buffer,
    size_t buffer_size )
```

Return the file name and path to the preference file.

If the preferences have not changed or have not been flushed, the file or directory may not have been created yet.

Parameters

out	<i>buffer</i>	write the resulting path into this buffer
in	<i>buffer_size</i>	size of the <i>buffer</i> in bytes

Returns

the root type at creation type, or MEMORY for runtime prefs, it does not return CORE or LOCALE flags.

12.105.5.10 filename() [2/2]

```
Fl_Preferences::Root Fl_Preferences::filename (
    char * buffer,
    size_t buffer_size,
    Root root,
    const char * vendor,
    const char * application ) [static]
```

Determine the file name and path to preferences that would be opened with these parameters.

Find the possible location of a preference file on disk without touching any of the pathname components. This can be used to check if a preference file already exists.

Parameters

out	<i>buffer</i>	write the resulting path into this buffer
in	<i>buffer_size</i>	size of the <i>buffer</i> in bytes
in	<i>root</i>	can be USER_L or SYSTEM_L for user specific or system wide preferences
in	<i>vendor</i>	unique text describing the company or author of this file, must be a valid filepath segment
in	<i>application</i>	unique text describing the application, must be a valid filepath segment

Returns

the input root value, or [Fl_Preferences::UNKNOWN_ROOT_TYPE](#) if the path could not be determined.

See also

[Fl_Preferences\(Root root, const char *vendor, const char *application \)](#)

12.105.5.11 flush()

```
int Fl_Preferences::flush ( )
```

Writes preferences to disk if they were modified.

This method can be used to verify that writing a preference file went well. Deleting the base preferences object will also write the contents of the database to disk.

Returns

-1 if anything went wrong, i.e. file could not be opened, permissions blocked writing, etc.

0 if the file was written to disk. This does not check if the disk ran out of space and the file is truncated.

1 if no data was written to the database and no write attempt to disk was made.

12.105.5.12 get() [1/8]

```
char Fl_Preferences::get (
    const char * key,
    char *& text,
    const char * defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). `get()` allocates memory of sufficient size to hold the value. The buffer must be free'd by the developer using `free(value)`.

Parameters

in	<i>key</i>	name of entry
out	<i>text</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

12.105.5.13 get() [2/8]

```
char Fl_Preferences::get (
    const char * key,
    char * text,
    const char * defaultValue,
    int maxSize )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). 'maxSize' is the maximum length of text that will be read. The text buffer must allow for one additional byte for a trailing zero.

Parameters

in	<i>key</i>	name of entry
out	<i>text</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set
in	<i>maxSize</i>	maximum length of value plus one byte for a trailing zero

Returns

0 if the default value was used

12.105.5.14 get() [3/8]

```
char Fl_Preferences::get (
    const char * key,
    double & value,
    double defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0).

Parameters

in	<i>key</i>	name of entry
out	<i>value</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

12.105.5.15 get() [4/8]

```
char Fl_Preferences::get (
    const char * key,
    float & value,
    float defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0).

Parameters

in	<i>key</i>	name of entry
out	<i>value</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

12.105.5.16 get() [5/8]

```
char Fl_Preferences::get (
    const char * key,
    int & value,
    int defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0).

Parameters

in	<i>key</i>	name of entry
out	<i>value</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

12.105.5.17 get() [6/8]

```
char Fl_Preferences::get (
    const char * key,
```

```

    void *& data,
    const void * defaultValue,
    int defaultSize )

```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). `get()` allocates memory of sufficient size to hold the value. The buffer must be free'd by the developer using `'free(value)'`.

Parameters

in	<i>key</i>	name of entry
out	<i>data</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set
in	<i>defaultSize</i>	size of default value array

Returns

0 if the default value was used

12.105.5.18 `get()` [7/8]

```

char Fl_Preferences::get (
    const char * key,
    void * data,
    const void * defaultValue,
    int defaultSize,
    int * maxSize )

```

Reads a binary entry from the group, encoded in hexadecimal blocks.

A binary (not hex) default value can be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). `maxSize` is the maximum length of text that will be read and returns the actual number of bytes read.

Parameters

in	<i>key</i>	name of entry
out	<i>data</i>	value returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set
in	<i>defaultSize</i>	size of default value array
in, out	<i>maxSize</i>	maximum length of value and actual number of bytes set

Returns

0 if the default value was used

12.105.5.19 `get()` [8/8]

```

char Fl_Preferences::get (
    const char * key,
    void * data,
    const void * defaultValue,
    int defaultSize,
    int maxSize )

```

Reads a binary entry from the group, encoded in hexadecimal blocks.

Parameters

in	<i>key</i>	name of entry
out	<i>data</i>	value returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value
in	<i>defaultSize</i>	size of default value array
in	<i>maxSize</i>	maximum length of value, to receive the number of bytes read, use the function below instead.

Returns

0 if the default value was used

See also

[Fl_Preferences::get\(const char *key, void *data, const void *defaultValue, int defaultSize, int *maxSize \)](#)

12.105.5.20 get_userdata_path()

```
char Fl_Preferences::get_userdata_path (
    char * path,
    int pathlen )
```

Creates a path that is related to the preference file and that is usable for additional application data.

This function creates a directory that is named after the preferences database without the .prefs extension and located in the same directory. It then fills the given buffer with the complete path name.

There is no way to verify that the path name fit into the buffer. If the name is too long, it will be clipped.

This function can be used with direct paths that don't end in .prefs . *getUserDataPath()* will remove any extension and end the path with a / . If the file name has no extension, *getUserDataPath()* will append .data/ to the path name.

Example:

```
Fl_Preferences prefs( USER, "matthiasm.com", "test" );
char path[FL_PATH_MAX];
prefs.getUserdataPath( path, FL_PATH_MAX );
```

creates the preferences database in the directory (User 'matt' on Linux):

```
/Users/matt/.fltk/matthiasm.com/test.prefs
```

..and returns the userdata path:

```
/Users/matt/.fltk/matthiasm.com/test/
```

Parameters

out	<i>path</i>	buffer for user data path
in	<i>pathlen</i>	size of path buffer (should be at least FL_PATH_MAX)

Returns

1 if there is no filename (*path* will be unmodified)

1 if *pathlen* is 0 (*path* will be unmodified)

1 if a path was created successfully, *path* will contain the path name ending in a '/'

0 if path was not created for some reason; *path* will contain the pathname that could not be created

See also

[Fl_Preferences::Fl_Preferences\(Root, const char*, const char*\)](#)

12.105.5.21 group()

```
const char * Fl_Preferences::group (
    int num_group )
```

Returns the name of the Nth (`num_group`) group.

There is no guaranteed order of group names. The index must be within the range given by `groups()`.

Parameters

<code>in</code>	<code>num_group</code>	number indexing the requested group
-----------------	------------------------	-------------------------------------

Returns

'C' string pointer to the group name

12.105.5.22 `group_exists()`

```
char Fl_Preferences::group_exists (
    const char * key )
```

Returns non-zero if a group with this name exists.

Group names are relative to the [Fl_Preferences](#) node and can contain a path. "." describes the current node, "/" describes the topmost node. By preceding a groupname with a "/" its path becomes relative to the topmost node.

Parameters

<code>in</code>	<code>key</code>	name of group that is searched for
-----------------	------------------	------------------------------------

Returns

0 if no group by that name was found

12.105.5.23 `groups()`

```
int Fl_Preferences::groups ( )
```

Returns the number of groups that are contained within a group.

Returns

0 for no groups at all

12.105.5.24 `new_UUID()`

```
const char * Fl_Preferences::new_UUID ( ) [static]
```

Returns a UUID as generated by the system.

A UUID is a "universally unique identifier" which is commonly used in configuration files to create identities. A UUID in ASCII looks like this: 937C4900-51AA-4C11-8DD3-7AB59944F03E. It has always 36 bytes plus a trailing zero.

Returns

a pointer to a static buffer containing the new UUID in ASCII format. The buffer is overwritten during every call to this function!

12.105.5.25 `set()` [1/7]

```
char Fl_Preferences::set (
    const char * key,
    const char * text )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preference file.

Parameters

in	<i>key</i>	name of entry
in	<i>text</i>	set this entry to <i>value</i>

Returns

0 if setting the value failed

12.105.5.26 set() [2/7]

```
char Fl_Preferences::set (
    const char * key,
    const void * data,
    int dsize )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preference file.

Parameters

in	<i>key</i>	name of entry
in	<i>data</i>	set this entry to <i>value</i>
in	<i>dsize</i>	size of data array

Returns

0 if setting the value failed

12.105.5.27 set() [3/7]

```
char Fl_Preferences::set (
    const char * key,
    double value )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preference file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>

Returns

0 if setting the value failed

12.105.5.28 set() [4/7]

```
char Fl_Preferences::set (
    const char * key,
    double value,
    int precision )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preference file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>
in	<i>precision</i>	number of decimal digits to represent value

Returns

0 if setting the value failed

12.105.5.29 set() [5/7]

```
char Fl_Preferences::set (
    const char * key,
    float value )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preference file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>

Returns

0 if setting the value failed

12.105.5.30 set() [6/7]

```
char Fl_Preferences::set (
    const char * key,
    float value,
    int precision )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preference file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>
in	<i>precision</i>	number of decimal digits to represent value

Returns

0 if setting the value failed

12.105.5.31 set() [7/7]

```
char Fl_Preferences::set (
    const char * key,
    int value )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preference file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>

Returns

0 if setting the value failed

12.105.5.32 size()

```
int Fl_Preferences::size (
    const char * key )
```

Returns the size of the value part of an entry.

Parameters

in	<i>key</i>	name of entry
----	------------	---------------

Returns

size of value

12.105.6 Member Data Documentation

12.105.6.1 CORE_READ_OK

```
const unsigned int Fl_Preferences::CORE_READ_OK = 0x0010 [static]
```

Set this if it is OK for FLTK to read preference files.

USER_READ_OK and/or SYSTEM_READ_OK must also be set.

12.105.6.2 CORE_WRITE_OK

```
const unsigned int Fl_Preferences::CORE_WRITE_OK = 0x0020 [static]
```

Set this if it is OK for FLTK to create or write preference files.

USER_WRITE_OK and/or SYSTEM_WRITE_OK must also be set.

12.105.6.3 NONE

```
const unsigned int Fl_Preferences::NONE = 0x0000 [static]
```

Set this if no call to [Fl_Preferences](#) shall access the file system.

See also

[Fl_Preferences::file_access\(unsigned int\)](#)

[Fl_Preferences::file_access\(\)](#)

The documentation for this class was generated from the following files:

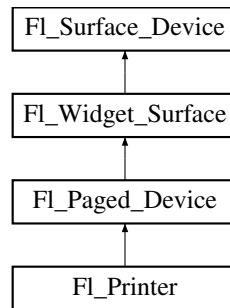
- Fl_Preferences.H
- Fl_Preferences.cxx

12.106 Fl_Printer Class Reference

OS-independent print support.

```
#include <Fl_Printer.H>
```

Inheritance diagram for `Fl_Printer`:



Public Member Functions

- `int begin_job` (int pagecount=0, int *frompage=NULL, int *topage=NULL, char **perr_message=NULL) **FL_OVERRIDE**
Begins a print job.
- `int begin_page` (void) **FL_OVERRIDE**
Begins a new printed page.
- `void end_job` (void) **FL_OVERRIDE**
To be called at the end of a print job.
- `int end_page` (void) **FL_OVERRIDE**
To be called at the end of each page.
- **Fl_Printer** (void)
The constructor.
- `bool is_current` () **FL_OVERRIDE**
Is this surface the current drawing surface?
- `void margins` (int *left, int *top, int *right, int *bottom) **FL_OVERRIDE**
Computes the dimensions of margins that lie between the printable page area and the full page.
- `void origin` (int *x, int *y) **FL_OVERRIDE**
Computes the coordinates of the current origin of graphics functions.
- `void origin` (int x, int y) **FL_OVERRIDE**
Sets the position of the origin of graphics in the drawable part of the drawing surface.
- `int printable_rect` (int *w, int *h) **FL_OVERRIDE**
Computes the width and height of the drawable area of the drawing surface.
- `void rotate` (float angle) **FL_OVERRIDE**
Rotates the graphics operations relatively to paper.
- `void scale` (float scale_x, float scale_y=0.) **FL_OVERRIDE**
Changes the scaling of page coordinates.
- `void set_current` (void) **FL_OVERRIDE**
Make this surface the current drawing surface.
- `void translate` (int x, int y) **FL_OVERRIDE**
Translates the current graphics origin accounting for the current rotation.
- `void untranslate` (void) **FL_OVERRIDE**
Undoes the effect of a previous `translate()` call.
- `~Fl_Printer` (void)
The destructor.

Public Member Functions inherited from FI_Paged_Device

- void **print_widget** (FI_Widget *widget, int delta_x=0, int delta_y=0)
Synonym of draw(FI_Widget, int, int)*
- void **print_window** (FI_Window *win, int x_offset=0, int y_offset=0)
Synonym of draw_decorated_window(FI_Window, int, int)*
- int **start_job** (int pagecount=0, int *frompage=NULL, int *topage=NULL, char **perr_message=NULL)
*Synonym of begin_job(int pagecount, int *frompage, int *topage, char **perr_message).*
- int **start_page** ()
Synonym of begin_page().
- virtual ~**FI_Paged_Device** ()
The destructor.

Public Member Functions inherited from FI_Widget_Surface

- void **draw** (FI_Widget *widget, int delta_x=0, int delta_y=0)
Draws the widget on the drawing surface.
- void **draw_decorated_window** (FI_Window *win, int x_offset=0, int y_offset=0)
Draws a window with its title bar and frame if any.
- void **print_window_part** (FI_Window *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Draws a rectangular part of an on-screen window.

Public Member Functions inherited from FI_Surface_Device

- FI_Graphics_Driver * **driver** ()
Returns the graphics driver of this drawing surface.
- virtual ~**FI_Surface_Device** ()
The destructor.

Static Public Attributes

These attributes are useful for the Linux/Unix platform only.

- static const char * **dialog_title** = "Print"
[this text may be customized at run-time]
- static const char * **dialog_printer** = "Printer:"
[this text may be customized at run-time]
- static const char * **dialog_range** = "Print Range"
[this text may be customized at run-time]
- static const char * **dialog_copies** = "Copies"
[this text may be customized at run-time]
- static const char * **dialog_all** = "All"
[this text may be customized at run-time]
- static const char * **dialog_pages** = "Pages"
[this text may be customized at run-time]
- static const char * **dialog_from** = "From:"
[this text may be customized at run-time]
- static const char * **dialog_to** = "To:"
[this text may be customized at run-time]
- static const char * **dialog_properties** = "Properties..."
[this text may be customized at run-time]
- static const char * **dialog_copyNo** = "# Copies:"
[this text may be customized at run-time]
- static const char * **dialog_print_button** = "Print"
[this text may be customized at run-time]
- static const char * **dialog_cancel_button** = "Cancel"

- [this text may be customized at run-time]*
- static const char * **dialog_print_to_file** = "Print To File"
- [this text may be customized at run-time]*
- static const char * **property_title** = "Printer Properties"
- [this text may be customized at run-time]*
- static const char * **property_pagesize** = "Page Size:"
- [this text may be customized at run-time]*
- static const char * **property_mode** = "Output Mode:"
- [this text may be customized at run-time]*
- static const char * **property_use** = "Use"
- [this text may be customized at run-time]*
- static const char * **property_save** = "Save"
- [this text may be customized at run-time]*
- static const char * **property_cancel** = "Cancel"
- [this text may be customized at run-time]*

Static Public Attributes inherited from [FI_Paged_Device](#)

- static const [page_format](#) **page_formats** [[NO_PAGE_FORMATS](#)]
width, height and name of all elements of the enum [Page_Format](#).

Additional Inherited Members

Public Types inherited from [FI_Paged_Device](#)

- enum [Page_Format](#) {
[A0](#) = 0 , [A1](#) , [A2](#) , [A3](#) ,
[A4](#) , [A5](#) , [A6](#) , [A7](#) ,
[A8](#) , [A9](#) , [B0](#) , [B1](#) ,
[B2](#) , [B3](#) , [B4](#) , [B5](#) ,
[B6](#) , [B7](#) , [B8](#) , [B9](#) ,
[B10](#) , [C5E](#) , [DLE](#) , [EXECUTIVE](#) ,
[FOLIO](#) , [LEDGER](#) , [LEGAL](#) , [LETTER](#) ,
[TABLOID](#) , [ENVELOPE](#) , [MEDIA](#) = 0x1000 }
Possible page formats.
- enum [Page_Layout](#) { [PORTRAIT](#) = 0 , [LANDSCAPE](#) = 0x100 , [REVERSED](#) = 0x200 , [ORIENTATION](#) = 0x300 }
Possible page layouts.

Static Public Member Functions inherited from [FI_Surface_Device](#)

- static [FI_Surface_Device](#) * [pop_current](#) ()
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void [push_current](#) ([FI_Surface_Device](#) *[new_current](#))
Pushes [new_current](#) on top of the stack of current drawing surfaces, and makes it current.
- static [FI_Surface_Device](#) * [surface](#) ()
The current drawing surface.

Protected Member Functions inherited from [FI_Paged_Device](#)

- [FI_Paged_Device](#) ()
The constructor.

Protected Member Functions inherited from [FI_Widget_Surface](#)

- [FI_Widget_Surface](#) ([FI_Graphics_Driver](#) *[d](#))
The constructor.

Protected Member Functions inherited from [Fl_Surface_Device](#)

- void **driver** ([Fl_Graphics_Driver](#) *graphics_driver)
Sets the graphics driver of this drawing surface.
- virtual void **end_current** ()
FLTK calls this each time a surface ceases to be the current drawing surface.
- **Fl_Surface_Device** ([Fl_Graphics_Driver](#) *graphics_driver)
Constructor that sets the graphics driver to use for the created surface.

Protected Attributes inherited from [Fl_Widget_Surface](#)

- int **x_offset**
horizontal offset to the origin of graphics coordinates
- int **y_offset**
vertical offset to the origin of graphics coordinates

12.106.1 Detailed Description

OS-independent print support.

[Fl_Printer](#) allows to use all drawing, color, text, image, and clip FLTK functions, and to have them operate on printed page(s). There are two main, non exclusive, ways to use it.

- Print any widget (standard, custom, [Fl_Window](#), [Fl_Gl_Window](#)) as it appears on screen, with optional translation, scaling and rotation. This is done by calling [print_widget\(\)](#), [print_window\(\)](#) or [print_window_part\(\)](#).
- Use a series of FLTK graphics commands (e.g., font, text, lines, colors, clip, image) to compose a page appropriately shaped for printing.

In both cases, begin by [begin_job\(\)](#), [begin_page\(\)](#), [printable_rect\(\)](#) and [origin\(\)](#) calls and finish by [end_page\(\)](#) and [end_job\(\)](#) calls.

Example of use: print a widget centered in a page

```
#include <FL/Fl_Printer.H>
#include <FL/fl_draw.H>
int width, height;
Fl_Widget *widget = ... // a widget we want printed
Fl_Printer *printer = new Fl_Printer();
if (printer->begin_job(1) == 0) {
    printer->begin_page();
    printer->printable_rect(&width, &height);
    fl_color(FL_BLACK);
    fl_line_style(FL_SOLID, 2);
    fl_rect(0, 0, width, height);
    fl_font(FL_COURIER, 12);
    time_t now; time(&now); fl_draw(ctime(&now), 0, fl_height());
    printer->origin(width/2, height/2);
    printer->print_widget(widget, -widget->w()/2, -widget->h()/2);
    printer->end_page();
    printer->end_job();
}
delete printer;
```

Recommended method to refresh GUI while printing :

```
printer->begin_job(0);
.....
Fl_Surface_Device::push_current(Fl_Display_Device::display_device());
Fl::check(); // or any operation that draws to display
Fl_Surface_Device::pop_current();
.....
printer->end_job();
```

Platform specifics

- X11 and Wayland platforms:
 - FLTK expresses all graphics data using (Level 2) PostScript and sends that to the selected printer. See class [Fl_PostScript_File_Device](#) for a description of how text and transparent images appear in print.
 - If the GTK library is available at run-time, class [Fl_Printer](#) runs GTK's printer dialog which allows to set printer, paper size and orientation.

- Under the KDE desktop, [Fl_Printer](#) runs the `kdiallog` command to create KDE-styled file dialogs if that command is available at run-time, unless FLTK was built with CMake and option `FLTK_USE_KDIALOG` turned off. In that case, [Fl_Printer](#) attempts to run the GTK dialog.
- If the GTK library is not available, or if `Fl::option(Fl::OPTION_PRINTER_USES_GTK)` has been turned off, class [Fl_Printer](#) runs FLTK's print dialog.
 - * Unless it has been previously changed, the default paper size is A4. To change that, press the "Properties" button of the "Print" dialog window opened by an `Fl_Printer::begin_job()` call. This opens a "Printer Properties" window where it's possible to select the adequate paper size. Finally press the "Save" button therein to assign the chosen paper size to the chosen printer for this and all further print operations.
 - * Use the static public attributes of this class to set the print dialog to other languages than English. For example, the "Printer:" dialog item `Fl_Printer::dialog_printer` can be set to French with:


```
Fl_Printer::dialog_printer = "Imprimante:";
```

 before creation of the [Fl_Printer](#) object.
 - * Use `Fl_PostScript_File_Device::file_chooser_title` to customize the title of the file chooser dialog that opens when using the "Print To File" option of the print dialog.
- Windows platform: Transparent [Fl_RGB_Image](#) 's don't print with exact transparency on most printers (a workaround is to use `print_window_part()`). [Fl_RGB_Image](#) 's don't `rotate()` well.
- Mac OS X platform: all graphics requests print as on display and accept rotation and scaling.

12.106.2 Member Function Documentation

12.106.2.1 `begin_job()`

```
int Fl_Printer::begin_job (
    int pagecount = 0,
    int * frompage = NULL,
    int * topage = NULL,
    char ** perr_message = NULL ) [virtual]
```

Begins a print job.

Parameters

in	<i>pagecount</i>	the total number of pages of the job (or 0 if you don't know the number of pages)
out	<i>frompage</i>	if non-null, *frompage is set to the first page the user wants printed
out	<i>topage</i>	if non-null, *topage is set to the last page the user wants printed
out	<i>perr_message</i>	if non-null and if the returned value is 2, *perr_message is set to a string describing the error. That string can be delete[]'d after use.

Returns

0 if OK, 1 if user cancelled the job, 2 if any error.

Reimplemented from [Fl_Paged_Device](#).

12.106.2.2 `begin_page()`

```
int Fl_Printer::begin_page (
    void ) [virtual]
```

Begins a new printed page.

The page coordinates are initially in points, i.e., 1/72 inch, and with origin at the top left of the printable page area. This function also makes this surface the current drawing surface with [Fl_Surface_Device::push_current\(\)](#).

Note

`begin_page()` calls `Fl_Surface_Device::push_current()` and leaves this device as the active surface. If any calls between `begin_page()` and `end_page()` open dialog boxes or will otherwise draw into FLTK windows, those calls must be put between a call to `Fl_Surface_Device::pop_current()` and a call to `Fl_Surface_Device::push_current()`, or the content of the dialog box will be rendered to the printer instead of the screen.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

12.106.2.3 end_job()

```
void Fl_Printer::end_job (
    void ) [virtual]
```

To be called at the end of a print job.

Reimplemented from [Fl_Paged_Device](#).

12.106.2.4 end_page()

```
int Fl_Printer::end_page (
    void ) [virtual]
```

To be called at the end of each page.

This function also stops this surface from being the current drawing surface with `Fl_Surface_Device::pop_current()`.

Note

`end_page()` calls `Fl_Surface_Device::pop_current()`. If any calls between `begin_page()` and `end_page()` open dialog boxes or will otherwise draw into FLTK windows, those calls must be put between a call to `Fl_Surface_Device::pop_current()` and a call to `Fl_Surface_Device::push_current()`.

Returns

0 if OK, non-zero if any error.

Reimplemented from [Fl_Paged_Device](#).

12.106.2.5 is_current()

```
bool Fl_Printer::is_current ( ) [virtual]
```

Is this surface the current drawing surface?

Reimplemented from [Fl_Surface_Device](#).

12.106.2.6 margins()

```
void Fl_Printer::margins (
    int * left,
    int * top,
    int * right,
    int * bottom ) [virtual]
```

Computes the dimensions of margins that lie between the printable page area and the full page.

Values are in the same unit as that used by FLTK drawing functions. They are changed by [scale\(\)](#) calls.

Parameters

out	<i>left</i>	If non-null, *left is set to the left margin size.
out	<i>top</i>	If non-null, *top is set to the top margin size.
out	<i>right</i>	If non-null, *right is set to the right margin size.
out	<i>bottom</i>	If non-null, *bottom is set to the bottom margin size.

Reimplemented from [Fl_Paged_Device](#).

12.106.2.7 origin() [1/2]

```
void Fl_Printer::origin (
    int * x,
    int * y ) [virtual]
```

Computes the coordinates of the current origin of graphics functions.

Parameters

out	<i>x,y</i>	If non-null, *x and *y are set to the horizontal and vertical coordinates of the graphics origin.
-----	------------	---

Reimplemented from [Fl_Widget_Surface](#).

12.106.2.8 origin() [2/2]

```
void Fl_Printer::origin (
    int x,
    int y ) [virtual]
```

Sets the position of the origin of graphics in the drawable part of the drawing surface.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the drawable area. Successive [origin\(\)](#) calls don't combine their effects. [Origin\(\)](#) calls are not affected by [rotate\(\)](#) calls (for classes derived from [Fl_Paged_Device](#)).

Parameters

in	<i>x,y</i>	Horizontal and vertical positions in the drawing surface of the desired origin of graphics.
----	------------	---

Reimplemented from [Fl_Widget_Surface](#).

12.106.2.9 printable_rect()

```
int Fl_Printer::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the drawable area of the drawing surface.

Values are in the same unit as that used by FLTK drawing functions and are unchanged by calls to [origin\(\)](#). If the object is derived from class [Fl_Paged_Device](#), values account for the user-selected paper type and print orientation and are changed by [scale\(\)](#) calls.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Widget_Surface](#).

12.106.2.10 rotate()

```
void Fl_Printer::rotate (
    float angle ) [virtual]
```

Rotates the graphics operations relatively to paper.

The rotation is centered on the current graphics origin. Successive [rotate\(\)](#) calls don't combine their effects.

Parameters

<i>angle</i>	Rotation angle in counter-clockwise degrees.
--------------	--

Reimplemented from [Fl_Paged_Device](#).

12.106.2.11 scale()

```
void Fl_Printer::scale (
    float scale_x,
    float scale_y = 0. ) [virtual]
```

Changes the scaling of page coordinates.

This function also resets the origin of graphics functions at top left of printable page area. After a [scale\(\)](#) call, do a [printable_rect\(\)](#) call to get the new dimensions of the printable page area. Successive [scale\(\)](#) calls don't combine their effects.

Parameters

<code>scale_x</code>	Horizontal dimensions of plot are multiplied by this quantity.
<code>scale_y</code>	Same as above, vertically. The value 0. is equivalent to setting <code>scale_y = scale_x</code> . Thus, <code>scale(factor);</code> is equivalent to <code>scale(factor, factor);</code>

Reimplemented from [Fl_Paged_Device](#).

12.106.2.12 set_current()

```
void Fl_Printer::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests. Starting from FLTK 1.4.0, the preferred API to change the current drawing surface is [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Note

It's recommended to use this function only as follows :

- The current drawing surface is the display;
- make current another surface, e.g., an [Fl_Printer](#) or an [Fl_Image_Surface](#) object, calling [set_current\(\)](#) on this object;
- draw to that surface;
- make the display current again with [Fl_Display_Device::display_device\(\)->set_current\(\)](#); . Don't do any other call to [set_current\(\)](#) before this one.

Other scenarios of drawing surface changes should be performed via [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Reimplemented from [Fl_Surface_Device](#).

12.106.2.13 translate()

```
void Fl_Printer::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call. Successive [translate\(\)](#) calls add up their effects.

Reimplemented from [Fl_Widget_Surface](#).

12.106.2.14 untranslate()

```
void Fl_Printer::untranslate (
    void ) [virtual]
```

Undoes the effect of a previous [translate\(\)](#) call.

Reimplemented from [Fl_Widget_Surface](#).

The documentation for this class was generated from the following files:

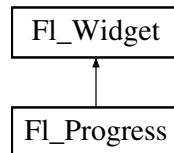
- [FI_Printer.H](#)
- [FI_Printer.cxx](#)

12.107 FI_Progress Class Reference

Displays a progress bar for the user.

```
#include <FI_Progress.H>
```

Inheritance diagram for FI_Progress:



Public Member Functions

- [FI_Progress](#) (int x, int y, int w, int h, const char *l=0)
The constructor creates the progress bar using the position, size, and label.
- float [maximum](#) () const
Gets the maximum value in the progress widget.
- void [maximum](#) (float v)
Sets the maximum value in the progress widget.
- float [minimum](#) () const
Gets the minimum value in the progress widget.
- void [minimum](#) (float v)
Sets the minimum value in the progress widget.
- float [value](#) () const
Gets the current value in the progress widget.
- void [value](#) (float v)
Sets the current value in the progress widget.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).

- virtual class [FI_GI_Window](#) const * **as_gi_window** () const
- virtual [FI_Group](#) * **as_group** ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void **bind_image** (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype](#) **box** () const
 - Gets the box type of the widget.*
- void **box** ([FI_Boxtype](#) new_box)
 - Sets the box type for the widget.*
- [FI_Callback_p](#) **callback** () const
 - Gets the current callback function for the widget.*
- void **callback** ([FI_Callback](#) *cb)
 - Sets the current callback function for the widget.*
- void **callback** ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void **callback** ([FI_Callback](#) *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void **callback** ([FI_Callback0](#) *cb)
 - Sets the current callback function for the widget.*
- void **callback** ([FI_Callback1](#) *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int **changed** () const
 - Checks if the widget value changed since the last callback.*
- void **clear_active** ()
 - Marks the widget as inactive without sending events or changing focus.*
- void **clear_changed** ()
 - Marks the value of the widget as unchanged.*
- void **clear_damage** (uchar c=0)
 - Clears or sets the damage flags.*
- void **clear_output** ()
 - Sets a widget to accept input.*
- void **clear_visible** ()
 - Hides the widget.*
- void **clear_visible_focus** ()
 - Disables keyboard focus navigation with this widget.*
- [FI_Color](#) **color** () const
 - Gets the background color of the widget.*
- void **color** ([FI_Color](#) bg)
 - Sets the background color of the widget.*
- void **color** ([FI_Color](#) bg, [FI_Color](#) sel)
 - Sets the background and selection color of the widget.*

- [FI_Color](#) `color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const [FI_Widget](#) *w) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- [uchar](#) `damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` ([uchar](#) c)
Sets the damage bits for the widget.
- void `damage` ([uchar](#) c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- [FI_Image](#) * `deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const [FI_Image](#) * `deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` ([FI_Image](#) &img)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with default arguments.
- void `do_callback` ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- void `do_callback` ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, [FI_Align](#)) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual int `handle` (int event)
Handles the specified event.
- virtual void `hide` ()
Makes a widget invisible.
- [FI_Image](#) * `image` ()
Gets the image that is used as part of the widget label when in the active state.
- const [FI_Image](#) * `image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` ([FI_Image](#) &img)
Sets the image to use as part of the widget label when in the active state.
- void `image` ([FI_Image](#) *img)

- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const `FL_Widget` *wgt) const

Checks if this widget is a child of wgt.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.
- void `label` (const char *text)

Sets the current label pointer.
- void `label` (`FL_Labeltype` a, const char *b)

Shortcut to set the label text and type in one call.
- `FL_Color` `labelcolor` () const

Gets the label color.
- void `labelcolor` (`FL_Color` c)

Sets the label color.
- `FL_Font` `labelfont` () const

Gets the font to use.
- void `labelfont` (`FL_Font` f)

Sets the font to use.
- `FL_Fontsize` `labelsize` () const

Gets the font size in pixels.
- void `labelsize` (`FL_Fontsize` pix)

Sets the font size in pixels.
- `FL_Labeltype` `labeltype` () const

Gets the label type.
- void `labeltype` (`FL_Labeltype` a)

Sets the label type.
- void `measure_label` (int &ww, int &hh) const

Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const

Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)

Sets whether this widget needs a keyboard.
- unsigned int `output` () const

Returns if a widget is used for output only.
- `FL_Group` * `parent` () const

Returns a pointer to the parent widget.
- void `parent` (`FL_Group` *p)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
- `FL_Color` `selection_color` () const

Gets the selection color.

- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

- Modifies keyboard focus navigation.*

 - int `visible_r` () const
Returns whether a widget and all its parents are visible.
 - int `w` () const
Gets the widget width.
 - `Fl_When when` () const
Returns the conditions under which the callback is called.
 - void `when` (uchar i)
Sets the flags used to decide when a callback is called.
 - `Fl_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
 - int `x` () const
Gets the widget position in its window.
 - int `y` () const
Gets the widget position in its window.
 - virtual `~Fl_Widget` ()
Destroys the widget.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draws the progress bar.

Protected Member Functions inherited from `Fl_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`Fl_Boxtype` t, `Fl_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`Fl_Boxtype` t, int x, int y, int w, int h, `Fl_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`Fl_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`Fl_Boxtype` t, int x, int y, int w, int h, `Fl_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `Fl_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)

- *Sets a flag in the flags mask.*
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `Fl_Widget`

- static void `default_callback` (`Fl_Widget *widget`, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from `Fl_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

12.107.1 Detailed Description

Displays a progress bar for the user.

12.107.2 Constructor & Destructor Documentation

12.107.2.1 `Fl_Progress()`

```
Fl_Progress::Fl_Progress (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor creates the progress bar using the position, size, and label.

You can set the background color with `color()` and the progress bar color with `selection_color()`, or you can set both colors together with `color(unsigned bg, unsigned sel)`.

The default colors are `FL_BACKGROUND2_COLOR` and `FL_YELLOW`, resp.

12.107.3 Member Function Documentation

12.107.3.1 draw()

```
void Fl_Progress::draw (
    void ) [protected], [virtual]
```

Draws the progress bar.
Implements [Fl_Widget](#).

12.107.3.2 maximum() [1/2]

```
float Fl_Progress::maximum ( ) const [inline]
```

Gets the maximum value in the progress widget.

12.107.3.3 maximum() [2/2]

```
void Fl_Progress::maximum (
    float v ) [inline]
```

Sets the maximum value in the progress widget.

12.107.3.4 minimum() [1/2]

```
float Fl_Progress::minimum ( ) const [inline]
```

Gets the minimum value in the progress widget.

12.107.3.5 minimum() [2/2]

```
void Fl_Progress::minimum (
    float v ) [inline]
```

Sets the minimum value in the progress widget.

12.107.3.6 value() [1/2]

```
float Fl_Progress::value ( ) const [inline]
```

Gets the current value in the progress widget.

12.107.3.7 value() [2/2]

```
void Fl_Progress::value (
    float v ) [inline]
```

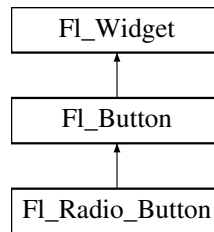
Sets the current value in the progress widget.

The documentation for this class was generated from the following files:

- [Fl_Progress.H](#)
- [Fl_Progress.cxx](#)

12.108 FI_Radio_Button Class Reference

Inheritance diagram for FI_Radio_Button:



Public Member Functions

- [FI_Radio_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.

Public Member Functions inherited from [FI_Button](#)

- int [clear](#) ()
Same as `value(0)`.
- [uchar compact](#) ()
Return true if buttons are rendered as compact buttons.
- void [compact](#) ([uchar v](#))
Decide if buttons should be rendered in compact mode.
- [FI_Boxtype down_box](#) () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void [down_box](#) ([FI_Boxtype b](#))
Sets the down box type.
- [FI_Color down_color](#) () const
(for backwards compatibility)
- void [down_color](#) (unsigned c)
(for backwards compatibility)
- [FI_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- int [set](#) ()
Same as `value(1)`.
- void [setonly](#) ()
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- int [shortcut](#) () const
Returns the current shortcut key for the button.
- void [shortcut](#) (const char *s)
(for backwards compatibility)
- void [shortcut](#) (int s)
Sets the shortcut key to `s`.
- char [value](#) () const
Returns the current value of the button (0 or 1).
- int [value](#) (int v)
Sets the current value of the button.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (FI_Align alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window** * **as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window** const * **as_gl_window** () const
- virtual **FI_Group** * **as_group** ()
Returns an FI_Group pointer if this widget is an FI_Group.
- virtual **FI_Group** const * **as_group** () const
- virtual **FI_Window** * **as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (FI_Image *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (FI_Boxtype new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (FI_Callback *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const

- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const

Gets the background color of the widget.
- void `color` (`FI_Color` bg)

Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)

Sets the background and selection color of the widget.
- `FI_Color` `color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget` *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar` `damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)

Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image` * `deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image` * `deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.

- void `do_callback` (`FI_Widget *widget`, long `arg`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, void `*arg=0`, `FI_Callback_Reason` `reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget *wgt`) const
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char `* label` () const
Gets the current label text.
- void `label` (const char `*text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype` `a`, const char `*b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` `c`)
Sets the label color.
- `FI_Font labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` `f`)
Sets the font to use.
- `FI_Fontsize labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` `pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` `a`)
Sets the label type.
- void `measure_label` (int `&ww`, int `&hh`) const
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool `needs`)

- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const

Returns if a widget is used for output only.
 - `FI_Group * parent` () const

Returns a pointer to the parent widget.
 - void `parent` (`FI_Group *p`)

Internal use only - "for hacks only".
 - void `position` (int X, int Y)

Repositions the window or widget.
 - void `redraw` ()

Schedules the drawing of the widget.
 - void `redraw_label` ()

Schedules the drawing of the label.
 - virtual void `resize` (int x, int y, int w, int h)

Changes the size or position of the widget.
 - `FI_Color selection_color` () const

Gets the selection color.
 - void `selection_color` (`FI_Color a`)

Sets the selection color.
 - void `set_active` ()

Marks the widget as active without sending events or changing focus.
 - void `set_changed` ()

Marks the value of the widget as changed.
 - void `set_output` ()

Sets a widget to output only.
 - void `set_visible` ()

Makes the widget visible.
 - void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
 - int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
 - void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
 - virtual void `show` ()

Makes a widget visible.
 - void `size` (int W, int H)

Changes the size of the widget.
 - int `take_focus` ()

Gives the widget the keyboard focus.
 - unsigned int `takeevents` () const

Returns if the widget is able to take events.
 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
 - const char * `tooltip` () const

Gets the current tooltip text.
 - void `tooltip` (const char *text)

Sets the current tooltip text.
 - `FI_Window * top_window` () const

Returns a pointer to the top-level window for the widget.
 - `FI_Window * top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.

- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.
- `int use_accents_menu ()`
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- `void * user_data () const`
Gets the user data for this widget.
- `void user_data (FI_Callback_User_Data *v, bool auto_free)`
Sets the user data for this widget.
- `void user_data (void *v)`
Sets the user data for this widget.
- `unsigned int visible () const`
Returns whether a widget is visible.
- `unsigned int visible_focus () const`
Checks whether this widget has a visible focus.
- `void visible_focus (int v)`
Modifies keyboard focus navigation.
- `int visible_r () const`
Returns whether a widget and all its parents are visible.
- `int w () const`
Gets the widget width.
- `FI_When when () const`
Returns the conditions under which the callback is called.
- `void when (uchar i)`
Sets the flags used to decide when a callback is called.
- `FI_Window * window () const`
Returns a pointer to the nearest parent window up the widget hierarchy.
- `int x () const`
Gets the widget position in its window.
- `int y () const`
Gets the widget position in its window.
- `virtual ~FI_Widget ()`
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- `static void default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- `static unsigned int label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- `static int test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from [FI_Button](#)

- void [draw](#) () [FL_OVERRIDE](#)
 - Draws the widget.*
- void [simulate_key_action](#) ()

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
 - Clears a flag in the flags mask.*
- void [draw_backdrop](#) () const
 - If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.*
- void [draw_box](#) () const
 - Draws the widget box according its box style.*
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
 - Draws a box of type t, of color c at the widget's position and size.*
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
 - Draws a box of type t, of color c at the position X,Y and size W,H.*
- void [draw_focus](#) () const
 - Draws a focus rectangle around the widget.*
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
 - Draws a focus rectangle around the widget.*
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
 - Draws a focus box for the widget at the given position and size.*
- void [draw_label](#) () const
 - Draws the widget's label at the defined label position.*
- void [draw_label](#) (int, int, int, int) const
 - Draws the label in an arbitrary bounding box.*
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
 - Creates a widget at the given position and size.*
- unsigned int [flags](#) () const
 - Gets the widget flags mask.*
- void [h](#) (int v)
 - Internal use only.*
- void [set_flag](#) (unsigned int c)
 - Sets a flag in the flags mask.*

- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Static Protected Member Functions inherited from [Fl_Button](#)

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from [Fl_Button](#)

- static [Fl_Widget_Tracker](#) * `key_release_tracker` = 0

12.108.1 Constructor & Destructor Documentation

12.108.1.1 Fl_Radio_Button()

```
Fl_Radio_Button::Fl_Radio_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor creates the button using the given position, size, and label. The Button [type\(\)](#) is set to FL_RADIO_BUTTON.

Parameters

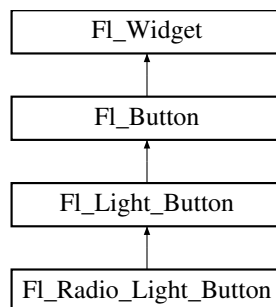
in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

The documentation for this class was generated from the following files:

- `Fl_Radio_Button.H`
- `Fl_Button.cxx`

12.109 Fl_Radio_Light_Button Class Reference

Inheritance diagram for `Fl_Radio_Light_Button`:



Public Member Functions

- `Fl_Radio_Light_Button` (int X, int Y, int W, int H, const char *l=0)

Public Member Functions inherited from [FI_Light_Button](#)

- [FI_Light_Button](#) (int x, int y, int w, int h, const char *l=0)
Creates a new [FI_Light_Button](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [FI_Button](#)

- int [clear](#) ()
Same as `value(0)`.
- [uchar compact](#) ()
Return true if buttons are rendered as compact buttons.
- void [compact](#) ([uchar](#) v)
Decide if buttons should be rendered in compact mode.
- [FI_Boxtype down_box](#) () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void [down_box](#) ([FI_Boxtype](#) b)
Sets the down box type.
- [FI_Color down_color](#) () const
(for backwards compatibility)
- void [down_color](#) (unsigned c)
(for backwards compatibility)
- [FI_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int [set](#) ()
Same as `value(1)`.
- void [setonly](#) ()
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- int [shortcut](#) () const
Returns the current shortcut key for the button.
- void [shortcut](#) (const char *s)
(for backwards compatibility)
- void [shortcut](#) (int s)
Sets the shortcut key to `s`.
- char [value](#) () const
Returns the current value of the button (0 or 1).
- int [value](#) (int v)
Sets the current value of the button.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.

- void `align` (`FI_Align` alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
 - Returns an `FI_Group` pointer if this widget is an `FI_Group`.*
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image` *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*

- void `clear_visible_focus ()`
Disables keyboard focus navigation with this widget.
- `FI_Color color () const`
Gets the background color of the widget.
- void `color (FI_Color bg)`
Sets the background color of the widget.
- void `color (FI_Color bg, FI_Color sel)`
Sets the background and selection color of the widget.
- `FI_Color color2 () const`
For back compatibility only.
- void `color2 (unsigned a)`
For back compatibility only.
- int `contains (const FI_Widget *w) const`
Checks if w is a child of this widget.
- void `copy_label (const char *new_label)`
Sets the current label.
- void `copy_tooltip (const char *text)`
Sets the current tooltip text.
- `uchar damage () const`
Returns non-zero if `draw()` needs to be called.
- void `damage (uchar c)`
Sets the damage bits for the widget.
- void `damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- int `damage_resize (int, int, int, int)`
Internal use only.
- void `deactivate ()`
Deactivates the widget.
- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- void `do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- void `do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h () const`
Gets the widget height.
- virtual void `hide ()`
Makes a widget invisible.
- `FI_Image * image ()`

- Gets the image that is used as part of the widget label when in the active state.*

 - const `FI_Image * image` () const
- Gets the image that is used as part of the widget label when in the active state.*

 - void `image (FI_Image &img)`
- Sets the image to use as part of the widget label when in the active state.*

 - void `image (FI_Image *img)`
- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound` () const
- Returns whether the image is managed by the widget.*

 - int `inside (const FI_Widget *wgt)` const
- Checks if this widget is a child of wgt.*

 - int `is_label_copied` () const
- Returns whether the current label was assigned with `copy_label()`.*

 - const char * `label` () const
- Gets the current label text.*

 - void `label (const char *text)`
- Sets the current label pointer.*

 - void `label (FI_Labeltype a, const char *b)`
- Shortcut to set the label text and type in one call.*

 - `FI_Color labelcolor` () const
- Gets the label color.*

 - void `labelcolor (FI_Color c)`
- Sets the label color.*

 - `FI_Font labelfont` () const
- Gets the font to use.*

 - void `labelfont (FI_Font f)`
- Sets the font to use.*

 - `FI_Fontsize labelsize` () const
- Gets the font size in pixels.*

 - void `labelsize (FI_Fontsize pix)`
- Sets the font size in pixels.*

 - `FI_Labeltype labeltype` () const
- Gets the label type.*

 - void `labeltype (FI_Labeltype a)`
- Sets the label type.*

 - void `measure_label (int &ww, int &hh)` const
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard (bool needs)`
- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group * parent` () const
- Returns a pointer to the parent widget.*

 - void `parent (FI_Group *p)`
- Internal use only - "for hacks only".*

 - void `position (int X, int Y)`
- Repositions the window or widget.*

 - void `redraw` ()
- Schedules the drawing of the widget.*

- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)

- *Sets the user data for this widget.*
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Light_Button](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from [FI_Button](#)

- void [simulate_key_action](#) ()

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int [flags](#) () const
Gets the widget flags mask.
- void [h](#) (int v)
Internal use only.
- void [set_flag](#) (unsigned int c)
Sets a flag in the flags mask.
- void [w](#) (int v)
Internal use only.
- void [x](#) (int v)
Internal use only.
- void [y](#) (int v)
Internal use only.

Static Protected Member Functions inherited from [FI_Button](#)

- static void [key_release_timeout](#) (void *)

Static Protected Attributes inherited from FI_Button

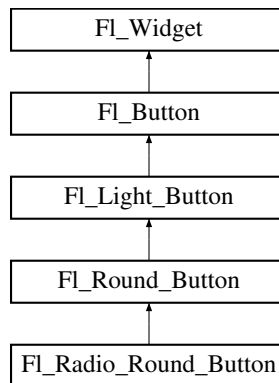
- static `FI_Widget_Tracker * key_release_tracker = 0`

The documentation for this class was generated from the following files:

- `FI_Radio_Light_Button.H`
- `FI_Light_Button.cxx`

12.110 FI_Radio_Round_Button Class Reference

Inheritance diagram for FI_Radio_Round_Button:



Public Member Functions

- `FI_Radio_Round_Button` (int X, int Y, int W, int H, const char *L=0)
Creates a new `FI_Radio_Button` widget using the given position, size, and label string.

Public Member Functions inherited from FI_Round_Button

- `FI_Round_Button` (int x, int y, int w, int h, const char *l=0)
Creates a new `FI_Round_Button` widget using the given position, size, and label string.

Public Member Functions inherited from FI_Light_Button

- `FI_Light_Button` (int x, int y, int w, int h, const char *l=0)
Creates a new `FI_Light_Button` widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.

Public Member Functions inherited from FI_Button

- int `clear` ()
Same as `value(0)`.
- `uchar compact` ()
Return true if buttons are rendered as compact buttons.
- void `compact` (`uchar` v)
Decide if buttons should be rendered in compact mode.
- `FI_Boxtype down_box` () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void `down_box` (`FI_Boxtype` b)
Sets the down box type.

- [FI_Color](#) **down_color** () const
(for backwards compatibility)
- void **down_color** (unsigned c)
(for backwards compatibility)
- [FI_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int **set** ()
Same as `value (1)`.
- void **setonly** ()
Turns on this button and turns off all other radio buttons in the group (calling `value (1)` or `set ()` does not do this).
- int **shortcut** () const
Returns the current shortcut key for the button.
- void **shortcut** (const char *s)
(for backwards compatibility)
- void **shortcut** (int s)
Sets the shortcut key to `s`.
- char **value** () const
Returns the current value of the button (0 or 1).
- int **value** (int v)
Sets the current value of the button.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)

- Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*

 - void `bind_image` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box` () const

Gets the box type of the widget.
- void `box` (`FI_Boxtype new_box`)

Sets the box type for the widget.
- `FI_Callback_p callback` () const

Gets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool auto_free)

Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback *cb`, void *p)

Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0 *cb`)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback1 *cb`, long p=0)

Sets the current callback function for the widget.
- unsigned int `changed` () const

Checks if the widget value changed since the last callback.
- void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color color` () const

Gets the background color of the widget.
- void `color` (`FI_Color bg`)

Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)

Sets the background and selection color of the widget.
- `FI_Color color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget *w`) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.

- `uchar damage ()` const
Returns non-zero if `draw()` needs to be called.
- `void damage (uchar c)`
Sets the damage bits for the widget.
- `void damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- `int damage_resize (int, int, int, int)`
Internal use only.
- `void deactivate ()`
Deactivates the widget.
- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage ()` const
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound ()` const
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align)` const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h ()` const
Gets the widget height.
- `virtual void hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image ()` const
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound ()` const
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt)` const
Checks if this widget is a child of `wgt`.
- `int is_label_copied ()` const
Returns whether the current label was assigned with `copy_label()`.
- `const char * label ()` const
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`

- Shortcut to set the label text and type in one call.*
- [FI_Color labelcolor](#) () const
Gets the label color.
 - void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
 - [FI_Font labelfont](#) () const
Gets the font to use.
 - void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
 - [FI_Fontsize labelsize](#) () const
Gets the font size in pixels.
 - void [labelsiz](#)e ([FI_Fontsize](#) pix)
Sets the font size in pixels.
 - [FI_Labeltype labeltype](#) () const
Gets the label type.
 - void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
 - void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
 - bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
 - void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
 - unsigned int [output](#) () const
Returns if a widget is used for output only.
 - [FI_Group * parent](#) () const
Returns a pointer to the parent widget.
 - void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
 - void [position](#) (int X, int Y)
Repositions the window or widget.
 - void [redraw](#) ()
Schedules the drawing of the widget.
 - void [redraw_label](#) ()
Schedules the drawing of the label.
 - virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
 - [FI_Color selection_color](#) () const
Gets the selection color.
 - void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
 - void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
 - void [set_changed](#) ()
Marks the value of the widget as changed.
 - void [set_output](#) ()
Sets a widget to output only.
 - void [set_visible](#) ()
Makes the widget visible.
 - void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.

- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

- *Gets the widget position in its window.*
- `int y () const`
Gets the widget position in its window.
- `virtual ~FI_Widget ()`
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- `static void default_callback (FI_Widget *widget, void *data)`
The default callback for all widgets that don't set a callback.
- `static unsigned int label_shortcut (const char *t)`
Returns the Unicode value of the '&x' shortcut in a given text.
- `static int test_shortcut (const char *, const bool require_alt=false)`
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- `enum {`
`INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,`
`FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7`
`,`
`OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11`
`,`
`MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15`
`,`
`GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU`
`= 1<<19 ,`
`NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,`
`AUTO_DELETE_USER_DATA = 1<<23 ,`
`MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,`
`USERFLAG1 = 1<<31 }`
flags possible values enumeration.

Protected Member Functions inherited from FI_Light_Button

- `void draw () FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from FI_Button

- `void simulate_key_action ()`

Protected Member Functions inherited from FI_Widget

- `void clear_flag (unsigned int c)`
Clears a flag in the flags mask.
- `void draw_backdrop () const`
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- `void draw_box () const`
Draws the widget box according its box style.
- `void draw_box (FI_Boxtype t, FI_Color c) const`
Draws a box of type t, of color c at the widget's position and size.
- `void draw_box (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const`

- Draws a box of type `t`, of color `c` at the position `X,Y` and size `W,H`.*

 - void `draw_focus` () const
- Draws a focus rectangle around the widget.*

 - void `draw_focus` (`Fl_Boxtype` `t`, int `X`, int `Y`, int `W`, int `H`) const
- Draws a focus rectangle around the widget.*

 - void `draw_focus` (`Fl_Boxtype` `t`, int `x`, int `y`, int `w`, int `h`, `Fl_Color` `bg`) const
- Draws a focus box for the widget at the given position and size.*

 - void `draw_label` () const
- Draws the widget's label at the defined label position.*

 - void `draw_label` (int, int, int, int) const
- Draws the label in an arbitrary bounding box.*

 - `Fl_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)
- Creates a widget at the given position and size.*

 - unsigned int `flags` () const
- Gets the widget flags mask.*

 - void `h` (int `v`)
- Internal use only.*

 - void `set_flag` (unsigned int `c`)
- Sets a flag in the flags mask.*

 - void `w` (int `v`)
- Internal use only.*

 - void `x` (int `v`)
- Internal use only.*

 - void `y` (int `v`)
- Internal use only.*

Static Protected Member Functions inherited from `Fl_Button`

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from `Fl_Button`

- static `Fl_Widget_Tracker` * `key_release_tracker` = 0

12.110.1 Constructor & Destructor Documentation

12.110.1.1 `Fl_Radio_Round_Button()`

```
Fl_Radio_Round_Button::Fl_Radio_Round_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_Radio_Button` widget using the given position, size, and label string. The button `type()` is set to `FL_RADIO_BUTTON`.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

The documentation for this class was generated from the following files:

- `Fl_Radio_Round_Button.H`

- `Fl_Round_Button.cxx`

12.111 Fl_Rect Class Reference

Rectangle with standard FLTK coordinates (X, Y, W, H).

```
#include <Fl_Rect.H>
```

Public Member Functions

- `int b () const`
gets the bottom edge (y + h).
- `void b (int B)`
sets the height based on B and y
- `Fl_Rect ()`
The default constructor creates an empty rectangle (x = y = w = h = 0).
- `Fl_Rect (const Fl_Widget &widget)`
This constructor creates a rectangle based on a widget's position and size.
- `Fl_Rect (const Fl_Widget *const widget)`
This constructor creates a rectangle based on a widget's position and size.
- `Fl_Rect (int W, int H)`
This constructor creates a rectangle with x = y = 0 and the given width and height.
- `Fl_Rect (int X, int Y, int W, int H)`
This constructor creates a rectangle with the given x,y coordinates and the given width and height.
- `Fl_Rect (int X, int Y, int W, int H, Fl_Boxtype bt)`
This constructor creates a rectangle with the given x,y coordinates and the given width and height reduced by the box frame size.
- `int h () const`
gets the height
- `void h (int H)`
sets the height
- `void inset (Fl_Boxtype bt)`
Move all edges in by the frame size of box type bt.
- `void inset (int d)`
Move all edges in by d.
- `void inset (int left, int top, int right, int bottom)`
Move all edges in by left, top, right, bottom.
- `int r () const`
gets the right edge (x + w).
- `void r (int R)`
sets the width based on R and x
- `int w () const`
gets the width
- `void w (int W)`
sets the width
- `int x () const`
gets the x coordinate (left edge)
- `void x (int X)`
sets the x coordinate (left edge)
- `int y () const`
gets the y coordinate (top edge)
- `void y (int Y)`
sets the y coordinate (top edge)

Friends

- `bool operator!= (const Fl_Rect &lhs, const Fl_Rect &rhs)`
- `bool operator== (const Fl_Rect &lhs, const Fl_Rect &rhs)`

12.111.1 Detailed Description

Rectangle with standard FLTK coordinates (X, Y, W, H).

This may be used internally, for overloaded widget constructors and other overloaded methods like `fl_measure()`, `fl_text_extents()`, `fl_rect()`, `fl_rectf()`, and maybe more.

12.111.2 Constructor & Destructor Documentation

12.111.2.1 Fl_Rect()

```
Fl_Rect::Fl_Rect (
    int X,
    int Y,
    int W,
    int H,
    Fl_Boxtype bt ) [inline]
```

This constructor creates a rectangle with the given x,y coordinates and the given width and height reduced by the box frame size.

This is the same as using the constructor w/o `bt` and subsequently calling `inset(bt)`.

12.111.3 Member Function Documentation

12.111.3.1 b()

```
int Fl_Rect::b ( ) const [inline]
```

gets the bottom edge (`y + h`).

Note

`r()` and `b()` are coordinates **outside** the area of the rectangle.

12.111.3.2 inset() [1/3]

```
void Fl_Rect::inset (
    Fl_Boxtype bt ) [inline]
```

Move all edges in by the frame size of box type `bt`.

Shrinks the rectangle at all sides by the frame width or height of the given box type `bt`.

This method uses the frame sizes given by the box type `bt` using

- `Fl::box_dx(bt)`
- `Fl::box_dy(bt)`
- `Fl::box_dw(bt)`
- `Fl::box_dh(bt)`

If the rectangle is smaller than the frame sizes the result is undefined, i.e. an invalid or empty rectangle.

12.111.3.3 inset() [2/3]

```
void Fl_Rect::inset (
    int d ) [inline]
```

Move all edges in by `d`.

Shrinks the rectangle by `d` at all sides keeping the center of the rectangle at the same spot.

If `d` is negative, the rectangle is enlarged.

If `d >= w()` or `h()` the result is undefined, i.e. an invalid or empty rectangle.

12.111.3.4 inset() [3/3]

```
void Fl_Rect::inset (
    int left,
    int top,
    int right,
    int bottom ) [inline]
```

Move all edges in by left, top, right, bottom.

Shrinks the rectangle on all sides keeping the center of the rectangle at the same spot.

If any value is negative, the rectangle is enlarged.

Values are not range checked; it is possible to create an invalid or empty rectangle.

12.111.3.5 r()

```
int Fl_Rect::r ( ) const [inline]
```

gets the right edge (x + w).

Note

`r()` and `b()` are coordinates **outside** the area of the rectangle.

The documentation for this class was generated from the following file:

- FI_Rect.H

12.112 FI_Scroll::FI_Region_LRTB Struct Reference

A local struct to manage a region defined by left/right/top/bottom.

```
#include <FI_Scroll.H>
```

Public Attributes

- `int b`
(*b*)ottom "y" position, aka y2
- `int l`
(*l*)eft "x" position, aka x1
- `int r`
(*r*)ight "x" position, aka x2
- `int t`
(*t*)op "y" position, aka y1

12.112.1 Detailed Description

A local struct to manage a region defined by left/right/top/bottom.

The documentation for this struct was generated from the following file:

- FI_Scroll.H

12.113 FI_Scroll::FI_Region_XYWH Struct Reference

A local struct to manage a region defined by xywh.

```
#include <FI_Scroll.H>
```

Public Attributes

- `int h`
- `int w`
- `int x`
- `int y`

12.113.1 Detailed Description

A local struct to manage a region defined by xywh.

The documentation for this struct was generated from the following file:

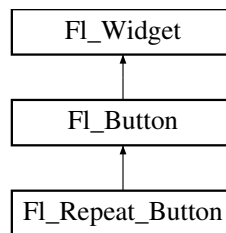
- `Fl_Scroll.H`

12.114 `Fl_Repeat_Button` Class Reference

The `Fl_Repeat_Button` is a subclass of `Fl_Button` that generates a callback when it is pressed and then repeatedly generates callbacks as long as it is held down.

```
#include <Fl_Repeat_Button.H>
```

Inheritance diagram for `Fl_Repeat_Button`:



Public Member Functions

- void **deactivate** ()
- `Fl_Repeat_Button` (int X, int Y, int W, int H, const char *l=0)
Creates a new `Fl_Repeat_Button` widget using the given position, size, and label string.
- int **handle** (int) `FL_OVERRIDE`
Handles the specified event.

Public Member Functions inherited from `Fl_Button`

- int **clear** ()
Same as `value(0)`.
- `uchar compact` ()
Return true if buttons are rendered as compact buttons.
- void **compact** (`uchar` v)
Decide if buttons should be rendered in compact mode.
- `Fl_Boxtype down_box` () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void **down_box** (`Fl_Boxtype` b)
Sets the down box type.
- `Fl_Color down_color` () const
(for backwards compatibility)
- void **down_color** (unsigned c)
(for backwards compatibility)
- `Fl_Button` (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int **set** ()
Same as `value(1)`.
- void **setonly** ()
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- int **shortcut** () const

- Returns the current shortcut key for the button.*

 - void **shortcut** (const char *s)
(for backwards compatibility)
 - void **shortcut** (int s)
Sets the shortcut key to s.
 - char **value** () const
Returns the current value of the button (0 or 1).
 - int **value** (int v)
Sets the current value of the button.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align** **align** () const
Gets the label alignment.
- void **align** (**FI_Align** alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_GI_Window** * **as_gi_window** ()
Returns an FI_GI_Window pointer if this widget is an FI_GI_Window.
- virtual class **FI_GI_Window** const * **as_gi_window** () const
- virtual **FI_Group** * **as_group** ()
Returns an FI_Group pointer if this widget is an FI_Group.
- virtual **FI_Group** const * **as_group** () const
- virtual **FI_Window** * **as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype** **box** () const
Gets the box type of the widget.
- void **box** (**FI_Boxtype** new_box)
Sets the box type for the widget.
- **FI_Callback_p** **callback** () const
Gets the current callback function for the widget.

- void `callback` (`FI_Callback` *cb)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)

Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback` *cb, void *p)

Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0` *cb)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback1` *cb, long p=0)

Sets the current callback function for the widget.
- unsigned int `changed` () const

Checks if the widget value changed since the last callback.
- void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar` c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const

Gets the background color of the widget.
- void `color` (`FI_Color` bg)

Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)

Sets the background and selection color of the widget.
- `FI_Color` `color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget` *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar` `damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar` c)

Sets the damage bits for the widget.
- void `damage` (`uchar` c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image` * `deimage` ()

- Gets the image that is used as part of the widget label when in the inactive state.*

 - const [FI_Image](#) * [deimage](#) () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void [deimage](#) ([FI_Image](#) &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void [deimage](#) ([FI_Image](#) *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int [deimage_bound](#) () const
- Returns whether the inactive image is managed by the widget.*

 - void [do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- Calls the widget callback function with default arguments.*

 - void [do_callback](#) ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- Calls the widget callback function with arbitrary arguments.*

 - void [do_callback](#) ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- Calls the widget callback function with arbitrary arguments.*

 - void [draw_label](#) (int, int, int, int, [FI_Align](#)) const
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int [h](#) () const
- Gets the widget height.*

 - virtual void [hide](#) ()
- Makes a widget invisible.*

 - [FI_Image](#) * [image](#) ()
- Gets the image that is used as part of the widget label when in the active state.*

 - const [FI_Image](#) * [image](#) () const
- Gets the image that is used as part of the widget label when in the active state.*

 - void [image](#) ([FI_Image](#) &img)
- Sets the image to use as part of the widget label when in the active state.*

 - void [image](#) ([FI_Image](#) *img)
- Sets the image to use as part of the widget label when in the active state.*

 - int [image_bound](#) () const
- Returns whether the image is managed by the widget.*

 - int [inside](#) (const [FI_Widget](#) *wgt) const
- Checks if this widget is a child of wgt.*

 - int [is_label_copied](#) () const
- Returns whether the current label was assigned with [copy_label\(\)](#).*

 - const char * [label](#) () const
- Gets the current label text.*

 - void [label](#) (const char *text)
- Sets the current label pointer.*

 - void [label](#) ([FI_Labeltype](#) a, const char *b)
- Shortcut to set the label text and type in one call.*

 - [FI_Color](#) [labelcolor](#) () const
- Gets the label color.*

 - void [labelcolor](#) ([FI_Color](#) c)
- Sets the label color.*

 - [FI_Font](#) [labelfont](#) () const
- Gets the font to use.*

 - void [labelfont](#) ([FI_Font](#) f)
- Sets the font to use.*

 - [FI_Fontsize](#) [labelsize](#) () const
- Gets the font size in pixels.*

- void `labelsize` (`Fl_Fontsize` pix)
Sets the font size in pixels.
- `Fl_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`Fl_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `Fl_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`Fl_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `Fl_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`Fl_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)
- Sets the current tooltip text.*

 - `FI_Window` * `top_window` () const
- Returns a pointer to the top-level window for the widget.*

 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - `uchar` `type` () const
- Gets the widget type.*

 - void `type` (`uchar` t)
- Sets the widget type.*

 - int `use_accents_menu` ()
- Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*

 - void * `user_data` () const
- Gets the user data for this widget.*

 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
- Sets the user data for this widget.*

 - void `user_data` (void *v)
- Sets the user data for this widget.*

 - unsigned int `visible` () const
- Returns whether a widget is visible.*

 - unsigned int `visible_focus` () const
- Checks whether this widget has a visible focus.*

 - void `visible_focus` (int v)
- Modifies keyboard focus navigation.*

 - int `visible_r` () const
- Returns whether a widget and all its parents are visible.*

 - int `w` () const
- Gets the widget width.*

 - `FI_When` `when` () const
- Returns the conditions under which the callback is called.*

 - void `when` (`uchar` i)
- Sets the flags used to decide when a callback is called.*

 - `FI_Window` * `window` () const
- Returns a pointer to the nearest parent window up the widget hierarchy.*

 - int `x` () const
- Gets the widget position in its window.*

 - int `y` () const
- Gets the widget position in its window.*

 - virtual `~FI_Widget` ()
- Destroys the widget.*

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 ,
[OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 ,
[MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 ,
[GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
 = 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPOP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Button](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- void [simulate_key_action](#) ()

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.

- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `Fl_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int `v`)
Internal use only.
- void `set_flag` (unsigned int `c`)
Sets a flag in the flags mask.
- void `w` (int `v`)
Internal use only.
- void `x` (int `v`)
Internal use only.
- void `y` (int `v`)
Internal use only.

Static Protected Member Functions inherited from `Fl_Button`

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from `Fl_Button`

- static `Fl_Widget_Tracker` * `key_release_tracker` = 0

12.114.1 Detailed Description

The `Fl_Repeat_Button` is a subclass of `Fl_Button` that generates a callback when it is pressed and then repeatedly generates callbacks as long as it is held down.

The speed of the repeat is fixed and depends on the implementation.

12.114.2 Constructor & Destructor Documentation

12.114.2.1 `Fl_Repeat_Button()`

```
Fl_Repeat_Button::Fl_Repeat_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Repeat_Button` widget using the given position, size, and label string. The default boxtype is `FL_UP_BOX`. Deletes the button.

12.114.3 Member Function Documentation

12.114.3.1 `handle()`

```
int Fl_Repeat_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Button](#).

The documentation for this class was generated from the following files:

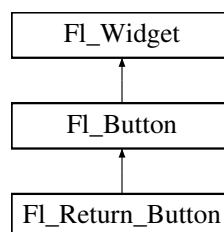
- `Fl_Repeat_Button.H`
- `Fl_Repeat_Button.cxx`

12.115 Fl_Return_Button Class Reference

The `Fl_Return_Button` is a subclass of `Fl_Button` that generates a callback when it is pressed or when the user presses the Enter key.

```
#include <Fl_Return_Button.H>
```

Inheritance diagram for `Fl_Return_Button`:



Public Member Functions

- `Fl_Return_Button` (int X, int Y, int W, int H, const char *l=0)
Creates a new `Fl_Return_Button` widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.

Public Member Functions inherited from `Fl_Button`

- int `clear` ()
Same as `value(0)`.
- `uchar compact` ()
Return true if buttons are rendered as compact buttons.
- void `compact` (`uchar` v)

- Decide if buttons should be rendered in compact mode.*

 - [FI_Boxtype](#) `down_box` () const
 - Returns the current down box type, which is drawn when `value()` is non-zero.*
 - void `down_box` ([FI_Boxtype](#) b)
 - Sets the down box type.*
 - [FI_Color](#) `down_color` () const
 - (for backwards compatibility)*
 - void `down_color` (unsigned c)
 - (for backwards compatibility)*
 - [FI_Button](#) (int X, int Y, int W, int H, const char *L=0)
 - The constructor creates the button using the given position, size, and label.*
 - int `set` ()
 - Same as `value(1)`.*
 - void `setonly` ()
 - Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).*
 - int `shortcut` () const
 - Returns the current shortcut key for the button.*
 - void `shortcut` (const char *s)
 - (for backwards compatibility)*
 - void `shortcut` (int s)
 - Sets the shortcut key to `s`.*
 - char `value` () const
 - Returns the current value of the button (0 or 1).*
 - int `value` (int v)
 - Sets the current value of the button.*

Public Member Functions inherited from [FI_Widget](#)

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) `align` () const
 - Gets the label alignment.*
- void `align` ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * `as_gl_window` ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * `as_gl_window` () const
- virtual [FI_Group](#) * `as_group` ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * `as_group` () const
- virtual [FI_Window](#) * `as_window` ()

- Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * **as_window** () const
- void [bind_deimage](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype](#) **box** () const
 - Gets the box type of the widget.*
- void [box](#) ([FI_Boxtype](#) new_box)
 - Sets the box type for the widget.*
- [FI_Callback_p](#) **callback** () const
 - Gets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void [callback](#) ([FI_Callback](#) *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void [callback](#) ([FI_Callback0](#) *cb)
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int [changed](#) () const
 - Checks if the widget value changed since the last callback.*
- void [clear_active](#) ()
 - Marks the widget as inactive without sending events or changing focus.*
- void [clear_changed](#) ()
 - Marks the value of the widget as unchanged.*
- void [clear_damage](#) ([uchar](#) c=0)
 - Clears or sets the damage flags.*
- void [clear_output](#) ()
 - Sets a widget to accept input.*
- void [clear_visible](#) ()
 - Hides the widget.*
- void [clear_visible_focus](#) ()
 - Disables keyboard focus navigation with this widget.*
- [FI_Color](#) **color** () const
 - Gets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg)
 - Sets the background color of the widget.*
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
 - Sets the background and selection color of the widget.*
- [FI_Color](#) **color2** () const
 - For back compatibility only.*
- void [color2](#) (unsigned a)
 - For back compatibility only.*
- int [contains](#) (const [FI_Widget](#) *w) const

- Checks if w is a child of this widget.*

 - void [copy_label](#) (const char *new_label)

Sets the current label.
- void [copy_tooltip](#) (const char *text)

Sets the current tooltip text.
- [uchar damage](#) () const

Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) (uchar c)

Sets the damage bits for the widget.
- void [damage](#) (uchar c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int [damage_resize](#) (int, int, int, int)

Internal use only.
- void [deactivate](#) ()

Deactivates the widget.
- [Fl_Image * deimage](#) ()

Gets the image that is used as part of the widget label when in the inactive state.
- const [Fl_Image * deimage](#) () const

Gets the image that is used as part of the widget label when in the inactive state.
- void [deimage](#) ([Fl_Image](#) &img)

Sets the image to use as part of the widget label when in the inactive state.
- void [deimage](#) ([Fl_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.
- int [deimage_bound](#) () const

Returns whether the inactive image is managed by the widget.
- void [do_callback](#) ([Fl_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with default arguments.
- void [do_callback](#) ([Fl_Widget](#) *widget, long arg, [Fl_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with arbitrary arguments.
- void [do_callback](#) ([Fl_Widget](#) *widget, void *arg=0, [Fl_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))

Calls the widget callback function with arbitrary arguments.
- void [draw_label](#) (int, int, int, int, [Fl_Align](#)) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int [h](#) () const

Gets the widget height.
- virtual void [hide](#) ()

Makes a widget invisible.
- [Fl_Image * image](#) ()

Gets the image that is used as part of the widget label when in the active state.
- const [Fl_Image * image](#) () const

Gets the image that is used as part of the widget label when in the active state.
- void [image](#) ([Fl_Image](#) &img)

Sets the image to use as part of the widget label when in the active state.
- void [image](#) ([Fl_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.
- int [image_bound](#) () const

Returns whether the image is managed by the widget.
- int [inside](#) (const [Fl_Widget](#) *wgt) const

Checks if this widget is a child of wgt.
- int [is_label_copied](#) () const

Returns whether the current label was assigned with [copy_label\(\)](#).

- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelszize () const`
Gets the font size in pixels.
- `void labelszize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- `void labeltype (FI_Labeltype a)`
Sets the label type.
- `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
- `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- `unsigned int output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`
Schedules the drawing of the widget.
- `void redraw_label ()`
Schedules the drawing of the label.
- `virtual void resize (int x, int y, int w, int h)`
Changes the size or position of the widget.
- `FI_Color selection_color () const`
Gets the selection color.
- `void selection_color (FI_Color a)`
Sets the selection color.
- `void set_active ()`
Marks the widget as active without sending events or changing focus.
- `void set_changed ()`
Marks the value of the widget as changed.
- `void set_output ()`

- Sets a widget to output only.*

 - void `set_visible ()`

Makes the widget visible.
- void `set_visible_focus ()`

Enables keyboard focus navigation with this widget.
- int `shortcut_label ()` const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label (int value)`

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show ()`

Makes a widget visible.
- void `size (int W, int H)`

Changes the size of the widget.
- int `take_focus ()`

Gives the widget the keyboard focus.
- unsigned int `takeevents ()` const

Returns if the widget is able to take events.
- int `test_shortcut ()`

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip ()` const

Gets the current tooltip text.
- void `tooltip (const char *text)`

Sets the current tooltip text.
- `FI_Window` * `top_window ()` const

Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset (int &xoff, int &yoff)` const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type ()` const

Gets the widget type.
- void `type (uchar t)`

Sets the widget type.
- int `use_accents_menu ()`

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data ()` const

Gets the user data for this widget.
- void `user_data (FI_Callback_User_Data *v, bool auto_free)`

Sets the user data for this widget.
- void `user_data (void *v)`

Sets the user data for this widget.
- unsigned int `visible ()` const

Returns whether a widget is visible.
- unsigned int `visible_focus ()` const

Checks whether this widget has a visible focus.
- void `visible_focus (int v)`

Modifies keyboard focus navigation.
- int `visible_r ()` const

Returns whether a widget and all its parents are visible.
- int `w ()` const

Gets the widget width.
- `FI_When` `when ()` const

Returns the conditions under which the callback is called.

- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- **FI_Window** * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual ~**FI_Widget** ()
Destroys the widget.

Protected Member Functions

- void **draw** () **FL_OVERRIDE**
Draws the widget.

Protected Member Functions inherited from **FI_Button**

- void **simulate_key_action** ()

Protected Member Functions inherited from **FI_Widget**

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (**FI_Boxtype** t, **FI_Color** c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (**FI_Boxtype** t, int x, int y, int w, int h, **FI_Color** c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FI_Boxtype** t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FI_Boxtype** t, int x, int y, int w, int h, **FI_Color** bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.

- void `x` (int `v`)
Internal use only.
- void `y` (int `v`)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void `default_callback` ([FI_Widget](#) *`widget`, void *`data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *`t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPOP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Static Protected Member Functions inherited from [FI_Button](#)

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from [FI_Button](#)

- static [FI_Widget_Tracker](#) * `key_release_tracker` = 0

12.115.1 Detailed Description

The [FI_Return_Button](#) is a subclass of [FI_Button](#) that generates a callback when it is pressed or when the user presses the Enter key.

A carriage-return symbol is drawn next to the button label.

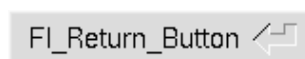


Figure 12.37 [FI_Return_Button](#)

12.115.2 Constructor & Destructor Documentation

12.115.2.1 Fl_Return_Button()

```
Fl_Return_Button::Fl_Return_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Return_Button](#) widget using the given position, size, and label string. The default boxtype is `FL_UP_BOX`. The inherited destructor deletes the button.

12.115.3 Member Function Documentation

12.115.3.1 draw()

```
void Fl_Return_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Button](#).

12.115.3.2 handle()

```
int Fl_Return_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Button](#).

The documentation for this class was generated from the following files:

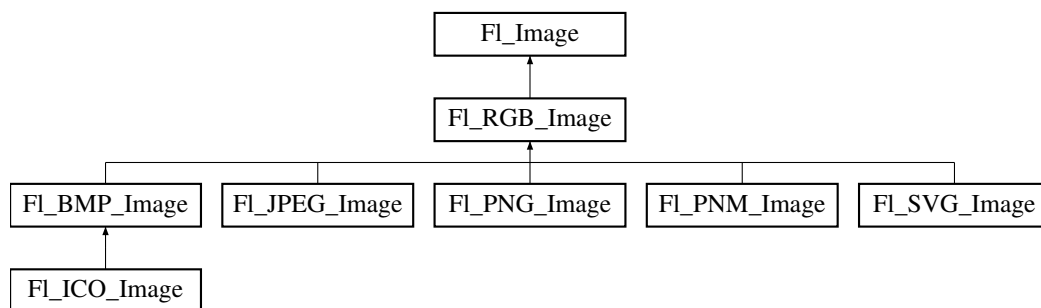
- [Fl_Return_Button.H](#)
- [Fl_Return_Button.cxx](#)

12.116 Fl_RGB_Image Class Reference

The [Fl_RGB_Image](#) class supports caching and drawing of full-color images with 1 to 4 channels of color information.

```
#include <Fl_Image.H>
```

Inheritance diagram for [Fl_RGB_Image](#):



Public Member Functions

- virtual [Fl_SVG_Image](#) * [as_svg_image](#) ()
Returns whether an image is an [Fl_SVG_Image](#) or not.
- int [cache_h](#) ()
- int [cache_w](#) ()
- void [color_average](#) ([Fl_Color](#) c, float i) [FL_OVERRIDE](#)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [Fl_Image](#) * [copy](#) () const
- [Fl_Image](#) * [copy](#) (int W, int H) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void [desaturate](#) () [FL_OVERRIDE](#)
The [desaturate\(\)](#) method converts an image to grayscale.
- void [draw](#) (int X, int Y)
- void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0) [FL_OVERRIDE](#)
Draws the image to the current drawing surface with a bounding box.
- [Fl_RGB_Image](#) ([const Fl_Pixmap](#) *pixmap, [Fl_Color](#) bg=[FL_GRAY](#))
The constructor creates a new RGBA image from the specified [Fl_Pixmap](#).
- [Fl_RGB_Image](#) ([const uchar](#) *bits, int bits_length, int W, int H, int D, int LD)
The constructor creates a new image from the specified data.
- [Fl_RGB_Image](#) ([const uchar](#) *bits, int W, int H, int D=3, int LD=0)
The constructor creates a new image from the specified data.
- void [label](#) ([Fl_Menu_Item](#) *m) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a menu item.
- void [label](#) ([Fl_Widget](#) *w) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a widget or menu item.
- virtual void [normalize](#) ()

- *Makes sure the object is fully initialized.*
- void `uncache ()` `FL_OVERRIDE`
If the image has been cached for display, delete the cache data.
- `~FI_RGB_Image ()` `FL_OVERRIDE`
The destructor frees all memory and server resources that are used by the image.

Public Member Functions inherited from `FI_Image`

- virtual class `FI_Shared_Image * as_shared_image ()`
Returns whether an image is an `FI_Shared_Image` or not.
- `FI_Image * copy ()` const
Creates a copy of the image in the same size.
- int `count ()` const
Returns the number of data values associated with the image.
- int `d ()` const
Returns the image depth.
- const char *const * `data ()` const
Returns a pointer to the current image data array.
- int `data_h ()` const
Returns the height of the image data.
- int `data_w ()` const
Returns the width of the image data.
- void `draw (int X, int Y)`
Draws the image to the current drawing surface.
- int `fail ()` const
Returns a value that is not 0 if there is currently no image available.
- `FI_Image (int W, int H, int D)`
The constructor creates an empty image with the specified width, height, and depth.
- int `h ()` const
Returns the current image drawing height in FLTK units.
- void `inactive ()`
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- int `ld ()` const
Returns the current line data size in bytes.
- virtual void `release ()`
Releases an `FI_Image` - the same as 'delete this'.
- virtual void `scale (int width, int height, int proportional=1, int can_expand=0)`
Sets the drawing size of the image.
- int `w ()` const
Returns the current image drawing width in FLTK units.
- virtual `~FI_Image ()`
The destructor is a virtual method that frees all memory used by the image.

Static Public Member Functions

- static size_t `max_size ()`
Returns the maximum allowed image size in bytes when creating an `FI_RGB_Image` object.
- static void `max_size (size_t size)`
Sets the maximum allowed image size in bytes when creating an `FI_RGB_Image` object.

Static Public Member Functions inherited from FI_Image

- static [FI_Labeltype](#) **define_FL_IMAGE_LABEL** ()
- static [FI_RGB_Scaling](#) **RGB_scaling** ()
 - Returns the currently used RGB image scaling method.*
- static void **RGB_scaling** ([FI_RGB_Scaling](#))
 - Sets the RGB image scaling method used for copy(int, int).*
- static [FI_RGB_Scaling](#) **scaling_algorithm** ()
 - Gets what algorithm is used when resizing a source image to draw it.*
- static void **scaling_algorithm** ([FI_RGB_Scaling](#) algorithm)
 - Sets what algorithm is used when resizing a source image to draw it.*

Public Attributes

- int **alloc_array**
 - If non-zero, the object's data array is delete[]'d when deleting the object.*
- const [uchar](#) * **array**
 - Points to the start of the object's data array.*

Friends

- class [FI_Graphics_Driver](#)

Additional Inherited Members

Static Public Attributes inherited from FI_Image

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false
 - True after [fl_register_images\(\)](#) was called, false before.*

Protected Member Functions inherited from FI_Image

- void **d** (int D)
 - Sets the current image depth.*
- void **data** (const char *const *p, int c)
 - Sets the current data pointer and count of pointers in the array.*
- void **draw_empty** (int X, int Y)
 - The protected method [draw_empty\(\)](#) draws a box with an X in it.*
- int **draw_scaled** (int X, int Y, int W, int H)
 - Draw the image to the current drawing surface rescaled to a given width and height.*
- void **h** (int H)
 - Sets the height of the image data.*
- void **ld** (int LD)
 - Sets the current line data size in bytes.*
- void **w** (int W)
 - Sets the width of the image data.*

Static Protected Member Functions inherited from FI_Image

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

12.116.1 Detailed Description

The [Fl_RGB_Image](#) class supports caching and drawing of full-color images with 1 to 4 channels of color information.

Images with an even number of channels are assumed to contain alpha information, which is used to blend the image with the contents of the screen.

[Fl_RGB_Image](#) is defined in [<FL/Fl_Image.H>](#), however for compatibility reasons [<FL/Fl_RGB_Image.H>](#) should be included.

12.116.2 Constructor & Destructor Documentation

12.116.2.1 Fl_RGB_Image() [1/3]

```
Fl_RGB_Image::Fl_RGB_Image (
    const uchar * bits,
    int W,
    int H,
    int D = 3,
    int LD = 0 )
```

The constructor creates a new image from the specified data.

The data array `bits` must contain sufficient data to provide $W * H * D$ image bytes and optional line padding, see `LD`.

`W` and `H` are the width and height of the image in pixels, resp.

`D` is the image depth and can be:

- `D=1`: each uchar in `bits[]` is a grayscale pixel value
- `D=2`: each uchar pair in `bits[]` is a grayscale + alpha pixel value
- `D=3`: each uchar triplet in `bits[]` is an R/G/B pixel value
- `D=4`: each uchar quad in `bits[]` is an R/G/B/A pixel value

`LD` specifies the line data size of the array, see [Fl_Image::ld\(int\)](#). If `LD` is zero, then $W * D$ is assumed, otherwise `LD` must be greater than or equal to $W * D$ to account for (unused) extra data per line (padding).

The caller is responsible that the image data array `bits` persists as long as the image is used.

This constructor sets [Fl_RGB_Image::alloc_array](#) to 0. To have the image object control the deallocation of the data array `bits`, set `alloc_array` to non-zero after construction.

Parameters

in	<i>bits</i>	The image data array.
in	<i>W</i>	The width of the image in pixels.
in	<i>H</i>	The height of the image in pixels.
in	<i>D</i>	The image depth, or 'number of channels' (default=3).
in	<i>LD</i>	Line data size (default=0).

See also

[Fl_Image::data\(\)](#), [Fl_Image::w\(\)](#), [Fl_Image::h\(\)](#), [Fl_Image::d\(\)](#), [Fl_Image::ld\(int\)](#)

12.116.2.2 Fl_RGB_Image() [2/3]

```
Fl_RGB_Image::Fl_RGB_Image (
    const uchar * bits,
    int bits_length,
    int W,
    int H,
    int D,
    int LD )
```

The constructor creates a new image from the specified data.

If the provided array is too small to contain all the image data, the constructor will not generate the image to avoid illegal memory read access and instead set `data` to `NULL` and `ld` to `ERR_MEMORY_ACCESS`.

Parameters

<i>bits</i>	image data
<i>bits_length</i>	length of the <i>bits</i> array in bytes
<i>W</i>	image width in pixels
<i>H</i>	image height in pixels
<i>D</i>	image depth in bytes, 1 for gray scale, 2 for gray with alpha, 3 for RGB, and 4 for RGB plus alpha
<i>LD</i>	line length in bytes, or 0 to use $W * D$.

See also

[Fl_RGB_Image\(const uchar *bits, int W, int H, int D, int LD\)](#)

12.116.2.3 Fl_RGB_Image() [3/3]

```
Fl_RGB_Image::Fl_RGB_Image (
    const Fl_Pixmap * pxm,
    Fl_Color bg = FL_GRAY )
```

The constructor creates a new RGBA image from the specified [Fl_Pixmap](#).

The RGBA image is built fully opaque except for the transparent area of the pixmap that is assigned the `bg` color with full transparency.

This constructor creates a new internal data array and sets [Fl_RGB_Image::alloc_array](#) to 1 so the data array is deleted when the image is destroyed.

12.116.3 Member Function Documentation

12.116.3.1 as_svg_image()

```
virtual Fl_SVG_Image * Fl_RGB_Image::as_svg_image ( ) [inline], [virtual]
```

Returns whether an image is an [Fl_SVG_Image](#) or not.

This virtual method returns a pointer to the [Fl_SVG_Image](#) if this object is an instance of [Fl_SVG_Image](#) or `NULL` if not.

Reimplemented in [Fl_SVG_Image](#).

12.116.3.2 color_average()

```
void Fl_RGB_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.

The first argument specifies the FLTK color to be used.

The second argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_Image](#).

Reimplemented in [Fl_SVG_Image](#).

12.116.3.3 copy()

```
Fl_Image * Fl_RGB_Image::copy (
    int W,
    int H ) const [virtual]
```

Creates a resized copy of the image.

The new image should be released when you are done with it.

Note: since FLTK 1.4.0 you can use [Fl_Image::release\(\)](#) for all types of images (i.e. all subclasses of [Fl_Image](#)) instead of operator *delete* for [Fl_Image](#)'s and [Fl_Image::release\(\)](#) for [Fl_Shared_Image](#)'s.

The new image data will be converted to the requested size. RGB images are resized using the algorithm set by [Fl_Image::RGB_scaling\(\)](#).

For the new image the following equations are true:

- $w() == data_w() == \bar{W}$
- $h() == data_h() == \bar{H}$

Parameters

in	<i>W,H</i>	Requested width and height of the new image
----	------------	---

Note

The returned image can be safely cast to the same image type as that of the source image provided this type is one of [Fl_RGB_Image](#), [Fl_SVG_Image](#), [Fl_Pixmap](#), [Fl_Bitmap](#), [Fl_Tiled_Image](#), [Fl_Anim_GIF_Image](#) and [Fl_Shared_Image](#). Returned objects copied from images of other, derived, image classes belong to the parent class appearing in this list. For example, the copy of an [Fl_GIF_Image](#) is an object of class [Fl_Pixmap](#).

Since FLTK 1.4.0 this method is 'const'. If you derive your own class from [Fl_Image](#) or any subclass your overridden methods of '[Fl_Image::copy\(\) const](#)' and '[Fl_Image::copy\(int, int\) const](#)' **must** also be 'const' for inheritance to work properly. This is different than in FLTK 1.3.x and earlier where these methods have not been 'const'.

Reimplemented from [Fl_Image](#).

Reimplemented in [Fl_SVG_Image](#).

12.116.3.4 desaturate()

```
void Fl_RGB_Image::desaturate ( ) [virtual]
```

The [desaturate\(\)](#) method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_Image](#).

Reimplemented in [Fl_SVG_Image](#).

12.116.3.5 draw()

```
void Fl_RGB_Image::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image to the current drawing surface with a bounding box.

Arguments *X*, *Y*, *W*, *H* specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the *cx* and *cy* arguments.

In other words: `fl_push_clip(X,Y,W,H)` is applied, the image is drawn with its upper-left corner at *X-cx*, *Y-cy* and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from [Fl_Image](#).

Reimplemented in [Fl_SVG_Image](#).

12.116.3.6 label() [1/2]

```
void Fl_RGB_Image::label (
    Fl_Menu_Item * m ) [virtual]
```

This method is an obsolete way to set the image attribute of a menu item.

Deprecated Please use [Fl_Menu_Item::image\(\)](#) instead.

Reimplemented from [Fl_Image](#).

12.116.3.7 label() [2/2]

```
void Fl_RGB_Image::label (
    Fl_Widget * widget ) [virtual]
```

This method is an obsolete way to set the image attribute of a widget or menu item.

Deprecated Please use [Fl_Widget::image\(\)](#) or [Fl_Widget::deimage\(\)](#) instead.

Reimplemented from [Fl_Image](#).

12.116.3.8 max_size() [1/2]

```
static size_t Fl_RGB_Image::max_size ( ) [inline], [static]
```

Returns the maximum allowed image size in bytes when creating an [Fl_RGB_Image](#) object.

See also

```
void Fl\_RGB\_Image::max\_size\(size\_t\)
```

12.116.3.9 max_size() [2/2]

```
static void Fl_RGB_Image::max_size (
    size_t size ) [inline], [static]
```

Sets the maximum allowed image size in bytes when creating an [Fl_RGB_Image](#) object.

The image size in bytes of an [Fl_RGB_Image](#) object is the value of the product $w() * h() * d()$. If this product exceeds size, the created object of a derived class of [Fl_RGB_Image](#) won't be loaded with the image data. This does not apply to direct RGB image creation with [Fl_RGB_Image::Fl_RGB_Image\(const uchar *bits, int W, int H, int D, int LD\)](#). The default [max_size\(\)](#) value is essentially infinite.

12.116.3.10 normalize()

```
virtual void Fl_RGB_Image::normalize ( ) [inline], [virtual]
```

Makes sure the object is fully initialized.

In particular, makes sure member variable [array](#) is non-null.

Reimplemented in [Fl_SVG_Image](#).

12.116.3.11 uncache()

```
void Fl_RGB_Image::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented from [Fl_Image](#).

12.116.4 Member Data Documentation

12.116.4.1 array

```
const uchar* Fl_RGB_Image::array
```

Points to the start of the object's data array.

See also

class [FI_SVG_Image](#) which delays initialization of this member variable.

The documentation for this class was generated from the following files:

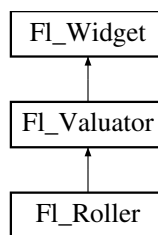
- [FI_Image.H](#)
- [FI_Image.cxx](#)

12.117 FI_Roller Class Reference

The [FI_Roller](#) widget is a "dolly" control commonly used to move 3D objects.

```
#include <FI_Roller.H>
```

Inheritance diagram for [FI_Roller](#):

**Public Member Functions**

- [FI_Roller](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [FI_Roller](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [FI_Valuator](#)

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.

- double [step](#) () const
Gets or sets the step value.
- void **step** (double a, int b)
See double [FI_Valuator::step\(\)](#) const
- void **step** (double s)
See double [FI_Valuator::step\(\)](#) const.
- void **step** (int a)
See double [FI_Valuator::step\(\)](#) const
- double [value](#) () const
Gets the floating point(double) value.
- int [value](#) (double)
Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_GI_Window](#) * [as_gi_window](#) ()
Returns an [FI_GI_Window](#) pointer if this widget is an [FI_GI_Window](#).
- virtual class [FI_GI_Window](#) const * **as_gi_window** () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void [bind_deimage](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.

- void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
- `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar` c)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar` c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (int, int, int, int)

- Internal use only.*

 - void `deactivate ()`
Deactivates the widget.
 - `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
 - const `FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
 - void `deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
 - void `deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
 - int `deimage_bound () const`
Returns whether the inactive image is managed by the widget.
 - void `do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
 - void `do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
 - void `do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
 - void `draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
 - int `h () const`
Gets the widget height.
 - virtual void `hide ()`
Makes a widget invisible.
 - `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
 - const `FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
 - void `image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
 - void `image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
 - int `image_bound () const`
Returns whether the image is managed by the widget.
 - int `inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
 - int `is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
 - const char * `label () const`
Gets the current label text.
 - void `label (const char *text)`
Sets the current label pointer.
 - void `label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
 - `FI_Color labelcolor () const`
Gets the label color.
 - void `labelcolor (FI_Color c)`
Sets the label color.
 - `FI_Font labelfont () const`
Gets the font to use.

- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)

- Changes the size of the widget.*

 - int [take_focus](#) ()

Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

Returns if the widget is able to take events.
- int [test_shortcut](#) ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const

Gets the current tooltip text.
- void [tooltip](#) (const char *text)

Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const

Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const

Gets the widget type.
- void [type](#) ([uchar](#) t)

Sets the widget type.
- int [use_accents_menu](#) ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const

Gets the user data for this widget.
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)

Sets the user data for this widget.
- void [user_data](#) (void *v)

Sets the user data for this widget.
- unsigned int [visible](#) () const

Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const

Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)

Modifies keyboard focus navigation.
- int [visible_r](#) () const

Returns whether a widget and all its parents are visible.
- int [w](#) () const

Gets the widget width.
- [FI_When](#) [when](#) () const

Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)

Sets the flags used to decide when a callback is called.
- [FI_Window](#) * [window](#) () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const

Gets the widget position in its window.
- int [y](#) () const

Gets the widget position in its window.
- virtual [~FI_Widget](#) ()

Destroys the widget.

Protected Member Functions

- void **draw** () [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from [FI_Valuator](#)

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
Creates a new [FI_Valuator](#) widget using the given position, size, and label string.
- void **handle_drag** (double newvalue)
Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.
- void **handle_push** ()
Stores the current value in the previous value.
- void **handle_release** ()
Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.
- int **horizontal** () const
Tells if the valuator is an [FL_HORIZONTAL](#) one.
- double **previous_value** () const
Gets the previous floating point value before an event changed it.
- void **set_value** (double v)
Sets the current floating point value.
- double **softclamp** (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void **value_damage** ()
Asks for partial redraw.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.

- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
, **OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
, **MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
, **GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }

flags possible values enumeration.

12.117.1 Detailed Description

The **FI_Roller** widget is a "dolly" control commonly used to move 3D objects.

The roller can be controlled by clicking and dragging the mouse, by the corresponding arrow keys when the roller has the keyboard focus, or by the mouse wheels when the mouse pointer is positioned over the roller widget.

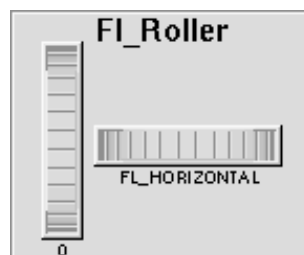


Figure 12.38 FI_Roller

12.117.2 Constructor & Destructor Documentation

12.117.2.1 Fl_Roller()

```
Fl_Roller::Fl_Roller (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Roller](#) widget using the given position, size, and label string. The default boxtype is `FL_NO_BOX`. Inherited destructor destroys the valuator.

12.117.3 Member Function Documentation

12.117.3.1 draw()

```
void Fl_Roller::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.117.3.2 handle()

```
int Fl_Roller::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

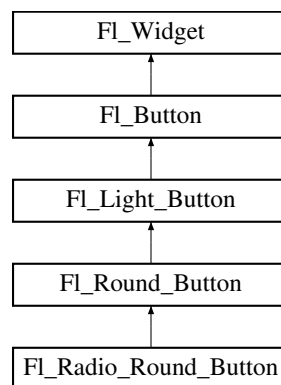
- `Fl_Roller.H`
- `Fl_Roller.cxx`

12.118 `Fl_Round_Button` Class Reference

Buttons generate callbacks when they are clicked by the user.

```
#include <Fl_Round_Button.H>
```

Inheritance diagram for `Fl_Round_Button`:



Public Member Functions

- `Fl_Round_Button` (int *x*, int *y*, int *w*, int *h*, const char **l*=0)
Creates a new `Fl_Round_Button` widget using the given position, size, and label string.

Public Member Functions inherited from `Fl_Light_Button`

- `Fl_Light_Button` (int *x*, int *y*, int *w*, int *h*, const char **l*=0)
Creates a new `Fl_Light_Button` widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.

Public Member Functions inherited from `Fl_Button`

- int `clear` ()
Same as `value(0)`.
- uchar `compact` ()
Return true if buttons are rendered as compact buttons.
- void `compact` (uchar *v*)
Decide if buttons should be rendered in compact mode.
- `Fl_Boxtype` `down_box` () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void `down_box` (`Fl_Boxtype` *b*)
Sets the down box type.
- `Fl_Color` `down_color` () const
(for backwards compatibility)

- void **down_color** (unsigned c)
(for backwards compatibility)
- **FI_Button** (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int **set** ()
Same as `value (1)`.
- void **setonly** ()
Turns on this button and turns off all other radio buttons in the group (calling `value (1)` or `set ()` does not do this).
- int **shortcut** () const
Returns the current shortcut key for the button.
- void **shortcut** (const char *s)
(for backwards compatibility)
- void **shortcut** (int s)
Sets the shortcut key to `s`.
- char **value** () const
Returns the current value of the button (0 or 1).
- int **value** (int v)
Sets the current value of the button.

Public Member Functions inherited from **FI_Widget**

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (**FI_Align** alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window** * **as_gl_window** ()
Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- virtual class **FI_Gl_Window** const * **as_gl_window** () const
- virtual **FI_Group** * **as_group** ()
Returns an `FI_Group` pointer if this widget is an `FI_Group`.
- virtual **FI_Group** const * **as_group** () const
- virtual **FI_Window** * **as_window** ()
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (**FI_Image** *img)

- Sets the image to use as part of the widget label when in the active state.*

 - void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
 - `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
 - void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
 - `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
 - void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
 - void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
 - unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
 - void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
 - void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
 - void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
 - void `clear_output` ()
 - Sets a widget to accept input.*
 - void `clear_visible` ()
 - Hides the widget.*
 - void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
 - `FI_Color` `color` () const
 - Gets the background color of the widget.*
 - void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
 - void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
 - `FI_Color` `color2` () const
 - For back compatibility only.*
 - void `color2` (unsigned a)
 - For back compatibility only.*
 - int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
 - void `copy_label` (const char *new_label)
 - Sets the current label.*
 - void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*

- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FL_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FL_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FL_Widget *widget`, `long arg`, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FL_Widget *widget`, `void *arg=0`, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FL_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FL_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FL_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FL_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FL_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FL_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FL_Labeltype a`, const char *b)
Shortcut to set the label text and type in one call.
- `FL_Color labelcolor` () const

- Gets the label color.*

 - void [labelcolor](#) ([FI_Color](#) c)
- Sets the label color.*

 - [FI_Font](#) [labelfont](#) () const
- Gets the font to use.*

 - void [labelfont](#) ([FI_Font](#) f)
- Sets the font to use.*

 - [FI_Fontsize](#) [labelsize](#) () const
- Gets the font size in pixels.*

 - void [labelsize](#) ([FI_Fontsize](#) pix)
- Sets the font size in pixels.*

 - [FI_Labeltype](#) [labeltype](#) () const
- Gets the label type.*

 - void [labeltype](#) ([FI_Labeltype](#) a)
- Sets the label type.*

 - void [measure_label](#) (int &ww, int &hh) const
- Sets width ww and height hh accordingly with the label size.*

 - bool [needs_keyboard](#) () const
- Returns whether this widget needs a keyboard.*

 - void [needs_keyboard](#) (bool needs)
- Sets whether this widget needs a keyboard.*

 - unsigned int [output](#) () const
- Returns if a widget is used for output only.*

 - [FI_Group](#) * [parent](#) () const
- Returns a pointer to the parent widget.*

 - void [parent](#) ([FI_Group](#) *p)
- Internal use only - "for hacks only".*

 - void [position](#) (int X, int Y)
- Repositions the window or widget.*

 - void [redraw](#) ()
- Schedules the drawing of the widget.*

 - void [redraw_label](#) ()
- Schedules the drawing of the label.*

 - virtual void [resize](#) (int x, int y, int w, int h)
- Changes the size or position of the widget.*

 - [FI_Color](#) [selection_color](#) () const
- Gets the selection color.*

 - void [selection_color](#) ([FI_Color](#) a)
- Sets the selection color.*

 - void [set_active](#) ()
- Marks the widget as active without sending events or changing focus.*

 - void [set_changed](#) ()
- Marks the value of the widget as changed.*

 - void [set_output](#) ()
- Sets a widget to output only.*

 - void [set_visible](#) ()
- Makes the widget visible.*

 - void [set_visible_focus](#) ()
- Enables keyboard focus navigation with this widget.*

 - int [shortcut_label](#) () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void `default_callback` (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from FI_Light_Button

- void `draw` () `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from FI_Button

- void `simulate_key_action` ()

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const

- Draws a focus box for the widget at the given position and size.*

 - void `draw_label` () const

Draws the widget's label at the defined label position.

 - void `draw_label` (int, int, int, int) const

Draws the label in an arbitrary bounding box.

 - `Fl_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)

Creates a widget at the given position and size.

 - unsigned int `flags` () const

Gets the widget flags mask.

 - void `h` (int `v`)

Internal use only.

 - void `set_flag` (unsigned int `c`)

Sets a flag in the flags mask.

 - void `w` (int `v`)

Internal use only.

 - void `x` (int `v`)

Internal use only.

 - void `y` (int `v`)

Internal use only.

Static Protected Member Functions inherited from `Fl_Button`

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from `Fl_Button`

- static `Fl_Widget_Tracker` * `key_release_tracker` = 0

12.118.1 Detailed Description

Buttons generate callbacks when they are clicked by the user.

You control exactly when and how by changing the values for `type()` and `when()`.

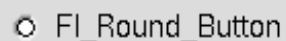


Figure 12.39 `Fl_Round_Button`

The `Fl_Round_Button` subclass displays the "on" state by turning on a light, rather than drawing pushed in. The shape of the "light" is initially set to `FL_ROUND_DOWN_BOX`. The color of the light when on is controlled with `selection_color()`, which defaults to `FL_FOREGROUND_COLOR`.

12.118.2 Constructor & Destructor Documentation

12.118.2.1 `Fl_Round_Button()`

```
Fl_Round_Button::Fl_Round_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_Round_Button` widget using the given position, size, and label string.


 FI_Round_Button

Figure 12.40 FI_Round_Button

The `FI_Round_Button` subclass displays the "ON" state by turning on a light, rather than drawing pushed in. The default box type is `FL_NO_BOX`, which draws the label w/o a box right of the checkmark. The shape of the "light" is set with `down_box()` and its default value is `FL_ROUND_DOWN_BOX`. The color of the light when on is controlled with `selection_color()`, which defaults to `FL_FOREGROUND_COLOR` (usually black).

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

The documentation for this class was generated from the following files:

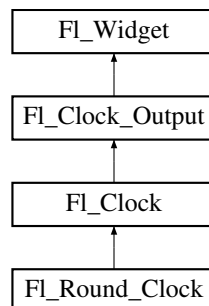
- `FI_Round_Button.H`
- `FI_Round_Button.cxx`

12.119 FI_Round_Clock Class Reference

A clock widget of type `FL_ROUND_CLOCK`.

```
#include <Fl_Round_Clock.H>
```

Inheritance diagram for `FI_Round_Clock`:



Public Member Functions

- `FI_Round_Clock` (int X, int Y, int W, int H, const char *L=0)

Creates the clock widget, setting his type and box.

Public Member Functions inherited from `FI_Clock`

- `FI_Clock` (int X, int Y, int W, int H, const char *L=0)
Create an `FI_Clock` widget using the given position, size, and label string.
- `FI_Clock` (uchar t, int X, int Y, int W, int H, const char *L)
Create an `FI_Clock` widget using the given clock type t , position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.
- `~FI_Clock` ()
The destructor removes the clock.

Public Member Functions inherited from [FI_Clock_Output](#)

- [FI_Clock_Output](#) (int X, int Y, int W, int H, const char *L=0)
Create a new [FI_Clock_Output](#) widget with the given position, size and label.
- int [hour](#) () const
Returns the displayed hour (0 to 23).
- int [minute](#) () const
Returns the displayed minute (0 to 59).
- int [second](#) () const
Returns the displayed second (0 to 60, 60=leap second).
- int [shadow](#) () const
Returns the shadow drawing mode of the hands.
- void [shadow](#) (int mode)
Sets the shadow drawing mode of the hands.
- [ulong value](#) () const
Returns the displayed time.
- void [value](#) (int H, int m, int s)
Set the displayed time.
- void [value](#) (ulong v)
Set the displayed time.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

- void `bind_image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box` () const
Gets the box type of the widget.
- void `box` (`FI_Boxtype new_box`)
Sets the box type for the widget.
- `FI_Callback_p callback` () const
Gets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback *cb`, void *p)
Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0 *cb`)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback1 *cb`, long p=0)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color color` () const
Gets the background color of the widget.
- void `color` (`FI_Color bg`)
Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)
Sets the background and selection color of the widget.
- `FI_Color color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const `FI_Widget *w`) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- uchar `damage` () const

- Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar c`)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (`int`, `int`, `int`, `int`)
 - Internal use only.*
- void `deactivate` ()
 - Deactivates the widget.*
- `FI_Image * deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
- const `FI_Image * deimage` () const
 - Gets the image that is used as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image &img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `deimage` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
- int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
- void `do_callback` (`FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
 - Calls the widget callback function with default arguments.*
- void `do_callback` (`FI_Widget *widget`, `long arg`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int `h` () const
 - Gets the widget height.*
- virtual void `hide` ()
 - Makes a widget invisible.*
- `FI_Image * image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
- const `FI_Image * image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
- void `image` (`FI_Image &img`)
 - Sets the image to use as part of the widget label when in the active state.*
- void `image` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
- int `image_bound` () const
 - Returns whether the image is managed by the widget.*
- int `inside` (const `FI_Widget *wgt`) const
 - Checks if this widget is a child of `wgt`.*
- int `is_label_copied` () const
 - Returns whether the current label was assigned with `copy_label()`.*
- const char * `label` () const
 - Gets the current label text.*
- void `label` (const char *`text`)
 - Sets the current label pointer.*
- void `label` (`FI_Labeltype a`, const char *`b`)
 - Shortcut to set the label text and type in one call.*

- [FI_Color labelcolor](#) () const
Gets the label color.
- void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
- [FI_Font labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group * parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const

- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()

Makes a widget visible.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.
- void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window` * `top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const

Gets the widget type.
- void `type` (`uchar` t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When` `when` () const

Returns the conditions under which the callback is called.
- void `when` (`uchar` i)

Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.

- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from `FI_Clock_Output`

- void `draw` () `FL_OVERRIDE`
Draw clock with current position and size.
- void `draw` (int X, int Y, int W, int H)
Draw clock with the given position and size.

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.

- void [draw_focus](#) ([FL_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FL_Boxtype](#) t, int x, int y, int w, int h, [FL_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FL_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int [flags](#) () const
Gets the widget flags mask.
- void [h](#) (int v)
Internal use only.
- void [set_flag](#) (unsigned int c)
Sets a flag in the flags mask.
- void [w](#) (int v)
Internal use only.
- void [x](#) (int v)
Internal use only.
- void [y](#) (int v)
Internal use only.

12.119.1 Detailed Description

A clock widget of type `FL_ROUND_CLOCK`.
Has no box.

12.119.2 Constructor & Destructor Documentation

12.119.2.1 [Fl_Round_Clock](#)()

```
Fl_Round_Clock::Fl_Round_Clock (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates the clock widget, setting his type and box.

Create an [Fl_Round_Clock](#) widget using the given position, size, and label string.

The clock type is `FL_ROUND_CLOCK` and the boxtype is `FL_NO_BOX`.

This constructor is the same as [Fl_Clock\(FL_ROUND_CLOCK, X, Y, W, H, L\)](#).

See also

[Fl_Clock\(uchar, int, int, int, int, const char *\)](#)

Parameters

in	<i>X, Y, W, H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

The documentation for this class was generated from the following files:

- [Fl_Round_Clock.H](#)

- `Fl_Clock.cxx`

12.120 Fl_Scheme Class Reference

Static Public Member Functions

- static int `add_scheme_name` (const char *name)
Add a scheme name to the list of known schemes.
- static const char ** `names` ()
Return a list of all known scheme names.
- static int `num_schemes` ()
Return the number of currently registered schemes.

12.120.1 Member Function Documentation

12.120.1.1 add_scheme_name()

```
int Fl_Scheme::add_scheme_name (
    const char * name ) [static]
```

Add a scheme name to the list of known schemes.

This method is public in FLTK 1.4.0 because derived classes of `Fl_Scheme` are not yet implemented. Thus, users implementing their own schemes can use this method to add the scheme name to the list of known schemes which is for instance used in `Fl_Scheme::names()`.

Note

Attention! In a future version, when subclasses of `Fl_Scheme` will be implemented, this method will either be replaced by another `protected` method or it will no longer do anything (kept only for ABI reasons).

The new scheme name must consist of valid ASCII characters as described below:

- lowercase letters 'a' - 'z'
- numbers '0' - '9'
- any character in "\$+_. " (w/o the quotes).

The name must not be longer than 12 ASCII characters (bytes). The new scheme name is added to the **end** of the **unordered** list.

Note

Call this method only once for each scheme name. If the returned value is ≤ 0 you should check the scheme name.

The given scheme `name` is copied and may be freed directly after the call to `add_scheme_name()`.

Parameters

<code>in</code>	<code>name</code>	New scheme name
-----------------	-------------------	-----------------

Returns

The new number of schemes if the name was successfully added. This is the same as the index of the scheme + 1.

Return values

0	Scheme name already exists
-1	Invalid character(s) in name
-2	The name is too long

Since

1.4.0

12.120.1.2 names()

```
const char ** Fl_Scheme::names ( ) [static]
```

Return a list of all known scheme names.

This list is only valid until a new scheme is added or one is removed. It is possible that scheme names are appended to the list during the runtime of the program but schemes can't be removed.

Getting the list of known schemes can be useful to populate a menu of scheme choices to let the user select a scheme. You should process the names immediately and you should never store a pointer to the list or any individual name for later reference because the location of the list can be changed (reallocated) when schemes are added.

The list of scheme names is nul-terminated.

Note

Currently (in FLTK 1.4.0) schemes can only be added to the list and not removed from the list. This may change in a later version.

Returns

List of currently known scheme names.

12.120.1.3 num_schemes()

```
static int Fl_Scheme::num_schemes ( ) [inline], [static]
```

Return the number of currently registered schemes.

Returns

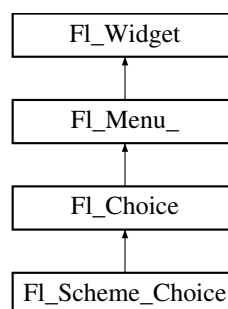
Number of registered schemes.

The documentation for this class was generated from the following files:

- [Fl_Scheme.H](#)
- [Fl_Scheme.cxx](#)

12.121 FI_Scheme_Choice Class Reference

Inheritance diagram for `FI_Scheme_Choice`:



Public Member Functions

- [FI_Scheme_Choice](#) (int X, int Y, int W, int H, const char *L=0)
The constructor initializes the [FI_Scheme_Choice](#) object with all known schemes.
- int [handle](#) (int event) [FL_OVERRIDE](#)
Handle FLTK events.
- virtual void [init_value](#) ()
Public method to initialize the value of the [FI_Scheme_Choice](#) widget.

Public Member Functions inherited from [FI_Choice](#)

- [FI_Choice](#) (int X, int Y, int W, int H, const char *L=0)
Create a new [FI_Choice](#) widget using the given position, size and label string.
- int [value](#) () const
Gets the index of the last item chosen by the user.
- int [value](#) (const [FI_Menu_Item](#) *v)
Sets the currently selected value using a pointer to menu item.
- int [value](#) (int v)
Sets the currently selected value using the index into the menu item array.

Public Member Functions inherited from [FI_Menu_](#)

- int [add](#) (const char *)
This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.
- int [add](#) (const char *, int [shortcut](#), [FI_Callback](#) *, void *=0, int=0)
Adds a new menu item.
- int [add](#) (const char *a, const char *b, [FI_Callback](#) *c, void *d=0, int e=0)
See int [FI_Menu_::add](#)(const char label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)*
- void [clear](#) ()
Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.
- int [clear_submenu](#) (int index)
*Clears the specified submenu pointed to by *index* of all menu items.*
- void [copy](#) (const [FI_Menu_Item](#) *m, void *user_data=0)
Sets the menu array pointer with a copy of m that will be automatically deleted.
- [FI_Boxtype](#) [down_box](#) () const
This box type is used to surround the currently-selected items in the menus.
- void [down_box](#) ([FI_Boxtype](#) b)
Sets the box type used to surround the currently-selected items in the menus.
- [FI_Color](#) [down_color](#) () const
For back compatibility, same as [selection_color\(\)](#)
- void [down_color](#) (unsigned c)
For back compatibility, same as [selection_color\(\)](#)
- int [find_index](#) (const char *name) const
*Find the menu item index for a given menu *pathname*, such as "Edit/Copy".*
- int [find_index](#) (const [FI_Menu_Item](#) *item) const
*Find the index into the menu array for a given *item*.*
- int [find_index](#) ([FI_Callback](#) *cb) const
*Find the index into the menu array for a given callback *cb*.*
- const [FI_Menu_Item](#) * [find_item](#) (const char *name)
*Find the menu item for a given menu *pathname*, such as "Edit/Copy".*
- const [FI_Menu_Item](#) * [find_item](#) ([FI_Callback](#) *)
*Find the menu item for the given callback *cb*.*
- const [FI_Menu_Item](#) * [find_item_with_argument](#) (long)
*Find the menu item for the given user argument *v*.*
- const [FI_Menu_Item](#) * [find_item_with_user_data](#) (void *)
*Find the menu item for the given user data *v*.*
- [FI_Menu_](#) (int, int, int, int, const char *=0)
Creates a new [FI_Menu_](#) widget using the given position, size, and label string.
- void [global](#) ()
Make the shortcuts for this menu work no matter what window has the focus when you type it.

- int **insert** (int index, const char *, int shortcut, [FI_Callback](#) *, void *=0, int=0)
Inserts a new menu item at the specified index position.
- int **insert** (int index, const char *a, const char *b, [FI_Callback](#) *c, void *d=0, int e=0)
See int [FI_Menu_::insert](#)(const char label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)*
- int **item_pathname** (char *name, int namelen, const [FI_Menu_Item](#) *finditem=0) const
Get the menu 'pathname' for the specified menuitem.
- const [FI_Menu_Item](#) * **menu** () const
Returns a pointer to the array of FI_Menu_Items.
- void **menu** (const [FI_Menu_Item](#) *m)
Sets the menu array pointer directly.
- [FI_Boxtype](#) **menu_box** () const
Get the box type for the menu popup windows.
- void **menu_box** ([FI_Boxtype](#) b)
Set the box type for the menu popup windows.
- const [FI_Menu_Item](#) * **menu_end** ()
Finishes menu modifications and returns menu().
- int **mode** (int i) const
Gets the flags of item i.
- void **mode** (int i, int fl)
Sets the flags of item i.
- const [FI_Menu_Item](#) * **mvalue** () const
Returns a pointer to the last menu item that was picked.
- const [FI_Menu_Item](#) * **picked** (const [FI_Menu_Item](#) *)
When user picks a menu item, call this.
- const [FI_Menu_Item](#) * **prev_mvalue** () const
Returns a pointer to the menu item that was picked before the current one was picked.
- void **remove** (int)
Deletes item i from the menu.
- void **replace** (int, const char *)
Changes the text of item i.
- void **setonly** ([FI_Menu_Item](#) *item)
Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.
- void **shortcut** (int i, int s)
Changes the shortcut of item i to s.
- int **size** () const
This returns the number of FI_Menu_Item structures that make up the menu, correctly counting submenus.
- void **size** (int W, int H)
- const [FI_Menu_Item](#) * **test_shortcut** ()
Returns the menu item with the entered shortcut (key value).
- const char * **text** () const
Returns the title of the last item chosen.
- const char * **text** (int i) const
Returns the title of item i.
- [FI_Color](#) **textcolor** () const
Get the current color of menu item labels.
- void **textcolor** ([FI_Color](#) c)
Sets the current color of menu item labels.
- [FI_Font](#) **textfont** () const
Gets the current font of menu item labels.
- void **textfont** ([FI_Font](#) c)
Sets the current font of menu item labels.

- [FI_Fontsize](#) `textsize` () const
Gets the font size of menu item labels.
- void `textsize` ([FI_Fontsize](#) c)
Sets the font size of menu item labels.
- int `value` () const
Returns the index into `menu()` of the last item chosen by the user.
- int `value` (const [FI_Menu_Item](#) *)
The value is the index into `menu()` of the last item chosen by the user.
- int `value` (int i)
The value is the index into `menu()` of the last item chosen by the user.

Public Member Functions inherited from [FI_Widget](#)

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) `align` () const
Gets the label alignment.
- void `align` ([FI_Align](#) alignment)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument` (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * `as_gl_window` ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * `as_gl_window` () const
- virtual [FI_Group](#) * `as_group` ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * `as_group` () const
- virtual [FI_Window](#) * `as_window` ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * `as_window` () const
- void `bind_deimage` ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) `box` () const
Gets the box type of the widget.
- void `box` ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p](#) `callback` () const

- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback` *cb, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1` *cb, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar` c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h () const`
Gets the widget height.
- `virtual void hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`

- Gets the font size in pixels.*
- void `labelsize` (`FI_Fontsize` pix)
 - Sets the font size in pixels.*
- `FI_Labeltype` `labeltype` () const
 - Gets the label type.*
- void `labeltype` (`FI_Labeltype` a)
 - Sets the label type.*
- void `measure_label` (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
- bool `needs_keyboard` () const
 - Returns whether this widget needs a keyboard.*
- void `needs_keyboard` (bool needs)
 - Sets whether this widget needs a keyboard.*
- unsigned int `output` () const
 - Returns if a widget is used for output only.*
- `FI_Group` * `parent` () const
 - Returns a pointer to the parent widget.*
- void `parent` (`FI_Group` *p)
 - Internal use only - "for hacks only".*
- void `position` (int X, int Y)
 - Repositions the window or widget.*
- void `redraw` ()
 - Schedules the drawing of the widget.*
- void `redraw_label` ()
 - Schedules the drawing of the label.*
- virtual void `resize` (int x, int y, int w, int h)
 - Changes the size or position of the widget.*
- `FI_Color` `selection_color` () const
 - Gets the selection color.*
- void `selection_color` (`FI_Color` a)
 - Sets the selection color.*
- void `set_active` ()
 - Marks the widget as active without sending events or changing focus.*
- void `set_changed` ()
 - Marks the value of the widget as changed.*
- void `set_output` ()
 - Sets a widget to output only.*
- void `set_visible` ()
 - Makes the widget visible.*
- void `set_visible_focus` ()
 - Enables keyboard focus navigation with this widget.*
- int `shortcut_label` () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void `shortcut_label` (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void `show` ()
 - Makes a widget visible.*
- void `size` (int W, int H)
 - Changes the size of the widget.*
- int `take_focus` ()
 - Gives the widget the keyboard focus.*

- unsigned int [takeevents](#) () const
Returns if the widget is able to take events.
- int [test_shortcut](#) ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const
Gets the current tooltip text.
- void [tooltip](#) (const char *text)
Sets the current tooltip text.
- [FI_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- uchar [type](#) () const
Gets the widget type.
- void [type](#) (uchar t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [FI_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) (uchar i)
Sets the flags used to decide when a callback is called.
- [FI_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~FI_Widget](#) ()
Destroys the widget.

Static Protected Member Functions

- static void [scheme_cb_](#) ([FI_Widget](#) *w, void *)
Internal [FI_Scheme_Choice](#) callback function (protected).

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Choice](#)

- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.

Protected Member Functions inherited from [FI_Menu_](#)

- int [item_pathname_](#) (char *name, int namelen, const [FI_Menu_Item](#) *finditem, const [FI_Menu_Item](#) *menu=0) const

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.

- void `draw_focus` (`Fl_Boxtype` t, int x, int y, int w, int h, `Fl_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `Fl_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Protected Attributes inherited from `Fl_Menu_`

- `uchar` `alloc`
- `uchar` `down_box_`
- `Fl_Boxtype` `menu_box_`
- `Fl_Color` `textcolor_`
- `Fl_Font` `textfont_`
- `Fl_Fontsize` `textsize_`

12.121.1 Constructor & Destructor Documentation

12.121.1.1 `Fl_Scheme_Choice()`

```
Fl_Scheme_Choice::Fl_Scheme_Choice (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor initializes the `Fl_Scheme_Choice` object with all known schemes.

Parameters

in	<i>X,Y</i>	Widget coordinates
in	<i>W,H</i>	Widget size (width, height)
in	<i>L</i>	Widget label (default: NULL, no label)

12.121.2 Member Function Documentation

12.121.2.1 `handle()`

```
int Fl_Scheme_Choice::handle (
    int event ) [virtual]
```

Handle FLTK events.

This widget uses FL_SHOW and some other events to initialize its `value()` according to the current scheme.

All events are also handled by the base class `FI_Choice`.

Parameters

in	<i>event</i>	
----	--------------	--

Returns

1 if the event was used, 0 otherwise

Reimplemented from `FI_Choice`.

12.121.2.2 `init_value()`

```
void Fl_Scheme_Choice::init_value ( ) [virtual]
```

Public method to initialize the value of the `FI_Scheme_Choice` widget.

Normally you don't need to call this unless you change the current scheme by calling `FI::scheme(const char *)`.

The `FI_Scheme_Choice` widget does this automatically when the widget is shown (when receiving the FL_SHOW event) which should always be after `FI_Window::show(argc, argv)` which may set the current scheme by interpreting the commandline.

Since

1.4.0

12.121.2.3 `scheme_cb_()`

```
void Fl_Scheme_Choice::scheme_cb_ (
    Fl_Widget * w,
    void * ) [static], [protected]
```

Internal `FI_Scheme_Choice` callback function (protected).

You don't need to set a callback for this widget. The default callback changes the scheme (`FI::scheme()`) and redraws all open windows.

You may override the callback if changing the scheme shall redraw other windows or don't redraw the window at all.

Parameters

in	<i>w</i>	The <code>FI_Scheme_Choice</code> widget
----	----------	--

The documentation for this class was generated from the following files:

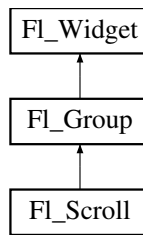
- `FI_Scheme_Choice.H`
- `FI_Scheme_Choice.cxx`

12.122 `FI_Scroll` Class Reference

This container widget lets you maneuver around a set of widgets much larger than your window.

```
#include <Fl_Scroll.H>
```

Inheritance diagram for `FI_Scroll`:



Classes

- struct [Fl_Region_LRTB](#)
A local struct to manage a region defined by left/right/top/bottom.
- struct [Fl_Region_XYWH](#)
A local struct to manage a region defined by xywh.
- struct [Fl_Scrollbar_Data](#)
A local struct to manage a scrollbar's xywh region and tab values.
- struct [ScrollInfo](#)
Structure to manage scrollbar and widget interior sizes.

Public Types

- enum {
HORIZONTAL = 1 , **VERTICAL** = 2 , **BOTH** = 3 , **ALWAYS_ON** = 4 ,
HORIZONTAL_ALWAYS = 5 , **VERTICAL_ALWAYS** = 6 , **BOTH_ALWAYS** = 7 }

Public Member Functions

- void **clear** ()
Clear all but the scrollbars...
- int **delete_child** (int n) [FL_OVERRIDE](#)
Removes the widget at *index* from the group and deletes it.
- [Fl_Scroll](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new *Fl_Scroll* widget using the given position, size, and label string.
- int **handle** (int) [FL_OVERRIDE](#)
Handles the specified event.
- void **resize** (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Resizes the *Fl_Scroll* widget and moves its children if necessary.
- void **scroll_to** (int, int)
Moves the contents of the scroll group to a new position.
- int **scrollbar_size** () const
Gets the current size of the scrollbars' troughs, in pixels.
- void **scrollbar_size** (int newSize)
Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.
- int **xposition** () const
Gets the current horizontal scrolling position.
- int **yposition** () const
Gets the current vertical scrolling position.
- virtual **~Fl_Scroll** ()
The destructor also deletes all the children.

Public Member Functions inherited from [FL_Group](#)

- [FL_Widget](#) *[& _ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FL_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FL_Widget](#) *o)
See void [FL_Group::add\(FL_Widget &w\)](#)
- void [add_resizable](#) ([FL_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FL_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FL_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FL_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FL_Group](#) pointer if this widget is an [FL_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FL_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- void [end](#) ()
Exactly the same as [current\(this->parent\(\)\)](#).
- int [find](#) (const [FL_Widget](#) &o) const
*See int [FL_Group::find\(const FL_Widget *w\) const](#).*
- int [find](#) (const [FL_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FL_Group](#) ([int](#), [int](#), [int](#), [int](#), const char *[=0](#))
Creates a new [FL_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FL_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FL_Widget](#) &, [int](#) i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FL_Widget](#) &o, [FL_Widget](#) *before)
This does [insert\(w, find\(before\)\)](#).
- void [remove](#) ([FL_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FL_Widget](#) *o)
Removes the widget o from the group.
- void [remove](#) ([int](#) index)
Removes the widget at [index](#) from the group but does not delete it.
- [FL_Widget](#) * [resizable](#) () const

- Returns the group's resizable widget.*

 - void `resizable` (`FI_Widget &o`)

Sets the group's resizable widget.

 - void `resizable` (`FI_Widget *o`)

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.

 - virtual `~FI_Group` ()

The destructor also deletes all the children.

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FI_Align align` () const
 - Gets the label alignment.*
- void `align` (`FI_Align alignment`)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window * as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window const * as_gl_window` () const
- virtual `FI_Window * as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window const * as_window` () const
- void `bind_deimage` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype new_box`)
 - Sets the box type for the widget.*
- `FI_Callback_p callback` () const
 - Gets the current callback function for the widget.*
- void `callback` (`FI_Callback *cb`)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback *cb`, void *p)

- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0 *cb`)

Sets the current callback function for the widget.

 - void `callback` (`FI_Callback1 *cb, long p=0`)

Sets the current callback function for the widget.

 - unsigned int `changed` () const

Checks if the widget value changed since the last callback.

 - void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.

 - void `clear_changed` ()

Marks the value of the widget as unchanged.

 - void `clear_damage` (`uchar c=0`)

Clears or sets the damage flags.

 - void `clear_output` ()

Sets a widget to accept input.

 - void `clear_visible` ()

Hides the widget.

 - void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.

 - `FI_Color color` () const

Gets the background color of the widget.

 - void `color` (`FI_Color bg`)

Sets the background color of the widget.

 - void `color` (`FI_Color bg, FI_Color sel`)

Sets the background and selection color of the widget.

 - `FI_Color color2` () const

For back compatibility only.

 - void `color2` (`unsigned a`)

For back compatibility only.

 - int `contains` (`const FI_Widget *w`) const

Checks if w is a child of this widget.

 - void `copy_label` (`const char *new_label`)

Sets the current label.

 - void `copy_tooltip` (`const char *text`)

Sets the current tooltip text.

 - `uchar damage` () const

Returns non-zero if `draw()` needs to be called.

 - void `damage` (`uchar c`)

Sets the damage bits for the widget.

 - void `damage` (`uchar c, int x, int y, int w, int h`)

Sets the damage bits for an area inside the widget.

 - int `damage_resize` (`int, int, int, int`)

Internal use only.

 - void `deactivate` ()

Deactivates the widget.

 - `FI_Image * deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.

 - const `FI_Image * deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.

 - void `deimage` (`FI_Image &img`)

Sets the image to use as part of the widget label when in the inactive state.

- void `deimage` (`Fl_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`Fl_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`Fl_Widget *widget`, long arg, `Fl_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`Fl_Widget *widget`, void *arg=0, `Fl_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `Fl_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `Fl_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `Fl_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`Fl_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`Fl_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `Fl_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`Fl_Labeltype` a, const char *b)
Shortcut to set the label text and type in one call.
- `Fl_Color` `labelcolor` () const
Gets the label color.
- void `labelcolor` (`Fl_Color` c)
Sets the label color.
- `Fl_Font` `labelfont` () const
Gets the font to use.
- void `labelfont` (`Fl_Font` f)
Sets the font to use.
- `Fl_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`Fl_Fontsize` pix)
Sets the font size in pixels.
- `Fl_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`Fl_Labeltype` a)

- Sets the label type.*

 - void `measure_label` (int &ww, int &hh) const

Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard` (bool needs)

Sets whether this widget needs a keyboard.
- unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group` * `parent` () const

Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
- Internal use only - "for hacks only".*

 - void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()
- Schedules the drawing of the widget.*

 - void `redraw_label` ()

Schedules the drawing of the label.
- `FI_Color` `selection_color` () const
- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)

Sets the selection color.
- void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()

Marks the value of the widget as changed.
- void `set_output` ()
- Sets a widget to output only.*

 - void `set_visible` ()

Makes the widget visible.
- void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void `show` ()

Makes a widget visible.
- void `size` (int W, int H)
- Changes the size of the widget.*

 - int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)

Sets the current tooltip text.

- [Fl_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [Fl_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
Gets the widget type.
- void [type](#) ([uchar](#) t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([Fl_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [Fl_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [Fl_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~Fl_Widget](#) ()
Destroys the widget.

Public Attributes

- [Fl_Scrollbar](#) [hscrollbar](#)
- [Fl_Scrollbar](#) [scrollbar](#)

Protected Member Functions

- void [bbox](#) (int &, int &, int &, int &) const
Returns the bounding box for the interior of the scrolling area, inside the scrollbars.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- void [fix_scrollbar_order](#) ()
Ensure the scrollbars are the last children.

- int `on_insert` (`FI_Widget *`, int) `FL_OVERRIDE`
Change insert position of a child before it is added.
- int `on_move` (int, int) `FL_OVERRIDE`
Change new position of a child before it is moved.
- void `recalc_scrollbars` (`ScrollInfo &si`) const
Calculate visibility/size/position of scrollbars, find children's bounding box.

Protected Member Functions inherited from `FI_Group`

- `FI_Rect *` `bounds` ()
Returns the internal array of widget sizes and positions.
- void `draw_child` (`FI_Widget &widget`) const
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (const `FI_Widget &widget`) const
Parents normally call this to draw outside labels of child widgets.
- virtual void `on_remove` (int)
Allow derived groups to act when a child widget is removed from the group.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`FI_Widget &widget`) const
Draws a child only if it needs it.

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype t`, `FI_Color c`) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype t`, int x, int y, int w, int h, `FI_Color c`) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype t`, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype t`, int x, int y, int w, int h, `FI_Color bg`) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)

- Internal use only.*
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * **current** ()
Returns the currently active group.
- static void **current** ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
, **OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
, **MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
, **GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 , **NEEDS_KEYBOARD** = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 , **MAXIMIZED** = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

12.122.1 Detailed Description

This container widget lets you maneuver around a set of widgets much larger than your window.

If the child widgets are larger than the size of this object then scrollbars will appear so that you can scroll over to them:

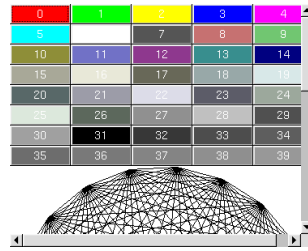


Figure 12.41 FI_Scroll

If all of the child widgets are packed together into a solid rectangle then you want to set `box()` to `FL_NO_BOX` or one of the `_FRAME` types. This will result in the best output. However, if the child widgets are a sparse arrangement you must set `box()` to a real `_BOX` type. This can result in some blinking during redrawing, but that can be solved by using a `FI_Double_Window`.

The `FI_Scroll` widget calculates the bounding box of all its children by using their widget positions and sizes (x, y, w, h). Outside labels are not considered. If you need outside labels of any widgets or free space outside of this bounding box you can add a tiny invisible `FI_Box` at the relevant corner(s) of the `FI_Scroll` widget, for instance:

```
FI_Scroll scroll(100, 100, 200, 200); // FI_Scroll at (100, 100)
FI_Box(100, 100, 1, 1); // FI_Box in top left corner
FI_Input(150, 120, 60, 30, "Input:"); // left most widget with label
// ... more widgets ...
scroll.end();
```

By default you can scroll in both directions, and the scrollbars disappear if the data will fit in the area of the scroll.

Use `FI_Scroll::type()` to change this as follows :

- 0 - No scrollbars
- `FI_Scroll::HORIZONTAL` - Only a horizontal scrollbar.
- `FI_Scroll::VERTICAL` - Only a vertical scrollbar.
- `FI_Scroll::BOTH` - The default is both scrollbars.
- `FI_Scroll::HORIZONTAL_ALWAYS` - Horizontal scrollbar always on, vertical always off.
- `FI_Scroll::VERTICAL_ALWAYS` - Vertical scrollbar always on, horizontal always off.
- `FI_Scroll::BOTH_ALWAYS` - Both always on.

Use `scrollbar.align(int)` (see void `FI_Widget::align(FI_Align)`) : to change what side the scrollbars are drawn on.

If the `FL_ALIGN_LEFT` bit is on, the vertical scrollbar is on the left. If the `FL_ALIGN_TOP` bit is on, the horizontal scrollbar is on the top. Note that only the alignment flags in scrollbar are considered. The flags in `hscrollbar` however are ignored.

This widget can also be used to pan around a single child widget "canvas". This child widget should be of your own class, with a `draw()` method that draws the contents. The scrolling is done by changing the `x()` and `y()` of the widget, so this child must use the `x()` and `y()` to position its drawing. To speed up drawing it should test `fl_not_clipped(int x,int y,int w,int h)` to find out if a particular area of the widget must be drawn.

Another very useful child is a single `FI_Pack`, which is itself a group that packs its children together and changes size to surround them. Filling the `FI_Pack` with `FI_Tabs` groups (and then putting normal widgets inside those) gives you a very powerful scrolling list of individually-openable panels.

Fluid lets you create these, but you can only lay out objects that fit inside the `FI_Scroll` without scrolling. Be sure to leave space for the scrollbars, as Fluid won't show these either.

You cannot use `FI_Window` as a child of this since the clipping is not conveyed to it when drawn, and it will draw over the scrollbars and neighboring objects.

12.122.2 Constructor & Destructor Documentation

12.122.2.1 FI_Scroll()

```
FI_Scroll::FI_Scroll (
    int X,
    int Y,
```

```

    int W,
    int H,
    const char * L = 0 )

```

Creates a new [Fl_Scroll](#) widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [Fl_Scroll](#) and all of its children can be automatic (local) variables, but you must declare the [Fl_Scroll](#) *first*, so that it is destroyed last.

12.122.2.2 ~Fl_Scroll()

```
Fl_Scroll::~Fl_Scroll ( ) [virtual]
```

The destructor also deletes all the children.

See also

[Fl_Group::~Fl_Group\(\)](#)

12.122.3 Member Function Documentation

12.122.3.1 bbox()

```

void Fl_Scroll::bbox (
    int & X,
    int & Y,
    int & W,
    int & H ) const [protected]

```

Returns the bounding box for the interior of the scrolling area, inside the scrollbars.

This method does not change the scrollbars or their visibility. First the scrollbar positions and visibility are calculated as they **should** be, according to the positions and sizes of the children. Then the bounding box is calculated.

You may need to call [redraw\(\)](#) to make sure the widget gets updated.

See also

[recalc_scrollbars\(\)](#)

12.122.3.2 delete_child()

```

int Fl_Scroll::delete_child (
    int index ) [virtual]

```

Removes the widget at `index` from the group and deletes it.

This method does nothing if `index` is out of bounds or if `Fl_Group::child(index)` is one of the scrollbars.

Parameters

in	<i>index</i>	index of child to be removed
----	--------------	------------------------------

Returns

success (0) or error code

Return values

0	success
1	index out of range
2	widget not allowed to be removed (see note)

See also

[Fl_Group::delete_child\(int index\)](#)

Since

FLTK 1.4.0

Reimplemented from [Fl_Group](#).

12.122.3.3 draw()

```
void Fl_Scroll::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Group](#).

12.122.3.4 fix_scrollbar_order()

```
void Fl_Scroll::fix_scrollbar_order ( ) [protected]
```

Ensure the scrollbars are the last children.

When [Fl_Scroll](#) is instantiated the first child of the [Fl_Group](#) is the vertical scrollbar `scrollbar` and the second child is the horizontal scrollbar `hscrollbar`.

These two widgets must always be the last two widgets and in this order to guarantee the correct drawing order and event delivery.

Since FLTK 1.4.0 the new method [on_insert\(\)](#) modifies the insert position of other children if it would be after the scrollbars.

12.122.3.5 handle()

```
int Fl_Scroll::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Group](#).

12.122.3.6 on_insert()

```
int Fl_Scroll::on_insert (
    Fl_Widget * candidate,
    int index ) [protected], [virtual]
```

Change insert position of a child before it is added.

Fix insert position if the new child is planned to be inserted after the scrollbars. We can assume that the scrollbars are always the last two children!

[FI_Group](#) calls this when a new widget is added. We return the new index if the new widget would be added after the scrollbars.

Parameters

in	<i>candidate</i>	the candidate will be added to the child array_ after this method returns.
in	<i>index</i>	add the child at this position in the array_

Returns

index to position the child as planned

a new index to force the child to a different position

-1 to keep the group from adding the candidate

Version

1.4.0

See also

[FI_Group::on_insert\(Fl_Widget *candidate, int index\)](#)

Reimplemented from [FI_Group](#).

12.122.3.7 on_move()

```
int Fl_Scroll::on_move (
    int old_index,
    int new_index ) [protected], [virtual]
```

Change new position of a child before it is moved.

Fix new position if the new child is planned to be moved after the scrollbars. We can assume that the scrollbars are always the last two children!

[FI_Group](#) calls this when a widget is moved within the list of children. We return a new index if the widget would be moved after the scrollbars.

Parameters

<i>old_index</i>	the current index of the child that will be moved
<i>new_index</i>	the new index of the child

Returns

new index, possibly corrected to avoid last two scrollbar entries

Reimplemented from [FI_Group](#).

12.122.3.8 recalc_scrollbars()

```
void Fl_Scroll::recalc_scrollbars (
    ScrollInfo & si ) const [protected]
```

Calculate visibility/size/position of scrollbars, find children's bounding box.

The `si` parameter will be filled with data from the calculations. Derived classes can make use of this call to figure out the scrolling area eg. during `resize()` handling.

This method does not change the scrollbars or their visibility. It calculates the scrollbar positions and visibility as they **should** be, according to the positions and sizes of the children.

You may need to call `redraw()` to make sure the widget gets updated.

Parameters

<code>in, out</code>	<code>si</code>	– <code>ScrollInfo</code> structure, filled with data
----------------------	-----------------	---

See also

[bbox\(\)](#)

12.122.3.9 resize()

```
void Fl_Scroll::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the `Fl_Scroll` widget and moves its children if necessary.

The `Fl_Scroll` widget first resizes itself, and then it moves all its children if (and only if) the `Fl_Scroll` widget has been moved. The children are moved by the same amount as the `Fl_Scroll` widget has been moved, hence all children keep their relative positions.

Note

`Fl_Scroll::resize()` does **not** call `Fl_Group::resize()`, and child widgets are **not** resized.

Since children of an `Fl_Scroll` are not resized, the `resizable()` widget is ignored (if it is set).

The scrollbars are moved to their proper positions, as given by `Fl_Scroll::scrollbar.align()`, and switched on or off as necessary.

Note

Due to current (FLTK 1.3.x) implementation constraints some of this may effectively be postponed until the `Fl_Scroll` is drawn the next time. This may change in a future release.

See also

[Fl_Group::resizable\(\)](#)

[Fl_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [Fl_Group](#).

12.122.3.10 scroll_to()

```
void Fl_Scroll::scroll_to (
    int X,
    int Y )
```

Moves the contents of the scroll group to a new position.

This is like moving the scrollbars of the `Fl_Scroll` around. For instance:

```
Fl_Scroll scroll (10,10,200,200);
Fl_Box b1 ( 10, 10,50,50,"b1"); // relative (x,y) = (0,0)
Fl_Box b2 ( 60, 60,50,50,"b2"); // relative (x,y) = (50,50)
Fl_Box b3 ( 60,110,50,50,"b3"); // relative (x,y) = (50,100)
```



```
// populate scroll with more children ...
scroll.end();
scroll.scroll_to(50,100);
```

will move the logical origin of the internal scroll area to (-50,-100) relative to the origin of the [Fl_Scroll](#) (10,10), i.e. [Fl_Box](#) b3 will be visible in the top left corner of the scroll area.

12.122.3.11 scrollbar_size() [1/2]

```
int Fl_Scroll::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

12.122.3.12 scrollbar_size() [2/2]

```
void Fl_Scroll::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting *newSize* to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

12.122.3.13 xposition()

```
int Fl_Scroll::xposition ( ) const [inline]
```

Gets the current horizontal scrolling position.

12.122.3.14 yposition()

```
int Fl_Scroll::yposition ( ) const [inline]
```

Gets the current vertical scrolling position.

The documentation for this class was generated from the following files:

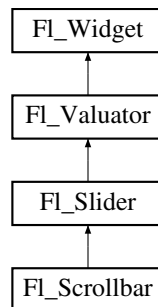
- [Fl_Scroll.H](#)
- [Fl_Scroll.cxx](#)

12.123 FI_Scrollbar Class Reference

The [FI_Scrollbar](#) widget displays a slider with arrow buttons at the ends of the scrollbar.

```
#include <FI_Scrollbar.H>
```

Inheritance diagram for [FI_Scrollbar](#):



Public Member Functions

- [FI_Scrollbar](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [FI_Scrollbar](#) widget with given position, size, and label.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- int [linesize](#) () const
Get the size of step, in lines, that the arrow keys move.
- void [linesize](#) (int i)
This number controls how big the steps are that the arrow keys do.
- int [value](#) () const
Gets the integer value (position) of the slider in the scrollbar.
- int [value](#) (int p)
Sets the value (position) of the slider in the scrollbar.
- int [value](#) (int pos, int windowSize, int first_line, int total_lines)
Sets the position, size and range of the slider in the scrollbar.
- [~FI_Scrollbar](#) ()
Destroys the Scrollbar.

Public Member Functions inherited from [FI_Slider](#)

- void [bounds](#) (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- [FI_Slider](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [FI_Slider](#) widget using the given position, size, and label string.
- [FI_Slider](#) (uchar t, int X, int Y, int W, int H, const char *L)
Creates a new [FI_Slider](#) widget using the given type, position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- int [scrollvalue](#) (int pos, int [size](#), int first, int total)
Sets the size and position of the sliding knob in the box.
- [FI_Boxtype slider](#) () const
Gets the slider box type.
- void [slider](#) ([FI_Boxtype](#) c)
Sets the slider box type.
- float [slider_size](#) () const

Get the dimensions of the moving piece of slider.

- void `slider_size` (double v)

Set the dimensions of the moving piece of slider.

Public Member Functions inherited from [FI_Valuator](#)

- void `bounds` (double a, double b)

Sets the minimum (a) and maximum (b) values for the valuator widget.
- double `clamp` (double)

Clamps the passed value to the valuator range.
- virtual int `format` (char *)

Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double `increment` (double, int)

Adds n times the step value to the passed value.
- double `maximum` () const

Gets the maximum value for the valuator.
- void `maximum` (double a)

Sets the maximum value for the valuator.
- double `minimum` () const

Gets the minimum value for the valuator.
- void `minimum` (double a)

Sets the minimum value for the valuator.
- void `precision` (int digits)

Sets the step value to $1.0 / 10^{\text{digits}}$.
- void `range` (double a, double b)

Sets the minimum and maximum values for the valuator.
- double `round` (double)

Round the passed value to the nearest step increment.
- double `step` () const

Gets or sets the step value.
- void `step` (double a, int b)

See double [FI_Valuator::step\(\)](#) const
- void `step` (double s)

See double [FI_Valuator::step\(\)](#) const.
- void `step` (int a)

See double [FI_Valuator::step\(\)](#) const
- double `value` () const

Gets the floating point(double) value.
- int `value` (double)

Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()

Activates the widget.
- unsigned int `active` () const

Returns whether the widget is active.
- int `active_r` () const

- Returns whether the widget and all of its parents are active.*

 - [FI_Align align](#) () const

Gets the label alignment.

 - void [align](#) ([FI_Align](#) alignment)

Sets the label alignment.

 - long [argument](#) () const

Gets the current user data (long) argument that is passed to the callback function.

 - void [argument](#) (long v)

Sets the current user data (long) argument that is passed to the callback function.

 - virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()

Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).

 - virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
 - virtual [FI_Group](#) * [as_group](#) ()

Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).

 - virtual [FI_Group](#) const * [as_group](#) () const
 - virtual [FI_Window](#) * [as_window](#) ()

Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).

 - virtual [FI_Window](#) const * [as_window](#) () const
 - void [bind_deimage](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.

 - void [bind_deimage](#) (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

 - void [bind_image](#) ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.

 - void [bind_image](#) (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.

 - [FI_Boxtype box](#) () const

Gets the box type of the widget.

 - void [box](#) ([FI_Boxtype](#) new_box)

Sets the box type for the widget.

 - [FI_Callback_p callback](#) () const

Gets the current callback function for the widget.

 - void [callback](#) ([FI_Callback](#) *cb)

Sets the current callback function for the widget.

 - void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)

Sets the current callback function and managed user data for the widget.

 - void [callback](#) ([FI_Callback](#) *cb, void *p)

Sets the current callback function and data for the widget.

 - void [callback](#) ([FI_Callback0](#) *cb)

Sets the current callback function for the widget.

 - void [callback](#) ([FI_Callback1](#) *cb, long p=0)

Sets the current callback function for the widget.

 - unsigned int [changed](#) () const

Checks if the widget value changed since the last callback.

 - void [clear_active](#) ()

Marks the widget as inactive without sending events or changing focus.

 - void [clear_changed](#) ()

Marks the value of the widget as unchanged.

 - void [clear_damage](#) (uchar c=0)

Clears or sets the damage flags.

 - void [clear_output](#) ()

- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

 - void `draw_label` (int, int, int, int, `FI_Align`) const
- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int `h` () const
- Gets the widget height.*

- virtual void `hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- void `image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- void `image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- int `image_bound () const`
Returns whether the image is managed by the widget.
- int `inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- int `is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- const char * `label () const`
Gets the current label text.
- void `label (const char *text)`
Sets the current label pointer.
- void `label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- void `labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- void `labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`
Gets the font size in pixels.
- void `labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- void `labeltype (FI_Labeltype a)`
Sets the label type.
- void `measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard () const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- unsigned int `output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- void `parent (FI_Group *p)`
Internal use only - "for hacks only".
- void `position (int X, int Y)`

- Repositions the window or widget.*

 - void [redraw](#) ()

Schedules the drawing of the widget.
- void [redraw_label](#) ()

Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)

Changes the size or position of the widget.
- [FI_Color selection_color](#) () const

Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)

Sets the selection color.
- void [set_active](#) ()

Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()

Marks the value of the widget as changed.
- void [set_output](#) ()

Sets a widget to output only.
- void [set_visible](#) ()

Makes the widget visible.
- void [set_visible_focus](#) ()

Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()

Makes a widget visible.
- void [size](#) (int W, int H)

Changes the size of the widget.
- int [take_focus](#) ()

Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const

Returns if the widget is able to take events.
- int [test_shortcut](#) ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const

Gets the current tooltip text.
- void [tooltip](#) (const char *text)

Sets the current tooltip text.
- [FI_Window * top_window](#) () const

Returns a pointer to the top-level window for the widget.
- [FI_Window * top_window_offset](#) (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- [uchar type](#) () const

Gets the widget type.
- void [type](#) ([uchar](#) t)

Sets the widget type.
- int [use_accents_menu](#) ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const

Gets the user data for this widget.

- void **user_data** ([FI_Callback_User_Data](#) *v, bool auto_free)
 - Sets the user data for this widget.*
- void **user_data** (void *v)
 - Sets the user data for this widget.*
- unsigned int **visible** () const
 - Returns whether a widget is visible.*
- unsigned int **visible_focus** () const
 - Checks whether this widget has a visible focus.*
- void **visible_focus** (int v)
 - Modifies keyboard focus navigation.*
- int **visible_r** () const
 - Returns whether a widget and all its parents are visible.*
- int **w** () const
 - Gets the widget width.*
- [FI_When](#) **when** () const
 - Returns the conditions under which the callback is called.*
- void **when** (uchar i)
 - Sets the flags used to decide when a callback is called.*
- [FI_Window](#) * **window** () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int **x** () const
 - Gets the widget position in its window.*
- int **y** () const
 - Gets the widget position in its window.*
- virtual [~FI_Widget](#) ()
 - Destroys the widget.*

Protected Member Functions

- void **draw** () [FL_OVERRIDE](#)
 - Draws the widget.*

Protected Member Functions inherited from [FI_Slider](#)

- void **draw** () [FL_OVERRIDE](#)
 - Draws the widget.*
- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int, int)

Protected Member Functions inherited from [FI_Valuator](#)

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
 - Creates a new [FI_Valuator](#) widget using the given position, size, and label string.*
- void **handle_drag** (double newvalue)
 - Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.*
- void **handle_push** ()
 - Stores the current value in the previous value.*
- void **handle_release** ()
 - Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.*
- int **horizontal** () const
 - Tells if the valuator is an [FL_HORIZONTAL](#) one.*
- double **previous_value** () const

- *Gets the previous floating point value before an event changed it.*
- void **set_value** (double v)
 - *Sets the current floating point value.*
- double **softclamp** (double)
 - *Clamps the value, but accepts v if the previous value is not already out of range.*
- virtual void **value_damage** ()
 - *Asks for partial redraw.*

Protected Member Functions inherited from Fl_Widget

- void **clear_flag** (unsigned int c)
 - *Clears a flag in the flags mask.*
- void **draw_backdrop** () const
 - *If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.*
- void **draw_box** () const
 - *Draws the widget box according its box style.*
- void **draw_box** (Fl_Boxtype t, Fl_Color c) const
 - *Draws a box of type t, of color c at the widget's position and size.*
- void **draw_box** (Fl_Boxtype t, int x, int y, int w, int h, Fl_Color c) const
 - *Draws a box of type t, of color c at the position X,Y and size W,H.*
- void **draw_focus** () const
 - *Draws a focus rectangle around the widget.*
- void **draw_focus** (Fl_Boxtype t, int X, int Y, int W, int H) const
 - *Draws a focus rectangle around the widget.*
- void **draw_focus** (Fl_Boxtype t, int x, int y, int w, int h, Fl_Color bg) const
 - *Draws a focus box for the widget at the given position and size.*
- void **draw_label** () const
 - *Draws the widget's label at the defined label position.*
- void **draw_label** (int, int, int, int) const
 - *Draws the label in an arbitrary bounding box.*
- Fl_Widget (int x, int y, int w, int h, const char *label=0L)
 - *Creates a widget at the given position and size.*
- unsigned int **flags** () const
 - *Gets the widget flags mask.*
- void **h** (int v)
 - *Internal use only.*
- void **set_flag** (unsigned int c)
 - *Sets a flag in the flags mask.*
- void **w** (int v)
 - *Internal use only.*
- void **x** (int v)
 - *Internal use only.*
- void **y** (int v)
 - *Internal use only.*

Additional Inherited Members

Static Public Member Functions inherited from Fl_Widget

- static void **default_callback** (Fl_Widget *widget, void *data)
 - *The default callback for all widgets that don't set a callback.*
- static unsigned int **label_shortcut** (const char *t)
 - *Returns the Unicode value of the '&x' shortcut in a given text.*
- static int **test_shortcut** (const char *, const bool require_alt=false)
 - *Returns true if the given text t contains the entered '&x' shortcut.*

Protected Types inherited from [Fl_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.123.1 Detailed Description

The [Fl_Scrollbar](#) widget displays a slider with arrow buttons at the ends of the scrollbar.

Clicking on the arrows move up/left and down/right by [linesize\(\)](#). Scrollbars also accept FL_SHORTCUT events: the arrows move by [linesize\(\)](#), and vertical scrollbars take Page Up/Down (they move by the page size minus [linesize\(\)](#)) and Home/End (they jump to the top or bottom).

Scrollbars have [step\(1\)](#) preset (they always return integers). If desired you can set the [step\(\)](#) to non-integer values. You will then have to use casts to get at the floating-point versions of [value\(\)](#) from [Fl_Slider](#).

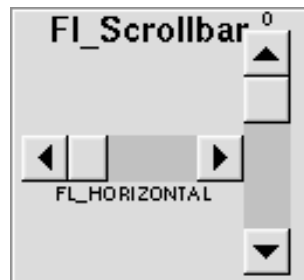


Figure 12.42 [Fl_Scrollbar](#)

12.123.2 Constructor & Destructor Documentation

12.123.2.1 [Fl_Scrollbar\(\)](#)

```
Fl_Scrollbar::Fl_Scrollbar (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Scrollbar](#) widget with given position, size, and label. You need to do `type(FL_HORIZONTAL)` if you want a horizontal scrollbar.

12.123.3 Member Function Documentation

12.123.3.1 [draw\(\)](#)

```
void Fl_Scrollbar::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.123.3.2 `handle()`

```
int Fl_Scrollbar::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

12.123.3.3 `linesize()`

```
void Fl_Scrollbar::linesize (
    int i ) [inline]
```

This number controls how big the steps are that the arrow keys do.

In addition page up/down move by the size last sent to `value()` minus one `linesize()`. The default is 16.

12.123.3.4 `value()` [1/3]

```
int Fl_Scrollbar::value ( ) const [inline]
```

Gets the integer value (position) of the slider in the scrollbar.

You can get the floating point value with [Fl_Slider::value\(\)](#).

See also

[Fl_Scrollbar::value\(int p\)](#)

[Fl_Scrollbar::value\(int pos, int size, int first, int total\)](#)

12.123.3.5 value() [2/3]

```
int Fl_Scrollbar::value (
    int p ) [inline]
```

Sets the value (position) of the slider in the scrollbar.

See also

[Fl_Scrollbar::value\(\)](#)

[Fl_Scrollbar::value\(int pos, int size, int first, int total\)](#)

12.123.3.6 value() [3/3]

```
int Fl_Scrollbar::value (
    int pos,
    int windowSize,
    int first_line,
    int total_lines ) [inline]
```

Sets the position, size and range of the slider in the scrollbar.

Parameters

in	<i>pos</i>	position, first line displayed
in	<i>windowSize</i>	number of lines displayed
in	<i>first_line</i>	number of first line
in	<i>total_lines</i>	total number of lines

You should call this every time your window changes size, your data changes size, or your scroll position changes (even if in response to a callback from this scrollbar). All necessary calls to [redraw\(\)](#) are done.

Calls [Fl_Slider::scrollvalue\(int pos, int size, int first, int total\)](#).

The documentation for this class was generated from the following files:

- [Fl_Scrollbar.H](#)
- [Fl_Scrollbar.cxx](#)

12.124 Fl_Scroll::Fl_Scrollbar_Data Struct Reference

A local struct to manage a scrollbar's xywh region and tab values.

```
#include <Fl_Scroll.H>
```

Public Attributes

- int **first**
scrollbar tab's "number of first line"
- int **h**
- int **pos**
scrollbar tab's "position of first line displayed"
- int **size**
scrollbar tab's "size of window in lines"
- int **total**
scrollbar tab's "total number of lines"
- int **w**
- int **x**
- int **y**

12.124.1 Detailed Description

A local struct to manage a scrollbar's xywh region and tab values.

The documentation for this struct was generated from the following file:

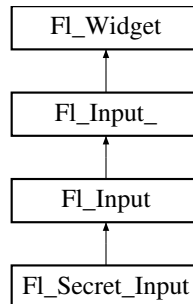
- FI_Scroll.H

12.125 FI_Secret_Input Class Reference

The [FI_Secret_Input](#) class is a subclass of [FI_Input](#) that displays its input as a string of placeholders.

```
#include <FI_Secret_Input.H>
```

Inheritance diagram for [FI_Secret_Input](#):



Public Member Functions

- [FI_Secret_Input](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Secret_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.

Public Member Functions inherited from [FI_Input](#)

- [FI_Input](#) (int, int, int, int, const char *l=0)
Creates a new [FI_Input](#) widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Input_](#)

- int [append](#) (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool [can_redo](#) () const
Check if there is a redo action available.
- bool [can_undo](#) () const
Check if the last operation can be undone.
- int [copy](#) (int clipboard)
Put the current selection into the clipboard.
- int [copy_cuts](#) ()
Copies the yank buffer to the clipboard.
- [FI_Color](#) [cursor_color](#) () const
Gets the color of the cursor.
- void [cursor_color](#) ([FI_Color](#) n)
Sets the color of the cursor.
- int [cut](#) ()
Deletes the current selection.
- int [cut](#) (int a, int b)

- Deletes all characters between index *a* and *b*.*

 - int `cut` (int *n*)

*Deletes the next *n* bytes rounded to characters before or after the cursor.*
- double `dvalue` () const
- Returns the widget text interpreted as a floating point number.*
- `Fl_Input_` (int, int, int, int, const char **=0*)
- Creates a new `Fl_Input_` widget.*
- unsigned int `index` (int *i*) const
- Returns the character at index *i*.*
- int `input_type` () const
- Gets the input field type.*
- void `input_type` (int *t*)
- Sets the input field type.*
- int `insert` (const char **t*, int *l=0*)
- Inserts text at the cursor position.*
- int `insert_position` () const
- Gets the position of the text cursor.*
- int `insert_position` (int *p*)
- Sets the cursor position and mark.*
- int `insert_position` (int *p*, int *m*)
- Sets the index for the cursor and mark.*
- int `ivalue` () const
- Returns the widget text interpreted as a signed integer.*
- int `mark` () const
- Gets the current selection mark.*
- int `mark` (int *m*)
- Sets the current selection mark.*
- int `maximum_size` () const
- Gets the maximum length of the input field in characters.*
- void `maximum_size` (int *m*)
- Sets the maximum length of the input field in characters.*
- int `position` () const
- int `position` (int *p*)
- int `position` (int *p*, int *m*)
- int `readonly` () const
- Gets the read-only state of the input field.*
- void `readonly` (int *b*)
- Sets the read-only state of the input field.*
- int `redo` ()
- Redo previous undo operation.*
- int `replace` (int *b*, int *e*, const char **text*, int *ilen=0*)
- Deletes text from *b* to *e* and inserts the new string *text*.*
- void `resize` (int, int, int, int) `FL_OVERRIDE`
- Changes the size of the widget.*
- int `shortcut` () const
- Return the shortcut key associated with this widget.*
- void `shortcut` (int *s*)
- Sets the shortcut key associated with this widget.*
- int `size` () const
- Returns the number of bytes in `value()`.*
- void `size` (int *W*, int *H*)

- Sets the width and height of this widget.*
- int [static_value](#) (const char *)
 - Changes the widget text.*
- int [static_value](#) (const char *, int)
 - Changes the widget text.*
- int [tab_nav](#) () const
 - Gets whether the Tab key causes focus navigation in multiline input fields or not.*
- void [tab_nav](#) (int val)
 - Sets whether the Tab key does focus navigation, or inserts tab characters into [FI_Multiline_Input](#).*
- [FI_Color](#) [textcolor](#) () const
 - Gets the color of the text in the input field.*
- void [textcolor](#) ([FI_Color](#) n)
 - Sets the color of the text in the input field.*
- [FI_Font](#) [textfont](#) () const
 - Gets the font of the text in the input field.*
- void [textfont](#) ([FI_Font](#) s)
 - Sets the font of the text in the input field.*
- [FI_Fontsize](#) [textsize](#) () const
 - Gets the size of the text in the input field.*
- void [textsize](#) ([FI_Fontsize](#) s)
 - Sets the size of the text in the input field.*
- int [undo](#) ()
 - Undoes previous changes to the text buffer.*
- const char * [value](#) () const
 - Returns the text displayed in the widget.*
- int [value](#) (const char *)
 - Changes the widget text.*
- int [value](#) (const char *, int)
 - Changes the widget text.*
- int [value](#) (double value)
 - Changes the widget text to a floating point number ("%g").*
- int [value](#) (int value)
 - Changes the widget text to a signed integer number.*
- int [wrap](#) () const
 - Gets the word wrapping state of the input field.*
- void [wrap](#) (int b)
 - Sets the word wrapping state of the input field.*
- [~FI_Input_](#) ()
 - Destroys the widget.*

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
 - Activates the widget.*
- unsigned int [active](#) () const
 - Returns whether the widget is active.*
- int [active_r](#) () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) [align](#) () const

- Gets the label alignment.*

 - void `align` (`FI_Align` alignment)
- Sets the label alignment.*

 - long `argument` () const
- Gets the current user data (long) argument that is passed to the callback function.*

 - void `argument` (long v)
- Sets the current user data (long) argument that is passed to the callback function.*

 - virtual class `FI_Gl_Window` * `as_gl_window` ()
- Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.*

 - virtual class `FI_Gl_Window` const * `as_gl_window` () const
- Returns an FI_Group pointer if this widget is an FI_Group.*

 - virtual `FI_Group` * `as_group` ()
- Returns an FI_Group pointer if this widget is an FI_Group.*

 - virtual `FI_Group` const * `as_group` () const
- Returns an FI_Window pointer if this widget is an FI_Window.*

 - virtual `FI_Window` * `as_window` ()
- Returns an FI_Window pointer if this widget is an FI_Window.*

 - virtual `FI_Window` const * `as_window` () const
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `bind_deimage` (`FI_Image` *img)
- Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*

 - void `bind_deimage` (int f)
- Sets the image to use as part of the widget label when in the active state.*

 - void `bind_image` (`FI_Image` *img)
- Bind the image to the widget, so the widget will delete the image when it is no longer needed.*

 - void `bind_image` (int f)
- Gets the box type of the widget.*

 - `FI_Boxtype` `box` () const
- Sets the box type for the widget.*

 - void `box` (`FI_Boxtype` new_box)
- Gets the current callback function for the widget.*

 - `FI_Callback_p` `callback` () const
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback` *cb, void *p)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback0` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1` *cb, long p=0)
- Checks if the widget value changed since the last callback.*

 - unsigned int `changed` () const
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_active` ()
- Marks the value of the widget as unchanged.*

 - void `clear_changed` ()
- Clears or sets the damage flags.*

 - void `clear_damage` (uchar c=0)
- Sets a widget to accept input.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()

- Hides the widget.*

 - void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const

Gets the background color of the widget.
- void `color` (`FI_Color` bg)

Sets the background color of the widget.
- void `color` (`FI_Color` bg, `FI_Color` sel)

Sets the background and selection color of the widget.
- `FI_Color` `color2` () const

For back compatibility only.
- void `color2` (unsigned a)

For back compatibility only.
- int `contains` (const `FI_Widget` *w) const

Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)

Sets the current label.
- void `copy_tooltip` (const char *text)

Sets the current tooltip text.
- `uchar` `damage` () const

Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar` c)

Sets the damage bits for the widget.
- void `damage` (`uchar` c, int x, int y, int w, int h)

Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)

Internal use only.
- void `deactivate` ()

Deactivates the widget.
- `FI_Image` * `deimage` ()

Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image` * `deimage` () const

Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` &img)

Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- virtual void `hide` ()

Makes a widget invisible.

- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`
Gets the font size in pixels.
- `void labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype () const`
Gets the label type.
- `void labeltype (FI_Labeltype a)`
Sets the label type.
- `void measure_label (int &ww, int &hh) const`
Sets width ww and height hh accordingly with the label size.
- `bool needs_keyboard () const`
Returns whether this widget needs a keyboard.
- `void needs_keyboard (bool needs)`
Sets whether this widget needs a keyboard.
- `unsigned int output () const`
Returns if a widget is used for output only.
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`

- Schedules the drawing of the widget.*
- void [redraw_label](#) ()
 - Schedules the drawing of the label.*
- [Fl_Color selection_color](#) () const
 - Gets the selection color.*
- void [selection_color](#) ([Fl_Color](#) a)
 - Sets the selection color.*
- void [set_active](#) ()
 - Marks the widget as active without sending events or changing focus.*
- void [set_changed](#) ()
 - Marks the value of the widget as changed.*
- void [set_output](#) ()
 - Sets a widget to output only.*
- void [set_visible](#) ()
 - Makes the widget visible.*
- void [set_visible_focus](#) ()
 - Enables keyboard focus navigation with this widget.*
- int [shortcut_label](#) () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void [shortcut_label](#) (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- virtual void [show](#) ()
 - Makes a widget visible.*
- void [size](#) (int W, int H)
 - Changes the size of the widget.*
- int [take_focus](#) ()
 - Gives the widget the keyboard focus.*
- unsigned int [takeevents](#) () const
 - Returns if the widget is able to take events.*
- int [test_shortcut](#) ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
- const char * [tooltip](#) () const
 - Gets the current tooltip text.*
- void [tooltip](#) (const char *text)
 - Sets the current tooltip text.*
- [Fl_Window * top_window](#) () const
 - Returns a pointer to the top-level window for the widget.*
- [Fl_Window * top_window_offset](#) (int &xoff, int &yoff) const
 - Finds the x/y offset of the current widget relative to the top-level window.*
- [uchar type](#) () const
 - Gets the widget type.*
- void [type](#) ([uchar](#) t)
 - Sets the widget type.*
- int [use_accents_menu](#) ()
 - Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*
- void * [user_data](#) () const
 - Gets the user data for this widget.*
- void [user_data](#) ([Fl_Callback_User_Data](#) *v, bool auto_free)
 - Sets the user data for this widget.*
- void [user_data](#) (void *v)
 - Sets the user data for this widget.*

- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Static Public Attributes inherited from `FI_Input`

- static const char * `copy_menu_text` = "Copy"
[this text may be customized at run-time]
- static const char * `cut_menu_text` = "Cut"
[this text may be customized at run-time]
- static const char * `paste_menu_text` = "Paste"
[this text may be customized at run-time]

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`

```

= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
USERFLAG1 = 1<<31 }

```

flags possible values enumeration.

Protected Member Functions inherited from FI_Input

- void **draw** () [FL_OVERRIDE](#)
Draws the widget.
- int **handle_key** ()
Handles a keystroke.
- int **handle_rmb** ()
Handle right mouse button down events.

Protected Member Functions inherited from FI_Input_

- int **apply_undo** ()
Apply the current undo/redo operation.
- void **drawtext** (int, int, int, int)
Draws the text in the passed bounding box.
- void **drawtext** (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.
- void **handle_mouse** (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int **handletext** (int e, int, int, int, int)
Handles all kinds of text field related events.
- int **line_end** (int i) const
Finds the end of a line.
- int **line_start** (int i) const
Finds the start of a line.
- int **linesPerPage** ()
- void **maybe_do_callback** ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
- int **up_down_position** (int, int keepmark=0)
Moves the cursor to the column given by up_down_pos.
- int **word_end** (int i) const
Finds the end of a word.
- int **word_start** (int i) const
Finds the start of a word.
- int **xscroll** () const
- int **yscroll** () const
- void **yscroll** (int yOffset)

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const

- Draws a box of type t, of color c at the widget's position and size.*

 - void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const

Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int **flags** () const

Gets the widget flags mask.
- void **h** (int v)

Internal use only.
- void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.
- void **x** (int v)

Internal use only.
- void **y** (int v)

Internal use only.

12.125.1 Detailed Description

The [FI_Secret_Input](#) class is a subclass of [FI_Input](#) that displays its input as a string of placeholders. Depending on the platform this placeholder is either the asterisk ('*') or the Unicode bullet character (U+2022). This subclass is usually used to receive passwords and other "secret" information.

12.125.2 Constructor & Destructor Documentation

12.125.2.1 FI_Secret_Input()

```
FI_Secret_Input::FI_Secret_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [FI_Secret_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Inherited destructor destroys the widget and any value associated with it.

12.125.3 Member Function Documentation

12.125.3.1 handle()

```
int FI_Secret_Input::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget. When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise. Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Input](#).

The documentation for this class was generated from the following files:

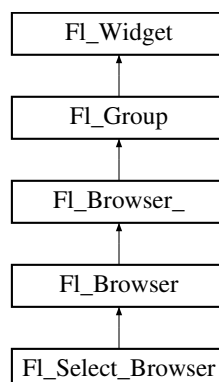
- Fl_Secret_Input.H
- Fl_Input.cxx

12.126 Fl_Select_Browser Class Reference

The class is a subclass of [Fl_Browser](#) which lets the user select a single item, or no items by clicking on the empty space.

```
#include <Fl_Select_Browser.H>
```

Inheritance diagram for Fl_Select_Browser:



Public Member Functions

- [Fl_Select_Browser](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Select_Browser](#) widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Browser](#)

- void [add](#) (const char *newtext, void *d=0)
Adds a new line to the end of the browser.
- void [bottomline](#) (int line)
*Scrolls the browser so the bottom item in the browser is showing the specified *line*.*
- void [clear](#) ()
Removes all the lines in the browser.
- char [column_char](#) () const
Gets the current column separator character.
- void [column_char](#) (char c)
*Sets the column separator to *c*.*
- const int * [column_widths](#) () const
Gets the current column width array.
- void [column_widths](#) (const int *arr)
*Sets the current array to *arr*.*
- void * [data](#) (int line) const
*Returns the user *data()* for specified *line*.*
- void [data](#) (int line, void *d)
*Sets the user data for specified *line* to *d*.*
- void [display](#) (int line, int val=1)
For back compatibility.
- int [displayed](#) (int line) const
*Returns non-zero if *line* has been scrolled to a position where it is being displayed.*
- [FI_Browser](#) (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- char [format_char](#) () const
Gets the current format code prefix character, which by default is '@'.
- void [format_char](#) (char c)
*Sets the current format code prefix character to *c*.*
- void [hide](#) () [FL_OVERRIDE](#)
*Hides the entire *FI_Browser* widget – opposite of *show()*.*
- void [hide](#) (int line)
*Makes *line* invisible, preventing selection by the user.*
- [FI_Image](#) * [icon](#) (int line) const
*Returns the icon currently defined for *line*.*
- void [icon](#) (int line, [FI_Image](#) *icon)
*Set the image icon for *line* to the value *icon*.*
- void [insert](#) (int line, const char *newtext, void *d=0)
*Insert a new entry whose label is *newtext* above given *line*, optional data *d*.*
- void [lineposition](#) (int line, [FI_Line_Position](#) pos)
*Updates the browser so that *line* is shown at position *pos*.*
- int [load](#) (const char *filename)
Clears the browser and reads the file, adding each line from the file to the browser.
- void [make_visible](#) (int line)
*Make the item at the specified *line* *visible()*.*
- void [middleline](#) (int line)
*Scrolls the browser so the middle item in the browser is showing the specified *line*.*
- void [move](#) (int to, int from)
*Line *from* is removed and reinserted at *to*.*
- void [remove](#) (int line)

- Remove entry for given `line` number, making the browser one line shorter.*

 - void `remove_icon` (int `line`)
 - Removes the icon for `line`.*
 - void `replace` (int `a`, const char *`b`)
 - For back compatibility only.*
 - int `select` (int `line`, int `val=1`)
 - Sets the selection state of the item at `line` to the value `val`.*
 - int `selected` (int `line`) const
 - Returns 1 if specified `line` is selected, 0 if not.*
 - void `show` () `FL_OVERRIDE`
 - Shows the entire `FI_Browser` widget – opposite of `hide()`.*
 - void `show` (int `line`)
 - Makes `line` visible, and available for selection by user.*
 - int `size` () const
 - Returns how many lines are in the browser.*
 - void `size` (int `W`, int `H`)
 - void `swap` (int `a`, int `b`)
 - Swaps two browser lines `a` and `b`.*
 - const char * `text` (int `line`) const
 - Returns the label text for the specified `line`.*
 - void `text` (int `line`, const char *`newtext`)
 - Sets the text for the specified `line` to `newtext`.*
 - `FI_Fontsize` `textsize` () const
 - Gets the default text size (in pixels) for the lines in the browser.*
 - void `textsize` (`FI_Fontsize` `newSize`)
 - Sets the default text size (in pixels) for the lines in the browser to `newSize`.*
 - int `topline` () const
 - Returns the line that is currently visible at the top of the browser.*
 - void `topline` (int `line`)
 - Scrolls the browser so the top item in the browser is showing the specified `line`.*
 - int `value` () const
 - Returns the line number of the currently selected line, or 0 if none selected.*
 - void `value` (int `line`)
 - Sets the browser's `value()`, which selects the specified `line`.*
 - int `visible` (int `line`) const
 - Returns non-zero if the specified `line` is visible, 0 if hidden.*
 - `~FI_Browser` ()
 - The destructor deletes all list items and destroys the browser.*

Public Member Functions inherited from `FI_Browser_`

- int `deselect` (int `docallbacks=0`)
 - Deselects all items in the list and returns 1 if the state changed or 0 if it did not.*
- void `display` (void *`item`)
 - Displays the `item`, scrolling the list as necessary.*
- int `handle` (int `event`) `FL_OVERRIDE`
 - Handles the `event` within the normal widget bounding box.*
- `uchar` `has_scrollbar` () const
 - Returns the current scrollbar mode, see `FI_Browser_::has_scrollbar(uchar)`*
- void `has_scrollbar` (`uchar` `mode`)
 - Sets whether the widget should have scrollbars or not (default `FI_Browser_::BOTH`).*

- int `hposition` () const
Gets the horizontal scroll position of the list as a pixel position `pos`.
- void `hposition` (int)
Sets the horizontal scroll position of the list to pixel position `pos`.
- int `linespacing` () const
Return the height of additional spacing between browser lines.
- void `linespacing` (int pixels)
Add some space between browser lines.
- int `position` () const
- void `position` (int pos)
- void `position` (int x, int y)
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`
Repositions and/or resizes the browser.
- void `scrollbar_left` ()
Moves the vertical scrollbar to the lefthand side of the list.
- void `scrollbar_right` ()
Moves the vertical scrollbar to the righthand side of the list.
- int `scrollbar_size` () const
Gets the current size of the scrollbars' troughs, in pixels.
- void `scrollbar_size` (int newSize)
Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.
- int `scrollbar_width` () const
Returns the global value `Fl::scrollbar_size()`.
- void `scrollbar_width` (int width)
Sets the global `Fl::scrollbar_size()`, and forces this instance of the widget to use it.
- int `select` (void *item, int val=1, int docallbacks=0)
Sets the selection state of `item` to `val`, and returns 1 if the state changed or 0 if it did not.
- int `select_only` (void *item, int docallbacks=0)
Selects `item` and returns 1 if the state changed or 0 if it did not.
- void `sort` (int flags=0)
Sort the items in the browser based on `flags`.
- `Fl_Color` `textcolor` () const
Gets the default text color for the lines in the browser.
- void `textcolor` (`Fl_Color` col)
Sets the default text color for the lines in the browser to color `col`.
- `Fl_Font` `textfont` () const
Gets the default text font for the lines in the browser.
- void `textfont` (`Fl_Font` font)
Sets the default text font for the lines in the browser to `font`.
- `Fl_Fontsize` `textsize` () const
Gets the default text size (in pixels) for the lines in the browser.
- void `textsize` (`Fl_Fontsize` newSize)
Sets the default text size (in pixels) for the lines in the browser to `size`.
- int `vposition` () const
Gets the vertical scroll position of the list as a pixel position `pos`.
- void `vposition` (int pos)
Sets the vertical scroll position of the list to pixel position `pos`.

Public Member Functions inherited from FL_Group

- [FL_Widget](#) ***& _ddfdesign_kludge** ()
This is for forms compatibility only.
- void **add** ([FL_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void **add** ([FL_Widget](#) *o)
See void [FL_Group::add\(FL_Widget &w\)](#)
- void **add_resizable** ([FL_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FL_Widget](#) *const * **array** () const
Returns a pointer to the array of children.
- [FL_Group](#) const * **as_group** () const [FL_OVERRIDE](#)
- [FL_Group](#) * **as_group** () [FL_OVERRIDE](#)
Returns an [FL_Group](#) pointer if this widget is an [FL_Group](#).
- void **begin** ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FL_Widget](#) * **child** (int n) const
Returns [array\(\)\[n\]](#).
- int **children** () const
Returns how many child widgets the group has.
- void **clear** ()
Deletes all child widgets from memory recursively.
- unsigned int **clip_children** ()
Returns the current clipping mode.
- void **clip_children** (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int **delete_child** (int n)
*Removes the widget at *index* from the group and deletes it.*
- void **end** ()
Exactly the same as [current\(this->parent\(\)\)](#).
- int **find** (const [FL_Widget](#) &o) const
*See int [FL_Group::find\(const FL_Widget *w\) const](#).*
- int **find** (const [FL_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FL_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FL_Group](#) widget using the given position, size, and label string.
- void **focus** ([FL_Widget](#) *W)
- void **forms_end** ()
This is for forms compatibility only.
- int **handle** (int) [FL_OVERRIDE](#)
Handles the specified event.
- void **init_sizes** ()
Resets the internal array of widget sizes and positions.
- void **insert** ([FL_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void **insert** ([FL_Widget](#) &o, [FL_Widget](#) *before)
This does [insert\(w, find\(before\)\)](#).
- void **remove** ([FL_Widget](#) &)
Removes a widget from the group but does not delete it.
- void **remove** ([FL_Widget](#) *o)

- Removes the widget `o` from the group.*
- void `remove` (int index)
 - Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget * resizable` () const
 - Returns the group's resizable widget.*
- void `resizable` (`FI_Widget &o`)
 - Sets the group's resizable widget.*
- void `resizable` (`FI_Widget *o`)
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- void `resize` (int, int, int) `FL_OVERRIDE`
 - Resizes the `FI_Group` widget and all of its children.*
- virtual `~FI_Group` ()
 - The destructor also deletes all the children.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
 - Activates the widget.*
- unsigned int `active` () const
 - Returns whether the widget is active.*
- int `active_r` () const
 - Returns whether the widget and all of its parents are active.*
- `FI_Align align` () const
 - Gets the label alignment.*
- void `align` (`FI_Align alignment`)
 - Sets the label alignment.*
- long `argument` () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window * as_gl_window` ()
 - Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Window * as_window` ()
 - Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype box` () const
 - Gets the box type of the widget.*
- void `box` (`FI_Boxtype new_box`)
 - Sets the box type for the widget.*
- `FI_Callback_p callback` () const

- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, `bool auto_free`)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback *cb`, `void *p`)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0 *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1 *cb`, `long p=0`)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FI_Color bg`, `FI_Color sel`)
- Sets the background and selection color of the widget.*

 - `FI_Color color2` () const
- For back compatibility only.*

 - void `color2` (`unsigned a`)
- For back compatibility only.*

 - int `contains` (`const FI_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (`const char *new_label`)
- Sets the current label.*

 - void `copy_tooltip` (`const char *text`)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (`int`, `int`, `int`, `int`)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- `void deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `int deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- `void draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h () const`
Gets the widget height.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image () const`
Gets the image that is used as part of the widget label when in the active state.
- `void image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- `void image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `int image_bound () const`
Returns whether the image is managed by the widget.
- `int inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- `int is_label_copied () const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label () const`
Gets the current label text.
- `void label (const char *text)`
Sets the current label pointer.
- `void label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor () const`
Gets the label color.
- `void labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont () const`
Gets the font to use.
- `void labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize () const`
Gets the font size in pixels.
- `void labelsize (FI_Fontsize pix)`

- Sets the font size in pixels.*
- [FI_Labeltype labeltype](#) () const
 - Gets the label type.*
- void [labeltype](#) ([FI_Labeltype](#) a)
 - Sets the label type.*
- void [measure_label](#) (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
- bool [needs_keyboard](#) () const
 - Returns whether this widget needs a keyboard.*
- void [needs_keyboard](#) (bool needs)
 - Sets whether this widget needs a keyboard.*
- unsigned int [output](#) () const
 - Returns if a widget is used for output only.*
- [FI_Group](#) * [parent](#) () const
 - Returns a pointer to the parent widget.*
- void [parent](#) ([FI_Group](#) *p)
 - Internal use only - "for hacks only".*
- void [position](#) (int X, int Y)
 - Repositions the window or widget.*
- void [redraw](#) ()
 - Schedules the drawing of the widget.*
- void [redraw_label](#) ()
 - Schedules the drawing of the label.*
- [FI_Color](#) [selection_color](#) () const
 - Gets the selection color.*
- void [selection_color](#) ([FI_Color](#) a)
 - Sets the selection color.*
- void [set_active](#) ()
 - Marks the widget as active without sending events or changing focus.*
- void [set_changed](#) ()
 - Marks the value of the widget as changed.*
- void [set_output](#) ()
 - Sets a widget to output only.*
- void [set_visible](#) ()
 - Makes the widget visible.*
- void [set_visible_focus](#) ()
 - Enables keyboard focus navigation with this widget.*
- int [shortcut_label](#) () const
 - Returns whether the widget's label uses '&' to indicate shortcuts.*
- void [shortcut_label](#) (int value)
 - Sets whether the widget's label uses '&' to indicate shortcuts.*
- void [size](#) (int W, int H)
 - Changes the size of the widget.*
- int [take_focus](#) ()
 - Gives the widget the keyboard focus.*
- unsigned int [takeevents](#) () const
 - Returns if the widget is able to take events.*
- int [test_shortcut](#) ()
 - Returns true if the widget's label contains the entered '&x' shortcut.*
- const char * [tooltip](#) () const
 - Gets the current tooltip text.*

- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (uchar t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Additional Inherited Members

Public Types inherited from `FI_Browser`

- enum `FI_Line_Position` { `TOP` , `BOTTOM` , `MIDDLE` }
For internal use only?

Public Types inherited from `FI_Browser_`

- enum {
`HORIZONTAL` = 1 , `VERTICAL` = 2 , `BOTH` = 3 , `ALWAYS_ON` = 4 ,
`HORIZONTAL_ALWAYS` = 5 , `VERTICAL_ALWAYS` = 6 , `BOTH_ALWAYS` = 7 }
Values for `has_scrollbar()`.

Static Public Member Functions inherited from FI_Group

- static [FI_Group * current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group *g](#))
Sets the current group.

Static Public Member Functions inherited from FI_Widget

- static void [default_callback](#) ([FI_Widget *widget](#), void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Public Attributes inherited from FI_Browser_

- [FI_Scrollbar hscrollbar](#)
Horizontal scrollbar.
- [FI_Scrollbar scrollbar](#)
Vertical scrollbar.

Protected Types inherited from FI_Widget

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPOP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from FI_Browser

- [FL_BLINE * _remove](#) (int line)
Removes the item at the specified line.
- [FL_BLINE * find_line](#) (int line) const
Returns the item for specified line.
- int [full_height](#) () const [FL_OVERRIDE](#)
The height of the entire list of all visible() items in pixels.
- int [incr_height](#) () const [FL_OVERRIDE](#)
The default 'average' item height (including inter-item spacing) in pixels.
- void [insert](#) (int line, [FL_BLINE *item](#))
Insert specified item above line.
- void * [item_at](#) (int line) const [FL_OVERRIDE](#)
Return the item at specified line.

- void **item_draw** (void *item, int X, int Y, int W, int H) const **FL_OVERRIDE**
Draws item at the position specified by X Y W H.
- void * **item_first** () const **FL_OVERRIDE**
Returns the very first item in the list.
- int **item_height** (void *item) const **FL_OVERRIDE**
Returns height of item in pixels.
- void * **item_last** () const **FL_OVERRIDE**
Returns the very last item in the list.
- void * **item_next** (void *item) const **FL_OVERRIDE**
Returns the next item after item.
- void * **item_prev** (void *item) const **FL_OVERRIDE**
Returns the previous item before item.
- void **item_select** (void *item, int val) **FL_OVERRIDE**
Change the selection state of item to the value val.
- int **item_selected** (void *item) const **FL_OVERRIDE**
See if item is selected.
- void **item_swap** (void *a, void *b) **FL_OVERRIDE**
Swap the items a and b.
- const char * **item_text** (void *item) const **FL_OVERRIDE**
Returns the label text for item.
- int **item_width** (void *item) const **FL_OVERRIDE**
Returns width of item in pixels.
- int **lineno** (void *item) const
Returns line number corresponding to item, or zero if not found.
- void **swap** (FL_BLINE *a, FL_BLINE *b)
Swap the two items a and b.

Protected Member Functions inherited from **FI_Browser_**

- void **bbox** (int &X, int &Y, int &W, int &H) const
Returns the bounding box for the interior of the list's display window, inside the scrollbars.
- void **deleting** (void *item)
This method should be used when item is being deleted from the list.
- int **displayed** (void *item) const
Returns non-zero if item has been scrolled to a position where it is being displayed.
- void **draw** () **FL_OVERRIDE**
Draws the list within the normal widget bounding box.
- void * **find_item** (int ypos)
This method returns the item under mouse y position ypos.
- **FI_Browser_** (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- virtual int **full_width** () const
This method may be provided by the subclass to indicate the full width of the item list, in pixels.
- void **inserting** (void *a, void *b)
This method should be used when an item is in the process of being inserted into the list.
- virtual int **item_quick_height** (void *item) const
This method may be provided by the subclass to return the height of the item, in pixels.
- int **leftedge** () const
This method returns the X position of the left edge of the list area after adjusting for the scrollbar and border, if any.
- void **new_list** ()
This method should be called when the list data is completely replaced or cleared.

- void **redraw_line** (void *item)
This method should be called when the contents of `item` has changed, but not its height.
- void **redraw_lines** ()
This method will cause the entire list to be redrawn.
- void **replacing** (void *a, void *b)
This method should be used when item `a` is being replaced by item `b`.
- void * **selection** () const
Returns the item currently selected, or NULL if there is no selection.
- void **swapping** (void *a, void *b)
This method should be used when two items `a` and `b` are being swapped.
- void * **top** () const
Returns the item that appears at the top of the list.

Protected Member Functions inherited from FI_Group

- **FI_Rect** * **bounds** ()
Returns the internal array of widget sizes and positions.
- void **draw** () **FL_OVERRIDE**
Draws the widget.
- void **draw_child** (**FI_Widget** &widget) const
Forces a child to redraw.
- void **draw_children** ()
Draws all children of the group.
- void **draw_outside_label** (const **FI_Widget** &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int **on_insert** (**FI_Widget** *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int **on_move** (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void **on_remove** (int)
Allow derived groups to act when a child widget is removed from the group.
- int * **sizes** ()
Returns the internal array of widget sizes and positions.
- void **update_child** (**FI_Widget** &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (**FI_Boxtype** t, **FI_Color** c) const
Draws a box of type `t`, of color `c` at the widget's position and size.
- void **draw_box** (**FI_Boxtype** t, int x, int y, int w, int h, **FI_Color** c) const
Draws a box of type `t`, of color `c` at the position `X,Y` and size `W,H`.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FI_Boxtype** t, int X, int Y, int W, int H) const

- Draws a focus rectangle around the widget.*

 - void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const

Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
- Draws the widget's label at the defined label position.*

 - void `draw_label` (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
- Creates a widget at the given position and size.*

 - unsigned int `flags` () const

Gets the widget flags mask.
- void `h` (int v)
- Internal use only.*

 - void `set_flag` (unsigned int c)

Sets a flag in the flags mask.
- void `w` (int v)
- Internal use only.*

 - void `x` (int v)

Internal use only.
- void `y` (int v)
- Internal use only.*

12.126.1 Detailed Description

The class is a subclass of `FI_Browser` which lets the user select a single item, or no items by clicking on the empty space.

As long as the mouse button is held down on an unselected item it is highlighted. Normally the callback is done when the user presses the mouse, but you can change this with `when()`.

See `FI_Browser` for methods to add and remove lines from the browser.

12.126.2 Constructor & Destructor Documentation

12.126.2.1 `FI_Select_Browser()`

```
FI_Select_Browser::FI_Select_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `FI_Select_Browser` widget using the given position, size, and label string.

The default boxtype is `FL_DOWN_BOX`. The constructor specializes `FI_Browser()` by setting the type to `FL_SELECT_BROWSER`. The destructor destroys the widget and frees all memory that has been allocated.

The documentation for this class was generated from the following files:

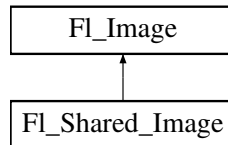
- `FI_Select_Browser.H`
- `FI_Browser.cxx`

12.127 `FI_Shared_Image` Class Reference

This class supports caching, loading, and drawing of image files.

```
#include <FI_Shared_Image.H>
```

Inheritance diagram for `FI_Shared_Image`:



Public Member Functions

- [FI_Shared_Image * as_shared_image \(\)](#) [FL_OVERRIDE](#)
Returns whether an image is an [FI_Shared_Image](#) or not.
- void [color_average \(FI_Color c, float i\)](#) [FL_OVERRIDE](#)
Averages the colors in the image with the provided FLTK color value.
- [FI_Image * copy \(\)](#)
Increments the reference counter and returns a pointer to itself.
- [FI_Image * copy \(\)](#) const
- [FI_Image * copy \(int W, int H\)](#) const [FL_OVERRIDE](#)
Return a shared image of this image with the requested size.
- void [desaturate \(\)](#) [FL_OVERRIDE](#)
Convert the image to gray scale.
- void **draw** (int X, int Y)
- void [draw \(int X, int Y, int W, int H, int cx=0, int cy=0\)](#) [FL_OVERRIDE](#)
Draw this image to the current graphics context.
- const [FI_Image * image \(\)](#) const
Returns a pointer to the internal [FI_Image](#) object.
- const char * **name** ()
Returns the filename of the shared image.
- int [original \(\)](#)
Returns whether this is an original image.
- int [refcount \(\)](#)
Returns the number of references of this shared image.
- void [release \(\)](#) [FL_OVERRIDE](#)
Releases and possibly destroys (if `refcount <= 0`) a shared image.
- virtual void **reload** ()
Reloads the shared image from disk.
- void [uncache \(\)](#) [FL_OVERRIDE](#)
Remove the cached device specific image data.

Public Member Functions inherited from [FI_Image](#)

- [FI_Image * copy \(\)](#) const
Creates a copy of the image in the same size.
- int [count \(\)](#) const
Returns the number of data values associated with the image.
- int [d \(\)](#) const
Returns the image depth.
- const char *const * [data \(\)](#) const
Returns a pointer to the current image data array.
- int [data_h \(\)](#) const
Returns the height of the image data.
- int [data_w \(\)](#) const
Returns the width of the image data.
- void [draw \(int X, int Y\)](#)

- Draws the image to the current drawing surface.*

 - int **fail** () const
Returns a value that is not 0 if there is currently no image available.
 - **FI_Image** (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
 - int **h** () const
Returns the current image drawing height in FLTK units.
 - void **inactive** ()
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
 - virtual void **label** (**FI_Menu_Item** *m)
This method is an obsolete way to set the image attribute of a menu item.
 - virtual void **label** (**FI_Widget** *w)
This method is an obsolete way to set the image attribute of a widget or menu item.
 - int **ld** () const
Returns the current line data size in bytes.
 - virtual void **scale** (int width, int height, int proportional=1, int can_expand=0)
Sets the drawing size of the image.
 - int **w** () const
Returns the current image drawing width in FLTK units.
 - virtual ~**FI_Image** ()
The destructor is a virtual method that frees all memory used by the image.

Static Public Member Functions

- static void **add_handler** (**FI_Shared_Handler** f)
Adds a shared image handler, which is basically a test function for adding new image formats.
- static **FI_Shared_Image** * **find** (const char *name, int W=0, int H=0)
Finds a shared image from its name and size specifications.
- static **FI_Shared_Image** * **get** (const char *name, int W=0, int H=0)
Find or load an image that can be shared by multiple widgets.
- static **FI_Shared_Image** * **get** (**FI_RGB_Image** *rgb, int own_it=1)
Builds a shared image from a pre-existing `FI_RGB_Image`.
- static **FI_Shared_Image** ** **images** ()
Returns the `FI_Shared_Image` array.*
- static int **num_images** ()
Number of shared images in their various cached sizes.
- static void **remove_handler** (**FI_Shared_Handler** f)
Removes a shared image handler.

Static Public Member Functions inherited from **FI_Image**

- static **FI_Labeltype** **define_FL_IMAGE_LABEL** ()
- static **FI_RGB_Scaling** **RGB_scaling** ()
Returns the currently used RGB image scaling method.
- static void **RGB_scaling** (**FI_RGB_Scaling**)
Sets the RGB image scaling method used for copy(int, int).
- static **FI_RGB_Scaling** **scaling_algorithm** ()
Gets what algorithm is used when resizing a source image to draw it.
- static void **scaling_algorithm** (**FI_RGB_Scaling** algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Protected Member Functions

- void [add](#) ()
Adds a shared image to the image pool.
- [FI_Shared_Image](#) * [copy_](#) (int W, int H) const
Create a resized copy of the image and wrap it into the share image class.
- [FI_Shared_Image](#) ()
Creates an empty shared image.
- [FI_Shared_Image](#) (const char *n, [FI_Image](#) *img=0)
Creates a shared image from its filename and its corresponding FI_Image img.*
- void [update](#) ()
Update the dimensions of the shared images.
- virtual [~FI_Shared_Image](#) ()
The destructor frees all memory and server resources that are used by the image.

Protected Member Functions inherited from [FI_Image](#)

- void [d](#) (int D)
Sets the current image depth.
- void [data](#) (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void [draw_empty](#) (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int [draw_scaled](#) (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void [h](#) (int H)
Sets the height of the image data.
- void [ld](#) (int LD)
Sets the current line data size in bytes.
- void [w](#) (int W)
Sets the width of the image data.

Static Protected Member Functions

- static int [compare](#) ([FI_Shared_Image](#) **i0, [FI_Shared_Image](#) **i1)
Compares two shared images.

Static Protected Member Functions inherited from [FI_Image](#)

- static void [labeltype](#) (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void [measure](#) (const [FI_Label](#) *lo, int &lw, int &lh)

Protected Attributes

- int [alloc_image_](#)
- [FI_Image](#) * [image_](#)
- const char * [name_](#)
- int [original_](#)
- int [refcount_](#)

Static Protected Attributes

- static int `alloc_handlers_` = 0
- static int `alloc_images_` = 0
- static `FI_Shared_Handler` * `handlers_` = 0
- static `FI_Shared_Image` ** `images_` = 0
- static int `num_handlers_` = 0
- static int `num_images_` = 0

Friends

- class `FI_Graphics_Driver`
- class `FI_JPEG_Image`
- class `FI_PNG_Image`
- class `FI_SVG_Image`

Additional Inherited Members

Static Public Attributes inherited from `FI_Image`

- static const int `ERR_FILE_ACCESS` = -2
- static const int `ERR_FORMAT` = -3
- static const int `ERR_MEMORY_ACCESS` = -4
- static const int `ERR_NO_IMAGE` = -1
- static bool `register_images_done` = false

True after `fl_register_images()` was called, false before.

12.127.1 Detailed Description

This class supports caching, loading, and drawing of image files.

Most applications will also want to link against the `fltk_images` library and call the `fl_register_images()` function to support standard image formats such as BMP, GIF, JPEG, PNG, and SVG (unless the library was built with the option removing SVG support).

Images can be requested (loaded) with `FI_Shared_Image::get()`, `find()`, and some other methods. All images are cached in an internal list of shared images and should be released when they are no longer needed. A refcount is used to determine if a released image is to be destroyed with `delete`.

See also

`fl_register_image()`
[FI_Shared_Image::get\(\)](#)
[FI_Shared_Image::find\(\)](#)
[FI_Shared_Image::release\(\)](#)

12.127.2 Constructor & Destructor Documentation

12.127.2.1 `FI_Shared_Image()` [1/2]

```
FI_Shared_Image::FI_Shared_Image ( ) [protected]
```

Creates an empty shared image.

The constructors create a new shared image record in the image cache.

The constructors are protected and cannot be used directly from a program. Use the [get\(\)](#) method instead.

12.127.2.2 FI_Shared_Image() [2/2]

```
Fl_Shared_Image::Fl_Shared_Image (
    const char * n,
    Fl_Image * img = 0 ) [protected]
```

Creates a shared image from its filename and its corresponding `Fl_Image*` `img`.

The constructors create a new shared image record in the image cache.

The constructors are protected and cannot be used directly from a program. Use the [get\(\)](#) method instead.

Parameters

in	<i>n</i>	filename or pool name of the image, must be unique among shared images
in	<i>img</i>	the image that is made available using the name

12.127.2.3 ~FI_Shared_Image()

```
Fl_Shared_Image::~~Fl_Shared_Image ( ) [protected], [virtual]
```

The destructor frees all memory and server resources that are used by the image.

The destructor is protected and cannot be used directly from a program. Use the [Fl_Shared_Image::release\(\)](#) method instead.

12.127.3 Member Function Documentation

12.127.3.1 add()

```
void Fl_Shared_Image::add ( ) [protected]
```

Adds a shared image to the image pool.

This **protected** method adds an image to the pool, an ordered list of shared images. The pool is searched for a matching image whenever one is requested, for instance with [Fl_Shared_Image::get\(\)](#) or [Fl_Shared_Image::find\(\)](#). This method does not increase or decrease reference counts!

12.127.3.2 add_handler()

```
void Fl_Shared_Image::add_handler (
    Fl_Shared_Handler f ) [static]
```

Adds a shared image handler, which is basically a test function for adding new image formats.

This function will be called when an [Fl_Shared_Image](#) is to be loaded (for instance with [Fl_Shared_Image::get\(\)](#)) and the image type is not known to FLTK.

All registered image handlers will be called in the order of registration. You should always call [fl_register_images\(\)](#) before adding your own handlers - unless you need to override a known image file type which should be rare.

See also

[Fl_Shared_Handler](#) for more information of the function you need to define.

12.127.3.3 as_shared_image()

```
Fl_Shared_Image * Fl_Shared_Image::as_shared_image ( ) [inline], [virtual]
```

Returns whether an image is an [Fl_Shared_Image](#) or not.

This virtual method returns a pointer to an [Fl_Shared_Image](#) if this object is an instance of [Fl_Shared_Image](#) or NULL if not. This can be used to detect if a given [Fl_Image](#) object is a shared image, i.e. derived from [Fl_Shared_Image](#).

Since

1.4.0

Reimplemented from [Fl_Image](#).

12.127.3.4 color_average()

```
void Fl_Shared_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

Averages the colors in the image with the provided FLTK color value. This method changes the pixel data of this specific image.

Note

It does not change any of the resized copies of this image, nor does it necessarily apply the color changes if this image is resized later.

Parameters

in	<i>c</i>	blend with this color
in	<i>i</i>	blend fraction

See also

[Fl_Image::color_average\(Fl_Color c, float i\)](#)

Reimplemented from [Fl_Image](#).

12.127.3.5 compare()

```
int Fl_Shared_Image::compare (
    Fl_Shared_Image ** i0,
    Fl_Shared_Image ** i1 ) [static], [protected]
```

Compares two shared images.

The order of comparison is:

1. Image name, usually the filename used to load it
2. Image width
3. Image height

Binary search in a sorted array works only if we search for the same parameters that were also used for sorting. No special cases are possible here.

[Fl_Shared_Image::find\(\)](#) requires a search for an element with a matching name and the original_ flags set. This is not implemented via binary search, but by a simple run of the array inside [Fl_Shared_Image::find\(\)](#).

Parameters

in	<i>i0,i1</i>	image pointer pointer for sorting
----	--------------	-----------------------------------

Returns

Whether the images match or their relative sort order (see text).

Return values

<i>0</i>	the images match
<i><0</i>	Image <i>i0</i> is <i>less</i> than image <i>i1</i>
<i>>0</i>	Image <i>i0</i> is <i>greater</i> than image <i>i1</i>

12.127.3.6 copy() [1/2]

```
Fl_Image * Fl_Shared_Image::copy ( )
```

Increments the reference counter and returns a pointer to itself.

When the image is no longer used, call `Fl_Shared_Image::release()`.

To get a copy of the image data, call `this->image()->copy()` instead.

Returns

pointer to an `Fl_Shared_Image` that can be safely cast

12.127.3.7 copy() [2/2]

```
Fl_Image * Fl_Shared_Image::copy (
    int W,
    int H ) const [virtual]
```

Return a shared image of this image with the requested size.

This is the same as calling `Fl_Shared_Image::get(this->name(), W, H)`.

If a shared image of the desired size already exists in the shared image pool, the existing image is returned and no copy is made. But the reference counter is incremented. When the image is no longer used, call `Fl_Shared_Image::release()`.

To get a copy of the image data, call `this->image()->copy(W, H)` instead.

Parameters

in	<i>W,H</i>	size of requested image
----	------------	-------------------------

Returns

pointer to an `Fl_Shared_Image` that can be safely cast, or NULL if the image can't be found and can't be created.

Reimplemented from `Fl_Image`.

12.127.3.8 copy_()

```
Fl_Shared_Image * Fl_Shared_Image::copy_ (
    int W,
    int H ) const [protected]
```

Create a resized copy of the image and wrap it into the share image class.

This function is usually followed by a call to `returned_image->add()` to add the image to the pool, and `this->refcounter_++` to make sure that the original shared image keeps a reference to the copy. Don't call this function if an image of the given size is already in the pool.

Parameters

in	<i>W,H</i>	new image size
----	------------	----------------

Returns

a new shared image pointer that is not yet in the pool

12.127.3.9 desaturate()

```
void Fl_Shared_Image::desaturate ( ) [virtual]
```

Convert the image to gray scale.

This method changes the pixel data of this specific image.

Note

It does not change any of the resized copies of this image, nor does it necessarily apply the color changes if this image is resized later.

See also

[Fl_Image::desaturate\(\)](#)

Reimplemented from [Fl_Image](#).

12.127.3.10 draw()

```
void Fl_Shared_Image::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draw this image to the current graphics context.

Parameters

in	<i>X,Y,W,H</i>	draw at this position and size
in	<i>cx,cy</i>	image origin

Reimplemented from [Fl_Image](#).

12.127.3.11 find()

```
Fl_Shared_Image * Fl_Shared_Image::find (
    const char * name,
    int W = 0,
    int H = 0 ) [static]
```

Finds a shared image from its name and size specifications.

This uses a binary search in the image cache.

If the image `name` exists with the exact width `W` and height `H`, then it is returned.

If `W == 0` and the image `name` exists with another size, then the **original** image with that `name` is returned.

In either case the refcount of the returned image is increased. The found image should be released with [Fl_Shared_Image::release\(\)](#) when no longer needed.

An image is marked `original` if it was directly loaded from a file or from memory as opposed to copied and resized images.

This comparison is used in [Fl_Shared_Image::find\(\)](#) to find an image that matches the requested one or to find the position where a new image should be entered into the sorted list of shared images.

It is used in two steps by [Fl_Shared_Image::add\(\)](#):

1. search with exact width and height
2. if not found, search again with width = 0 (and height = 0)

The first step will only return a match if the image exists with the same width and height. The second step will match if there is an image marked `original` with the same name, regardless of width and height.

12.127.3.12 get() [1/2]

```
Fl_Shared_Image * Fl_Shared_Image::get (
    const char * name,
    int W = 0,
    int H = 0 ) [static]
```

Find or load an image that can be shared by multiple widgets.

If the image exists with the requested size, this image will be returned.

If the image exists, but only with another size, then a new copy with the requested size (width *W* and height *H*) will be created as a resized copy of the original image. The new image is added to the internal list of shared images.

If the image does not yet exist, then a new image of the proper dimension is created from the filename *name*. The original image from filename *name* is always added to the list of shared images in its original size. If the requested size differs, then the resized copy with width *W* and height *H* is also added to the list of shared images.

Note

If the sizes differ, then *two* images are created as mentioned above. This is intentional so the original image is cached and preserved. If you request the same image with another size later, then the **original** image will be found, copied, resized, and returned.

Shared JPEG and PNG images can also be created from memory by using their named memory access constructor. You should [release\(\)](#) the image when you're done with it.

Parameters

<i>name</i>	name of the image
<i>W,H</i>	desired size

Returns

the image at the requested size, or NULL if the image could not be found or generated

See also

[FI_Shared_Image::find\(const char *name, int W, int H\)](#)

[FI_Shared_Image::release\(\)](#)

[FI_JPEG_Image::FI_JPEG_Image\(const char *name, const unsigned char *data\)](#)

[FI_PNG_Image::FI_PNG_Image](#) (const char *name_png, const unsigned char *buffer, int maxsize)

12.127.3.13 get() [2/2]

```
Fl_Shared_Image * Fl_Shared_Image::get (
    Fl_RGB_Image * rgb,
    int own_it = 1 ) [static]
```

Builds a shared image from a pre-existing [FI_RGB_Image](#).

Parameters

in	<i>rgb</i>	an FI_RGB_Image used to build a new shared image.
in	<i>own_it</i>	1 if the shared image should delete <i>rgb</i> when it is itself deleted, 0 otherwise

Version

1.3.4

12.127.3.14 image()

```
const Fl_Image * Fl_Shared_Image::image ( ) const [inline]
```

Returns a pointer to the internal [FI_Image](#) object.

The output is a pointer to the *internal* image ('[FI_Image](#)' or subclass) which can be used to inspect or copy the image.

Do not try to modify the image! You can copy the image though if you want or need to change any attributes, size etc. If all you need to do is to resize the image you should use `Fl_Shared_Image::copy(int, int)` instead.

Note

The internal image (pointer) is protected for good reasons, e.g. to prevent access to the image so it can't be modified by user code. **DO NOT** cast away the 'const' attribute to modify the image.

User code should rarely need this method. Use with caution.

Returns

const `Fl_Image*` image, the internal [Fl_Image](#)

Since

1.4.0

12.127.3.15 images()

```
Fl_Shared_Image ** Fl_Shared_Image::images ( ) [static]
```

Returns the `Fl_Shared_Image*` array.

Returns

a pointer to an array of shared image pointers, sorted by name and size

See also

[Fl_Shared_Image::num_images\(\)](#)

12.127.3.16 num_images()

```
int Fl_Shared_Image::num_images ( ) [static]
```

Number of shared images in their various cached sizes.

Returns

number of entries in the array

See also

[Fl_Shared_Image::images\(\)](#)

12.127.3.17 original()

```
int Fl_Shared_Image::original ( ) [inline]
```

Returns whether this is an original image.

Images loaded from a file or from memory are marked `original` as opposed to images created as a copy of another image with different size (width or height).

Note

This is useful for debugging (rarely used in user code).

Since

FLTK 1.4.0

12.127.3.18 refcount()

```
int Fl_Shared_Image::refcount ( ) [inline]
```

Returns the number of references of this shared image.

When reference is below 1, the image is deleted.

12.127.3.19 release()

```
void Fl_Shared_Image::release ( ) [virtual]
```

Releases and possibly destroys (if refcount \leq 0) a shared image.

In the latter case, it will reorganize the shared image array so that no hole will occur.

Reimplemented from [Fl_Image](#).

12.127.3.20 uncache()

```
void Fl_Shared_Image::uncache ( ) [virtual]
```

Remove the cached device specific image data.

See also

[Fl_Image::uncache\(\)](#)

Reimplemented from [Fl_Image](#).

12.127.3.21 update()

```
void Fl_Shared_Image::update ( ) [protected]
```

Update the dimensions of the shared images.

Internal method to synchronize shared image data with the actual image data.

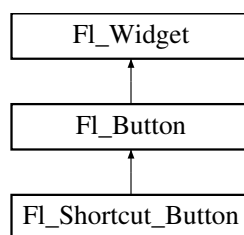
The documentation for this class was generated from the following files:

- [Fl_Shared_Image.H](#)
- [Fl_Shared_Image.cxx](#)

12.128 FI_Shortcut_Button Class Reference

A button that allows the user to type a key combination to create shortcuts.

Inheritance diagram for [FI_Shortcut_Button](#):

**Public Member Functions**

- [FI_Shortcut_Button](#) (int X, int Y, int W, int H, const char *l=0)
Construct a shortcut button.
- [FI_Shortcut value](#) ()
Return the user selected shortcut.
- void [value](#) ([FI_Shortcut shortcut](#))
Set the displayed shortcut.

Public Member Functions inherited from [FI_Button](#)

- int [clear](#) ()
Same as `value(0)`.
- [uchar compact](#) ()
Return true if buttons are rendered as compact buttons.
- void [compact](#) ([uchar](#) v)
Decide if buttons should be rendered in compact mode.
- [FI_Boxtype down_box](#) () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void [down_box](#) ([FI_Boxtype](#) b)
Sets the down box type.
- [FI_Color down_color](#) () const
(for backwards compatibility)
- void [down_color](#) (unsigned c)
(for backwards compatibility)
- [FI_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int [set](#) ()
Same as `value(1)`.
- void [setonly](#) ()
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- int [shortcut](#) () const
Returns the current shortcut key for the button.
- void [shortcut](#) (const char *s)
(for backwards compatibility)
- void [shortcut](#) (int s)
Sets the shortcut key to `s`.
- char [value](#) () const
Returns the current value of the button (0 or 1).
- int [value](#) (int v)
Sets the current value of the button.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align](#) alignment)
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()

Returns an *FI_GI_Window* pointer if this widget is an *FI_GI_Window*.

- virtual class *FI_GI_Window* const * **as_gi_window** () const
- virtual *FI_Group* * **as_group** ()

Returns an *FI_Group* pointer if this widget is an *FI_Group*.

- virtual *FI_Group* const * **as_group** () const
- virtual *FI_Window* * **as_window** ()

Returns an *FI_Window* pointer if this widget is an *FI_Window*.

- virtual *FI_Window* const * **as_window** () const
- void **bind_deimage** (*FI_Image* *img)

Sets the image to use as part of the widget label when in the inactive state.

- void **bind_deimage** (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

- void **bind_image** (*FI_Image* *img)

Sets the image to use as part of the widget label when in the active state.

- void **bind_image** (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.

- *FI_Boxtype* **box** () const

Gets the box type of the widget.

- void **box** (*FI_Boxtype* new_box)

Sets the box type for the widget.

- *FI_Callback_p* **callback** () const

Gets the current callback function for the widget.

- void **callback** (*FI_Callback* *cb)

Sets the current callback function for the widget.

- void **callback** (*FI_Callback* *cb, *FI_Callback_User_Data* *p, bool auto_free)

Sets the current callback function and managed user data for the widget.

- void **callback** (*FI_Callback* *cb, void *p)

Sets the current callback function and data for the widget.

- void **callback** (*FI_Callback0* *cb)

Sets the current callback function for the widget.

- void **callback** (*FI_Callback1* *cb, long p=0)

Sets the current callback function for the widget.

- unsigned int **changed** () const

Checks if the widget value changed since the last callback.

- void **clear_active** ()

Marks the widget as inactive without sending events or changing focus.

- void **clear_changed** ()

Marks the value of the widget as unchanged.

- void **clear_damage** (uchar c=0)

Clears or sets the damage flags.

- void **clear_output** ()

Sets a widget to accept input.

- void **clear_visible** ()

Hides the widget.

- void **clear_visible_focus** ()

Disables keyboard focus navigation with this widget.

- *FI_Color* **color** () const

Gets the background color of the widget.

- void **color** (*FI_Color* bg)

Sets the background color of the widget.

- void **color** (*FI_Color* bg, *FI_Color* sel)

- Sets the background and selection color of the widget.*

 - [FI_Color](#) `color2` () const
 - For back compatibility only.*
 - void `color2` (unsigned a)
 - For back compatibility only.*
 - int `contains` (const [FI_Widget](#) *w) const
 - Checks if w is a child of this widget.*
 - void `copy_label` (const char *new_label)
 - Sets the current label.*
 - void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
 - [uchar](#) `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
 - void `damage` ([uchar](#) c)
 - Sets the damage bits for the widget.*
 - void `damage` ([uchar](#) c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
 - int `damage_resize` (int, int, int, int)
 - Internal use only.*
 - void `deactivate` ()
 - Deactivates the widget.*
 - [FI_Image](#) * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - const [FI_Image](#) * `deimage` () const
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - void `deimage` ([FI_Image](#) &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - void `deimage` ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
 - void `do_callback` ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with default arguments.*
 - void `do_callback` ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
 - void `do_callback` ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
 - void `draw_label` (int, int, int, int, [FI_Align](#)) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
 - int `h` () const
 - Gets the widget height.*
 - virtual void `hide` ()
 - Makes a widget invisible.*
 - [FI_Image](#) * `image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
 - const [FI_Image](#) * `image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
 - void `image` ([FI_Image](#) &img)
 - Sets the image to use as part of the widget label when in the active state.*
 - void `image` ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*

- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget` *wgt) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype` a, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color` `labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font` `labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)

- Sets the selection color.*

 - void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()
- Marks the value of the widget as changed.*

 - void `set_output` ()
- Sets a widget to output only.*

 - void `set_visible` ()
- Makes the widget visible.*

 - void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void `show` ()
- Makes a widget visible.*

 - void `size` (int W, int H)
- Changes the size of the widget.*

 - int `take_focus` ()
- Gives the widget the keyboard focus.*

 - unsigned int `takeevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

 - void `tooltip` (const char *text)
- Sets the current tooltip text.*

 - `Fl_Window` * `top_window` () const
- Returns a pointer to the top-level window for the widget.*

 - `Fl_Window` * `top_window_offset` (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - `uchar` `type` () const
- Gets the widget type.*

 - void `type` (`uchar` t)
- Sets the widget type.*

 - int `use_accents_menu` ()
- Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.*

 - void * `user_data` () const
- Gets the user data for this widget.*

 - void `user_data` (`Fl_Callback_User_Data` *v, bool auto_free)
- Sets the user data for this widget.*

 - void `user_data` (void *v)
- Sets the user data for this widget.*

 - unsigned int `visible` () const
- Returns whether a widget is visible.*

 - unsigned int `visible_focus` () const
- Checks whether this widget has a visible focus.*

 - void `visible_focus` (int v)
- Modifies keyboard focus navigation.*

- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- void `do_end_hot_callback` ()
Call the callback if the user is interested.
- void `draw` () `FL_OVERRIDE`
Draw the textual representation of the shortcut button.
- int `handle` (int) `FL_OVERRIDE`
Handle keystrokes to catch the user's shortcut.

Protected Member Functions inherited from `FI_Button`

- void `simulate_key_action` ()

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.

- [FI_Widget](#) (int *x*, int *y*, int *w*, int *h*, const char **label*=0L)
 - Creates a widget at the given position and size.*
- unsigned int **flags** () const
 - Gets the widget flags mask.*
- void **h** (int *v*)
 - Internal use only.*
- void **set_flag** (unsigned int *c*)
 - Sets a flag in the flags mask.*
- void **w** (int *v*)
 - Internal use only.*
- void **x** (int *v*)
 - Internal use only.*
- void **y** (int *v*)
 - Internal use only.*

Protected Attributes

- [FI_Shortcut](#) **shortcut_value**

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) **widget*, void **data*)
 - The default callback for all widgets that don't set a callback.*
- static unsigned int [label_shortcut](#) (const char **t*)
 - Returns the Unicode value of the '&x' shortcut in a given text.*
- static int [test_shortcut](#) (const char **t*, const bool *require_alt*=false)
 - Returns true if the given text *t* contains the entered '&x' shortcut.*

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }
 - flags possible values enumeration.*

Static Protected Member Functions inherited from [FI_Button](#)

- static void [key_release_timeout](#) (void *)

Static Protected Attributes inherited from [FI_Button](#)

- static [FI_Widget_Tracker](#) * [key_release_tracker](#) = 0

12.128.1 Detailed Description

A button that allows the user to type a key combination to create shortcuts.

After clicked once, the button catches the following keyboard events and records the pressed keys and all modifiers. It draws a text representation of the shortcut.

The backspace key deletes the current shortcut. A second click on the button or moving focus makes the last shortcut permanent.

The Shortcut button calls the user callback after every change if `FL_WHEN_CHANGED` is set, and when the button is no longer recording shortcuts if `FL_WHEN_RELEASE` is set.

12.128.2 Constructor & Destructor Documentation

12.128.2.1 Fl_Shortcut_Button()

```
Fl_Shortcut_Button::Fl_Shortcut_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Construct a shortcut button.

Parameters

<i>X,Y,W,H</i>	position and size of the button
<i>l</i>	label text when no shortcut is set

12.128.3 Member Function Documentation

12.128.3.1 draw()

```
void Fl_Shortcut_Button::draw (
    void ) [protected], [virtual]
```

Draw the textual representation of the shortcut button.

When the button can receive shortcut key events, it's "hot". A hot button is drawn in selection color. A cold button is drawn as a regular text box containing a human readable version of the shortcut key.

Reimplemented from [Fl_Button](#).

12.128.3.2 handle()

```
int Fl_Shortcut_Button::handle (
    int e ) [protected], [virtual]
```

Handle keystrokes to catch the user's shortcut.

Reimplemented from [Fl_Button](#).

12.128.3.3 value() [1/2]

```
Fl_Shortcut Fl_Shortcut_Button::value ( )
```

Return the user selected shortcut.

Returns

shortcut encoded as key and modifier

12.128.3.4 value() [2/2]

```
void Fl_Shortcut_Button::value (
    Fl_Shortcut shortcut )
```

Set the displayed shortcut.

Parameters

in	<i>shortcut</i>	encoded as key and modifier
----	-----------------	-----------------------------

The documentation for this class was generated from the following files:

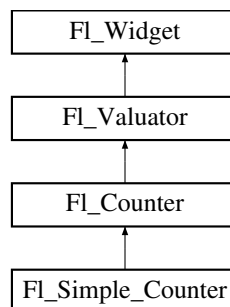
- `Fl_Shortcut_Button.H`
- `Fl_Shortcut_Button.cxx`

12.129 `Fl_Simple_Counter` Class Reference

This widget creates a counter with only 2 arrow buttons.

```
#include <Fl_Simple_Counter.H>
```

Inheritance diagram for `Fl_Simple_Counter`:



Public Member Functions

- **`Fl_Simple_Counter`** (int X, int Y, int W, int H, const char *L=0)

Public Member Functions inherited from `Fl_Counter`

- `Fl_Counter` (int X, int Y, int W, int H, const char *L=0)
Creates a new `Fl_Counter` widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.
- void `lstep` (double a)
Sets the increment for the large step buttons.
- double `step` () const
Returns the increment for normal step buttons.
- void `step` (double a)
Sets the increment for the normal step buttons.
- void `step` (double a, double b)
Sets the increments for the normal and large step buttons.
- `Fl_Color` `textcolor` () const
Gets the font color.
- void `textcolor` (`Fl_Color` s)
Sets the font color to s.
- `Fl_Font` `textfont` () const
Gets the text font.
- void `textfont` (`Fl_Font` s)
Sets the text font to s.
- `Fl_Fontsize` `textsize` () const
Gets the font size.

- void **textsize** (FI_Fontsize s)
Sets the font size to s.
- **~FI_Counter** ()
Destroys the valuator.

Public Member Functions inherited from FI_Valuator

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.
- double **step** () const
Gets or sets the step value.
- void **step** (double a, int b)
See double FI_Valuator::step() const
- void **step** (double s)
See double FI_Valuator::step() const.
- void **step** (int a)
See double FI_Valuator::step() const
- double **value** () const
Gets the floating point(double) value.
- int **value** (double)
Sets the current value.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.

- int `active_r` () const
Returns whether the widget and all of its parents are active.
- `FI_Align` `align` () const
Gets the label alignment.
- void `align` (`FI_Align` alignment)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument` (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class `FI_Gl_Window` * `as_gl_window` ()
Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
Returns an `FI_Group` pointer if this widget is an `FI_Group`.
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` (`FI_Image` *img)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype` `box` () const
Gets the box type of the widget.
- void `box` (`FI_Boxtype` new_box)
Sets the box type for the widget.
- `FI_Callback_p` `callback` () const
Gets the current callback function for the widget.
- void `callback` (`FI_Callback` *cb)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback` *cb, void *p)
Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0` *cb)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback1` *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar` c=0)
Clears or sets the damage flags.

- void `clear_output ()`
Sets a widget to accept input.
- void `clear_visible ()`
Hides the widget.
- void `clear_visible_focus ()`
Disables keyboard focus navigation with this widget.
- `FI_Color color () const`
Gets the background color of the widget.
- void `color (FI_Color bg)`
Sets the background color of the widget.
- void `color (FI_Color bg, FI_Color sel)`
Sets the background and selection color of the widget.
- `FI_Color color2 () const`
For back compatibility only.
- void `color2 (unsigned a)`
For back compatibility only.
- int `contains (const FI_Widget *w) const`
Checks if w is a child of this widget.
- void `copy_label (const char *new_label)`
Sets the current label.
- void `copy_tooltip (const char *text)`
Sets the current tooltip text.
- `uchar damage () const`
Returns non-zero if `draw()` needs to be called.
- void `damage (uchar c)`
Sets the damage bits for the widget.
- void `damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- int `damage_resize (int, int, int, int)`
Internal use only.
- void `deactivate ()`
Deactivates the widget.
- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- `const FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound () const`
Returns whether the inactive image is managed by the widget.
- void `do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- void `do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h () const`

- Gets the widget height.*

 - virtual void `hide ()`
- Makes a widget invisible.*

 - `FI_Image * image ()`
- Gets the image that is used as part of the widget label when in the active state.*

 - const `FI_Image * image () const`
- Gets the image that is used as part of the widget label when in the active state.*

 - void `image (FI_Image &img)`
- Sets the image to use as part of the widget label when in the active state.*

 - void `image (FI_Image *img)`
- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound () const`
- Returns whether the image is managed by the widget.*

 - int `inside (const FI_Widget *wgt) const`
- Checks if this widget is a child of wgt.*

 - int `is_label_copied () const`
- Returns whether the current label was assigned with `copy_label()`.*

 - const char * `label () const`
- Gets the current label text.*

 - void `label (const char *text)`
- Sets the current label pointer.*

 - void `label (FI_Labeltype a, const char *b)`
- Shortcut to set the label text and type in one call.*

 - `FI_Color labelcolor () const`
- Gets the label color.*

 - void `labelcolor (FI_Color c)`
- Sets the label color.*

 - `FI_Font labelfont () const`
- Gets the font to use.*

 - void `labelfont (FI_Font f)`
- Sets the font to use.*

 - `FI_Fontsize labelsize () const`
- Gets the font size in pixels.*

 - void `labelsize (FI_Fontsize pix)`
- Sets the font size in pixels.*

 - `FI_Labeltype labeltype () const`
- Gets the label type.*

 - void `labeltype (FI_Labeltype a)`
- Sets the label type.*

 - void `measure_label (int &ww, int &hh) const`
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard () const`
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard (bool needs)`
- Sets whether this widget needs a keyboard.*

 - unsigned int `output () const`
- Returns if a widget is used for output only.*

 - `FI_Group * parent () const`
- Returns a pointer to the parent widget.*

 - void `parent (FI_Group *p)`
- Internal use only - "for hacks only".*

- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color selection_color` () const
Gets the selection color.
- void `selection_color` (FI_Color a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (uchar t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const

- Gets the user data for this widget.*

 - void **user_data** ([FI_Callback_User_Data](#) *v, bool auto_free)

Sets the user data for this widget.

 - void **user_data** (void *v)

Sets the user data for this widget.

 - unsigned int **visible** () const

Returns whether a widget is visible.

 - unsigned int **visible_focus** () const

Checks whether this widget has a visible focus.

 - void **visible_focus** (int v)

Modifies keyboard focus navigation.

 - int **visible_r** () const

Returns whether a widget and all its parents are visible.

 - int **w** () const

Gets the widget width.

 - [FI_When](#) **when** () const

Returns the conditions under which the callback is called.

 - void **when** (uchar i)

Sets the flags used to decide when a callback is called.

 - [FI_Window](#) * **window** () const

Returns a pointer to the nearest parent window up the widget hierarchy.

 - int **x** () const

Gets the widget position in its window.

 - int **y** () const

Gets the widget position in its window.

 - virtual **~FI_Widget** ()

Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)

The default callback for all widgets that don't set a callback.

 - static unsigned int **label_shortcut** (const char *t)

Returns the Unicode value of the '&x' shortcut in a given text.

 - static int **test_shortcut** (const char *, const bool require_alt=false)

Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
 - = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from FI_Counter

- void `arrow_widths` (int &w1, int &w2)
Compute sizes (widths) of arrow boxes.
- void `draw` () `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from FI_Valuator

- `FI_Valuator` (int X, int Y, int W, int H, const char *L)
Creates a new FI_Valuator widget using the given position, size, and label string.
- void `handle_drag` (double newvalue)
Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.
- void `handle_push` ()
Stores the current value in the previous value.
- void `handle_release` ()
Called after an FL_WHEN_RELEASE event is received and before the callback.
- int `horizontal` () const
Tells if the valuator is an FL_HORIZONTAL one.
- double `previous_value` () const
Gets the previous floating point value before an event changed it.
- void `set_value` (double v)
Sets the current floating point value.
- double `softclamp` (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void `value_damage` ()
Asks for partial redraw.

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.

- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

12.129.1 Detailed Description

This widget creates a counter with only 2 arrow buttons.

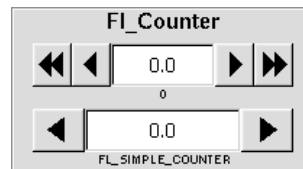


Figure 12.43 FI_Simple_Counter

The documentation for this class was generated from the following files:

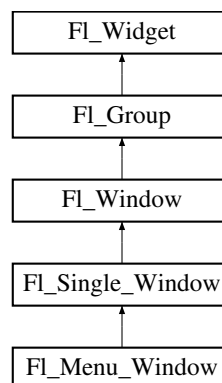
- FI_Simple_Counter.H
- FI_Counter.cxx

12.130 FI_Single_Window Class Reference

This is the same as [FI_Window](#).

```
#include <FI_Single_Window.H>
```

Inheritance diagram for FI_Single_Window:



Public Member Functions

- **FI_Single_Window** (int W, int H, const char *l=0)
Creates a new [FI_Single_Window](#) widget using the given size, and label (title) string.
- **FI_Single_Window** (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Single_Window](#) widget using the given position, size, and label (title) string.

- void `show ()` `FL_OVERRIDE`
Makes a widget visible.
- void `show (int a, char **b)`
*Same as `FI_Window::show(int a, char **b)`*

Public Member Functions inherited from `FI_Window`

- virtual class `FI_Double_Window * as_double_window ()`
Return non-null if this is an `FI_Double_Window` object.
- virtual class `FI_Overlay_Window * as_overlay_window ()`
Return non-null if this is an `FI_Overlay_Window` object.
- `FI_Window` const * `as_window ()` const `FL_OVERRIDE`
- `FI_Window * as_window ()` `FL_OVERRIDE`
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- unsigned int `border ()` const
Returns whether the window possesses a border.
- void `border (int b)`
Sets whether or not the window manager border is around the window.
- void `clear_border ()`
Fast inline function to turn the window manager border off.
- void `clear_modal_states ()`
Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.
- void `copy_label (const char *a)`
Sets the window titlebar label to a copy of a character string.
- void `cursor (const FI_RGB_Image *, int, int)`
Changes the cursor for this window using the provided image as cursor's shape.
- void `cursor (FI_Cursor c, FI_Color, FI_Color=FL_WHITE)`
For back compatibility only.
- void `cursor (FI_Cursor)`
Changes the cursor for this window.
- int `decorated_h ()` const
Returns the window height including any window title bar and any frame added by the window manager.
- int `decorated_w ()` const
Returns the window width including any frame added by the window manager.
- void `default_cursor (FI_Cursor c, FI_Color, FI_Color=FL_WHITE)`
For back compatibility only.
- void `default_cursor (FI_Cursor)`
Sets the default window cursor.
- void `draw_backdrop ()`
Draw the background image if one is set and is aligned inside.
- `FI_Window` (int `w`, int `h`, const char *`title=0`)
Creates a window from the given width `w`, height `h`, and `title`.
- `FI_Window` (int `x`, int `y`, int `w`, int `h`, const char *`title=0`)
Creates a window from the given position (`x`, `y`), size (`w`, `h`) and `title`.
- void `free_position ()`
Undoes the effect of a previous `resize()` or `show()` so that the next time `show()` is called the window manager is free to position the window.
- void `fullscreen ()`
Makes the window completely fill one or more screens, without any window manager border visible.
- unsigned int `fullscreen_active ()` const
Returns non zero if `FULLSCREEN` flag is set, 0 otherwise.

- void **fullscreen_off** ()
Turns off any side effects of [fullscreen\(\)](#)
- void **fullscreen_off** (int X, int Y, int W, int H)
Turns off any side effects of [fullscreen\(\)](#) and does [resize\(x,y,w,h\)](#).
- void **fullscreen_screens** (int top, int bottom, int left, int right)
Sets which screens should be used when this window is in fullscreen mode.
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.
- void **hide** () **FL_OVERRIDE**
Removes the window from the screen.
- void **hotspot** (const **FL_Widget** &p, int offscreen=0)
See void [FL_Window::hotspot\(int x, int y, int offscreen = 0\)](#)
- void **hotspot** (const **FL_Widget** *, int offscreen=0)
See void [FL_Window::hotspot\(int x, int y, int offscreen = 0\)](#)
- void **hotspot** (int x, int y, int offscreen=0)
Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.
- const void * **icon** () const
Gets the current icon window target dependent data.
- void **icon** (const **FL_RGB_Image** *)
Sets or resets a single window icon.
- void **icon** (const void *ic)
Platform-specific method to set the window icon usable on Windows and X11 only.
- void **iconize** ()
Iconifies the window.
- const char * **iconlabel** () const
See void [FL_Window::iconlabel\(const char\)](#)*
- void **iconlabel** (const char *)
Sets the icon label.
- void **icons** (const **FL_RGB_Image** *[], int)
Sets the window icons.
- void **icons** (HICON big_icon, HICON small_icon)
Sets the window icons using HICON handles (Windows platform only).
- const char * **label** () const
See void [FL_Window::label\(const char\)](#)*
- void **label** (const char *)
Sets the window title bar label.
- void **label** (const char *label, const char ***iconlabel**)
Sets the icon label.
- void **make_current** ()
Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.
- void **maximize** ()
Maximizes a top-level window to its current screen.
- unsigned int **maximize_active** () const
Returns whether the window is currently maximized.
- unsigned int **menu_window** () const
Returns true if this window is a menu window.
- unsigned int **modal** () const
Returns true if this window is modal.

- unsigned int **non_modal** () const
Returns true if this window is modal or non-modal.
- [fl_uintptr_t os_id](#) ()
Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int **override** () const
Returns non zero if OVERRIDE flag is set, 0 otherwise.
- void [resize](#) (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Changes the size and position of the window.
- int **screen_num** ()
The number of the screen containing the mapped window.
- void [screen_num](#) (int screen_num)
Set the number of the screen where to map the window.
- void [set_menu_window](#) ()
Marks the window as a menu window.
- void [set_modal](#) ()
A "modal" window, when [shown\(\)](#), will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void [set_non_modal](#) ()
A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.
- void **set_override** ()
Activates the flags NOBORDER|OVERRIDE.
- void [set_tooltip_window](#) ()
Marks the window as a tooltip window.
- const [Fl_Image](#) * **shape** ()
Returns the image controlling the window shape or NULL.
- void [shape](#) (const [Fl_Image](#) &b)
Set the window's shape with an [Fl_Image](#).
- void [shape](#) (const [Fl_Image](#) *img)
Assigns a non-rectangular shape to the window.
- void [show](#) () [FL_OVERRIDE](#)
Puts the window on the screen.
- void [show](#) (int argc, char **argv)
Puts the window on the screen with [show\(\)](#) and parses command-line arguments.
- int [shown](#) ()
Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).
- void [size_range](#) (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)
Sets the allowable range the user can resize this window to.
- unsigned int **tooltip_window** () const
Returns true if this window is a tooltip window.
- void [un_maximize](#) ()
Returns a previously maximized top-level window to its previous size.
- void [wait_for_expose](#) ()
Waits for the window to be displayed after calling [show\(\)](#).
- int **x_root** () const
Gets the x position of the window on the screen.
- const char * **xclass** () const
Returns the xclass for this window, or a default.
- void [xclass](#) (const char *c)
Sets the xclass for this window.
- int **y_root** () const
Gets the y position of the window on the screen.
- virtual [~Fl_Window](#) ()
The destructor also deletes all the children.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *[_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
Removes the widget at `index` from the group and deletes it.
- void [end](#) ()
Exactly the same as `current(this->parent())`.
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\)](#) const.*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does `insert(w, find(before))`.
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)
Removes the widget `o` from the group.
- void [remove](#) (int index)

- Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget * resizable () const`

Returns the group's resizable widget.
- `void resizable (FI_Widget &o)`

Sets the group's resizable widget.
- `void resizable (FI_Widget *o)`

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FI_Group ()`

The destructor also deletes all the children.

Public Member Functions inherited from `FI_Widget`

- `void _clear_fullscreen ()`
- `void _set_fullscreen ()`
- `void activate ()`

Activates the widget.
- `unsigned int active () const`

Returns whether the widget is active.
- `int active_r () const`

Returns whether the widget and all of its parents are active.
- `FI_Align align () const`

Gets the label alignment.
- `void align (FI_Align alignment)`

Sets the label alignment.
- `long argument () const`

Gets the current user data (long) argument that is passed to the callback function.
- `void argument (long v)`

Sets the current user data (long) argument that is passed to the callback function.
- `virtual class FI_Gl_Window * as_gl_window ()`

Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- `virtual class FI_Gl_Window const * as_gl_window () const`
- `void bind_deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
- `void bind_deimage (int f)`

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- `void bind_image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.
- `void bind_image (int f)`

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`

Gets the box type of the widget.
- `void box (FI_Boxtype new_box)`

Sets the box type for the widget.
- `FI_Callback_p callback () const`

Gets the current callback function for the widget.
- `void callback (FI_Callback *cb)`

Sets the current callback function for the widget.
- `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

Sets the current callback function and managed user data for the widget.
- `void callback (FI_Callback *cb, void *p)`

Sets the current callback function and data for the widget.

- void `callback (FI_Callback0 *cb)`
Sets the current callback function for the widget.
- void `callback (FI_Callback1 *cb, long p=0)`
Sets the current callback function for the widget.
- unsigned int `changed () const`
Checks if the widget value changed since the last callback.
- void `clear_active ()`
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed ()`
Marks the value of the widget as unchanged.
- void `clear_damage (uchar c=0)`
Clears or sets the damage flags.
- void `clear_output ()`
Sets a widget to accept input.
- void `clear_visible ()`
Hides the widget.
- void `clear_visible_focus ()`
Disables keyboard focus navigation with this widget.
- `FI_Color color () const`
Gets the background color of the widget.
- void `color (FI_Color bg)`
Sets the background color of the widget.
- void `color (FI_Color bg, FI_Color sel)`
Sets the background and selection color of the widget.
- `FI_Color color2 () const`
For back compatibility only.
- void `color2 (unsigned a)`
For back compatibility only.
- int `contains (const FI_Widget *w) const`
Checks if w is a child of this widget.
- void `copy_label (const char *new_label)`
Sets the current label.
- void `copy_tooltip (const char *text)`
Sets the current tooltip text.
- `uchar damage () const`
Returns non-zero if `draw()` needs to be called.
- void `damage (uchar c)`
Sets the damage bits for the widget.
- void `damage (uchar c, int x, int y, int w, int h)`
Sets the damage bits for an area inside the widget.
- int `damage_resize (int, int, int, int)`
Internal use only.
- void `deactivate ()`
Deactivates the widget.
- `FI_Image * deimage ()`
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage () const`
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage (FI_Image *img)`

- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.
- void `do_callback` (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, FI_Align) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- FI_Image * `image` ()

Gets the image that is used as part of the widget label when in the active state.
- const FI_Image * `image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (FI_Image &img)

Sets the image to use as part of the widget label when in the active state.
- void `image` (FI_Image *img)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const FI_Widget *wgt) const

Checks if this widget is a child of wgt.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.
- void `label` (const char *text)

Sets the current label pointer.
- void `label` (FI_Labeltype a, const char *b)

Shortcut to set the label text and type in one call.
- FI_Color `labelcolor` () const

Gets the label color.
- void `labelcolor` (FI_Color c)

Sets the label color.
- FI_Font `labelfont` () const

Gets the font to use.
- void `labelfont` (FI_Font f)

Sets the font to use.
- FI_Fontsize `labelsize` () const

Gets the font size in pixels.
- void `labelsize` (FI_Fontsize pix)

Sets the font size in pixels.
- FI_Labeltype `labeltype` () const

Gets the label type.
- void `labeltype` (FI_Labeltype a)

Sets the label type.
- void `measure_label` (int &ww, int &hh) const

Sets width ww and height hh accordingly with the label size.

- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const

- Gets the widget type.*

 - void `type` (uchar t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (FI_Callback_User_Data *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- FI_When `when` () const

Returns the conditions under which the callback is called.
- void `when` (uchar i)

Sets the flags used to decide when a callback is called.
- FI_Window * `window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.
- int `y` () const

Gets the widget position in its window.
- virtual `~FI_Widget` ()

Destroys the widget.

Additional Inherited Members

Public Types inherited from FI_Window

- typedef struct HICON__ * HICON

Static Public Member Functions inherited from FI_Window

- static FI_Window * `current` ()

Returns the last window that was made current.
- static void `default_callback` (FI_Window *, void *v)

Back compatibility: Sets the default callback v for win to call on close event.
- static void `default_icon` (const FI_RGB_Image *)

Sets a single default window icon.
- static void `default_icons` (const FI_RGB_Image *[], int)

Sets the default window icons.
- static void `default_icons` (HICON big_icon, HICON small_icon)

Sets the default window icons (Windows platform only).

- static const char * [default_xclass](#) ()
Returns the default xclass.
- static void [default_xclass](#) (const char *)
Sets the default window xclass.
- static bool [is_a_rescale](#) ()
Returns true when a window is being rescaled.
- static char [show_next_window_iconic](#) ()
Returns the static flag whether the next window should be opened iconified.
- static void [show_next_window_iconic](#) (char stat)
Sets a static flag whether the next window should be opened iconified.

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

Protected Member Functions inherited from [FI_Window](#)

- void [default_size_range](#) ()
Protected method to calculate the default size range of a window.
- void [draw](#) () [FL_OVERRIDE](#)
Draws the widget.
- virtual void [flush](#) ()
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- int [force_position](#) () const

- Returns the internal state of the window's FORCE_POSITION flag.*
- void `force_position` (int force)
 - Sets an internal flag that tells FLTK and the window manager to honor position requests.*
- void `free_icons` ()
 - Deletes all icons previously attached to the window.*
- int `is_resizable` ()
 - Protected method to determine whether a window is resizable.*

Protected Member Functions inherited from FI_Group

- `FI_Rect *` `bounds` ()
 - Returns the internal array of widget sizes and positions.*
- void `draw_child` (`FI_Widget` &widget) const
 - Forces a child to redraw.*
- void `draw_children` ()
 - Draws all children of the group.*
- void `draw_outside_label` (const `FI_Widget` &widget) const
 - Parents normally call this to draw outside labels of child widgets.*
- virtual int `on_insert` (`FI_Widget` *, int)
 - Allow derived groups to act when a widget is added as a child.*
- virtual int `on_move` (int, int)
 - Allow derived groups to act when a widget is moved within the group.*
- virtual void `on_remove` (int)
 - Allow derived groups to act when a child widget is removed from the group.*
- int * `sizes` ()
 - Returns the internal array of widget sizes and positions.*
- void `update_child` (`FI_Widget` &widget) const
 - Draws a child only if it needs it.*

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
 - Clears a flag in the flags mask.*
- void `draw_backdrop` () const
 - If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.*
- void `draw_box` () const
 - Draws the widget box according its box style.*
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
 - Draws a box of type t, of color c at the widget's position and size.*
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
 - Draws a box of type t, of color c at the position X,Y and size W,H.*
- void `draw_focus` () const
 - Draws a focus rectangle around the widget.*
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
 - Draws a focus rectangle around the widget.*
- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
 - Draws a focus box for the widget at the given position and size.*
- void `draw_label` () const
 - Draws the widget's label at the defined label position.*
- void `draw_label` (int, int, int, int) const
 - Draws the label in an arbitrary bounding box.*
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)

- Creates a widget at the given position and size.*

 - unsigned int **flags** () const

Gets the widget flags mask.
- void **h** (int v)
- Internal use only.*

 - void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)
- Internal use only.*

 - void **x** (int v)

Internal use only.
- void **y** (int v)
- Internal use only.*

Static Protected Attributes inherited from [Fl_Window](#)

- static [Fl_Window](#) * **current_**
- Stores the last window that was made current.*

12.130.1 Detailed Description

This is the same as [Fl_Window](#).

However, it is possible that some implementations will provide double-buffered windows by default. This subclass can be used to force single-buffering. This may be useful for modifying existing programs that use incremental update, or for some types of image data, such as a movie flipbook.

12.130.2 Member Function Documentation

12.130.2.1 show()

```
void Fl_Single_Window::show ( ) [virtual]
```

Makes a widget visible.

An invisible widget never gets redrawn and does not get keyboard or mouse events, but can receive a few other events like FL_SHOW.

The [visible\(\)](#) method returns true if the widget is set to be visible. The [visible_r\(\)](#) method returns true if the widget and all of its parents are visible. A widget is only visible if [visible\(\)](#) is true on it *and all of its parents*.

Changing it will send FL_SHOW or FL_HIDE events to the widget. *Do not change it if the parent is not visible, as this will send false FL_SHOW or FL_HIDE events to the widget.* [redraw\(\)](#) is called if necessary on this or the parent.

See also

[hide\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

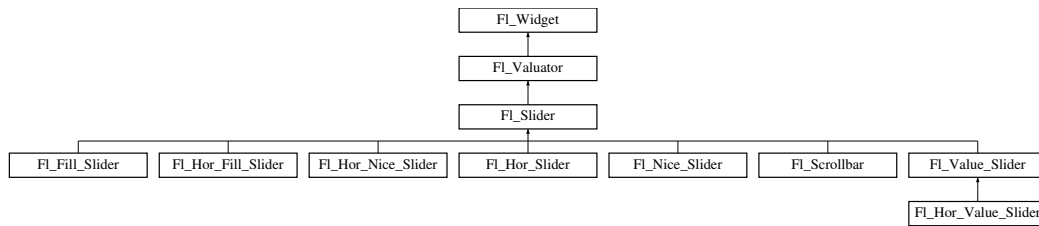
- Fl_Single_Window.H
- Fl_Single_Window.cxx

12.131 Fl_Slider Class Reference

The [Fl_Slider](#) widget contains a sliding knob inside a box.

```
#include <Fl_Slider.H>
```

Inheritance diagram for [Fl_Slider](#):



Public Member Functions

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- **FL_Slider** (int X, int Y, int W, int H, const char *L=0)
*Creates a new **FL_Slider** widget using the given position, size, and label string.*
- **FI_Slider** (uchar t, int X, int Y, int W, int H, const char *L)
*Creates a new **FL_Slider** widget using the given type, position, size, and label string.*
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.
- int **scrollvalue** (int pos, int size, int first, int total)
Sets the size and position of the sliding knob in the box.
- **FL_Boxtype slider** () const
Gets the slider box type.
- void **slider** (FL_Boxtype c)
Sets the slider box type.
- float **slider_size** () const
Get the dimensions of the moving piece of slider.
- void **slider_size** (double v)
Set the dimensions of the moving piece of slider.

Public Member Functions inherited from FL_Valuator

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)

- Round the passed value to the nearest step increment.*

 - double **step** () const
 - Gets or sets the step value.*
 - void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
 - void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
 - void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double **value** () const
 - Gets the floating point(double) value.*
- int **value** (double)
 - Sets the current value.*

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) **align** () const
 - Gets the label alignment.*
- void **align** ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void **bind_image** (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype](#) **box** () const

- Gets the box type of the widget.*

 - void `box` (`FI_Boxtype` new_box)
- Sets the box type for the widget.*

 - `FI_Callback_p` `callback` () const
- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback` *cb, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1` *cb, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar` c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if draw() needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

- int **damage_resize** (int, int, int, int)
Internal use only.
- void **deactivate** ()
Deactivates the widget.
- **FI_Image * deimage** ()
Gets the image that is used as part of the widget label when in the inactive state.
- const **FI_Image * deimage** () const
Gets the image that is used as part of the widget label when in the inactive state.
- void **deimage** (**FI_Image** &img)
Sets the image to use as part of the widget label when in the inactive state.
- void **deimage** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the inactive state.
- int **deimage_bound** () const
Returns whether the inactive image is managed by the widget.
- void **do_callback** (**FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)
Calls the widget callback function with default arguments.
- void **do_callback** (**FI_Widget** *widget, long arg, **FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)
Calls the widget callback function with arbitrary arguments.
- void **do_callback** (**FI_Widget** *widget, void *arg=0, **FI_Callback_Reason** reason=**FL_REASON_UNKNOWN**)
Calls the widget callback function with arbitrary arguments.
- void **draw_label** (int, int, int, int, **FI_Align**) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int **h** () const
Gets the widget height.
- virtual void **hide** ()
Makes a widget invisible.
- **FI_Image * image** ()
Gets the image that is used as part of the widget label when in the active state.
- const **FI_Image * image** () const
Gets the image that is used as part of the widget label when in the active state.
- void **image** (**FI_Image** &img)
Sets the image to use as part of the widget label when in the active state.
- void **image** (**FI_Image** *img)
Sets the image to use as part of the widget label when in the active state.
- int **image_bound** () const
Returns whether the image is managed by the widget.
- int **inside** (const **FI_Widget** *wgt) const
Checks if this widget is a child of wgt.
- int **is_label_copied** () const
Returns whether the current label was assigned with [copy_label\(\)](#).
- const char * **label** () const
Gets the current label text.
- void **label** (const char *text)
Sets the current label pointer.
- void **label** (**FI_Labeltype** a, const char *b)
Shortcut to set the label text and type in one call.
- **FI_Color labelcolor** () const
Gets the label color.
- void **labelcolor** (**FI_Color** c)
Sets the label color.
- **FI_Font labelfont** () const

- Gets the font to use.*

 - void [labelfont](#) ([FI_Font](#) f)
- Sets the font to use.*

 - [FI_Fontsize](#) [labelsize](#) () const
- Gets the font size in pixels.*

 - void [labelsize](#) ([FI_Fontsize](#) pix)
- Sets the font size in pixels.*

 - [FI_Labeltype](#) [labeltype](#) () const
- Gets the label type.*

 - void [labeltype](#) ([FI_Labeltype](#) a)
- Sets the label type.*

 - void [measure_label](#) (int &ww, int &hh) const
- Sets width ww and height hh accordingly with the label size.*

 - bool [needs_keyboard](#) () const
- Returns whether this widget needs a keyboard.*

 - void [needs_keyboard](#) (bool needs)
- Sets whether this widget needs a keyboard.*

 - unsigned int [output](#) () const
- Returns if a widget is used for output only.*

 - [FI_Group](#) * [parent](#) () const
- Returns a pointer to the parent widget.*

 - void [parent](#) ([FI_Group](#) *p)
- Internal use only - "for hacks only".*

 - void [position](#) (int X, int Y)
- Repositions the window or widget.*

 - void [redraw](#) ()
- Schedules the drawing of the widget.*

 - void [redraw_label](#) ()
- Schedules the drawing of the label.*

 - virtual void [resize](#) (int x, int y, int w, int h)
- Changes the size or position of the widget.*

 - [FI_Color](#) [selection_color](#) () const
- Gets the selection color.*

 - void [selection_color](#) ([FI_Color](#) a)
- Sets the selection color.*

 - void [set_active](#) ()
- Marks the widget as active without sending events or changing focus.*

 - void [set_changed](#) ()
- Marks the value of the widget as changed.*

 - void [set_output](#) ()
- Sets a widget to output only.*

 - void [set_visible](#) ()
- Makes the widget visible.*

 - void [set_visible_focus](#) ()
- Enables keyboard focus navigation with this widget.*

 - int [shortcut_label](#) () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void [shortcut_label](#) (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void [show](#) ()
- Makes a widget visible.*

- void [size](#) (int W, int H)
Changes the size of the widget.
- int [take_focus](#) ()
Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const
Returns if the widget is able to take events.
- int [test_shortcut](#) ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const
Gets the current tooltip text.
- void [tooltip](#) (const char *text)
Sets the current tooltip text.
- [Fl_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [Fl_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
Gets the widget type.
- void [type](#) ([uchar](#) t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([Fl_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [Fl_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [Fl_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~Fl_Widget](#) ()
Destroys the widget.

Protected Member Functions

- void **draw** () [FL_OVERRIDE](#)
Draws the widget.
- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int, int)

Protected Member Functions inherited from [FI_Valuator](#)

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
Creates a new [FI_Valuator](#) widget using the given position, size, and label string.
- void **handle_drag** (double newvalue)
Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.
- void **handle_push** ()
Stores the current value in the previous value.
- void **handle_release** ()
Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.
- int **horizontal** () const
Tells if the valuator is an [FL_HORIZONTAL](#) one.
- double **previous_value** () const
Gets the previous floating point value before an event changed it.
- void **set_value** (double v)
Sets the current floating point value.
- double **softclamp** (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void [value_damage](#) ()
Asks for partial redraw.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.

- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FL_Widget](#)

- static void [default_callback](#) ([FL_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FL_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.131.1 Detailed Description

The [FL_Slider](#) widget contains a sliding knob inside a box.

It is often used as a scrollbar. Moving the box all the way to the top/left sets it to the [minimum\(\)](#), and to the bottom/right to the [maximum\(\)](#). The [minimum\(\)](#) may be greater than the [maximum\(\)](#) to reverse the slider direction.

Use void [FL_Widget::type](#)(int) to set how the slider is drawn, which can be one of the following:

- [FL_VERTICAL](#) - Draws a vertical slider (this is the default).
- [FL_HORIZONTAL](#) - Draws a horizontal slider.
- [FL_VERT_FILL_SLIDER](#) - Draws a filled vertical slider, useful as a progress or value meter.
- [FL_HOR_FILL_SLIDER](#) - Draws a filled horizontal slider, useful as a progress or value meter.
- [FL_VERT_NICE_SLIDER](#) - Draws a vertical slider with a nice looking control knob.

- FL_HOR_NICE_SLIDER - Draws a horizontal slider with a nice looking control knob.

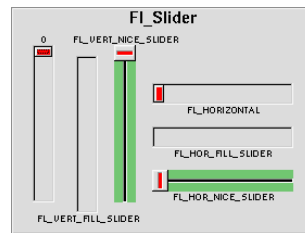


Figure 12.44 Fl_Slider

12.131.2 Constructor & Destructor Documentation

12.131.2.1 Fl_Slider()

```
Fl_Slider::Fl_Slider (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Slider](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

12.131.3 Member Function Documentation

12.131.3.1 bounds()

```
void Fl_Slider::bounds (
    double a,
    double b )
```

Sets the minimum (a) and maximum (b) values for the valuator widget. if at least one of the values is changed, a partial redraw is asked.

12.131.3.2 draw()

```
void Fl_Slider::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

Reimplemented in [Fl_Value_Slider](#).

12.131.3.3 handle()

```
int Fl_Slider::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

Reimplemented in [FI_Value_Slider](#).

12.131.3.4 scrollvalue()

```
int Fl_Slider::scrollvalue (
    int pos,
    int size,
    int first,
    int total )
```

Sets the size and position of the sliding knob in the box.

Parameters

<code>in</code>	<code>pos</code>	position of first line displayed
<code>in</code>	<code>size</code>	size of window in lines
<code>in</code>	<code>first</code>	number of first line
<code>in</code>	<code>total</code>	total number of lines Returns <code>FI_Valuator::value(p)</code>

12.131.3.5 slider_size()

```
void Fl_Slider::slider_size (
    double v )
```

Set the dimensions of the moving piece of slider.

This is the fraction of the size of the entire widget. If you set this to 1 then the slider cannot move. The default value is .08.

For the "fill" sliders this is the size of the area around the end that causes a drag effect rather than causing the slider to jump to the mouse.

The documentation for this class was generated from the following files:

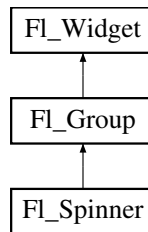
- `FI_Slider.H`
- `FI_Slider.cxx`

12.132 FI_Spinner Class Reference

This widget is a combination of a numerical input widget and repeat buttons.

```
#include <Fl_Spinner.H>
```

Inheritance diagram for Fl_Spinner:



Classes

- class [Fl_Spinner_Input](#)

Public Member Functions

- [Fl_Color](#) **color** () const
Returns the background color of the spinner widget's input field.
- void **color** ([Fl_Color](#) v)
Sets the background color of the spinner widget's input field.
- [Fl_Spinner](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Spinner](#) widget using the given position, size, and label string.
- const char * **format** () const
Returns the format string for the value.
- void **format** (const char *f)
Sets the format string for the value.
- int **handle** (int event) [FL_OVERRIDE](#)
Handles the specified event.
- double **maximum** () const
Gets the maximum value of the widget.
- void **maximum** (double m)
Sets the maximum value of the widget.
- int **maximum_size** () const
Returns the maximum width of the input field.
- void **maximum_size** (int m)
Sets the maximum width of the input field.
- double **minimum** () const
Gets the minimum value of the widget.
- void **minimum** (double m)
Sets the minimum value of the widget.
- void **range** (double a, double b)
Sets the minimum and maximum values for the widget.
- void **resize** (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Resizes the [Fl_Group](#) widget and all of its children.
- [Fl_Color](#) **selection_color** () const
Returns the selection color of the spinner widget's input field.
- void **selection_color** ([Fl_Color](#) val)
Sets the selection color of the spinner widget's input field.
- double **step** () const
Gets the amount to change the value when the user clicks a button.
- void **step** (double s)

- Sets or returns the amount to change the value when the user clicks a button.*
- **FI_Color textcolor** () const
 - Gets the color of the text in the input field.*
- void **textcolor** (FI_Color c)
 - Sets the color of the text in the input field.*
- **FI_Font textfont** () const
 - Gets the font of the text in the input field.*
- void **textfont** (FI_Font f)
 - Sets the font of the text in the input field.*
- **FI_Fontsize textsize** () const
 - Gets the size of the text in the input field.*
- void **textsize** (FI_Fontsize s)
 - Sets the size of the text in the input field.*
- **uchar type** () const
 - Gets the numeric representation in the input field.*
- void **type** (uchar v)
 - Sets the numeric representation in the input field.*
- double **value** () const
 - Gets the current value of the widget.*
- void **value** (double v)
 - Sets the current value of the input widget.*
- int **wrap** () const
 - Gets the wrap mode of the [FI_Spinner](#) widget.*
- void **wrap** (int set)
 - Sets whether the spinner wraps around at upper and lower bounds.*

Public Member Functions inherited from [FI_Group](#)

- **FI_Widget *& _ddfdesign_kludge** ()
 - This is for forms compatibility only.*
- void **add** (FI_Widget &)
 - The widget is removed from its current group (if any) and then added to the end of this group.*
- void **add** (FI_Widget *o)
 - See void [FI_Group::add\(FI_Widget &w\)](#)*
- void **add_resizable** (FI_Widget &o)
 - Adds a widget to the group and makes it the resizable widget.*
- **FI_Widget *const * array** () const
 - Returns a pointer to the array of children.*
- **FI_Group const * as_group** () const **FL_OVERRIDE**
- **FI_Group * as_group** () **FL_OVERRIDE**
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- void **begin** ()
 - Sets the current group so you can build the widget tree by just constructing the widgets.*
- **FI_Widget * child** (int n) const
 - Returns [array\(\)\[n\]](#).*
- int **children** () const
 - Returns how many child widgets the group has.*
- void **clear** ()
 - Deletes all child widgets from memory recursively.*
- unsigned int **clip_children** ()
 - Returns the current clipping mode.*

- void `clip_children` (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int `delete_child` (int n)
Removes the widget at `index` from the group and deletes it.
- void `end` ()
Exactly the same as `current(this->parent())`.
- int `find` (const `FL_Widget` &o) const
*See int `FL_Group::find(const FL_Widget *w)` const.*
- int `find` (const `FL_Widget` *) const
Searches the child array for the widget and returns the index.
- `FL_Group` (int, int, int, int, const char *s=0)
Creates a new `FL_Group` widget using the given position, size, and label string.
- void `focus` (`FL_Widget` *W)
- void `forms_end` ()
This is for forms compatibility only.
- void `init_sizes` ()
Resets the internal array of widget sizes and positions.
- void `insert` (`FL_Widget` &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void `insert` (`FL_Widget` &o, `FL_Widget` *before)
This does `insert(w, find(before))`.
- void `remove` (`FL_Widget` &)
Removes a widget from the group but does not delete it.
- void `remove` (`FL_Widget` *o)
Removes the widget `o` from the group.
- void `remove` (int index)
Removes the widget at `index` from the group but does not delete it.
- `FL_Widget` * `resizable` () const
Returns the group's resizable widget.
- void `resizable` (`FL_Widget` &o)
Sets the group's resizable widget.
- void `resizable` (`FL_Widget` *o)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- virtual `~FL_Group` ()
The destructor also deletes all the children.

Public Member Functions inherited from `FL_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- `FL_Align` `align` () const
Gets the label alignment.
- void `align` (`FL_Align` alignment)
Sets the label alignment.
- long `argument` () const

- Gets the current user data (long) argument that is passed to the callback function.*

 - void `argument` (long v)
- Sets the current user data (long) argument that is passed to the callback function.*

 - virtual class `FI_Gl_Window` * `as_gl_window` ()

Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.

 - virtual class `FI_Gl_Window` const * `as_gl_window` () const
 - virtual `FI_Window` * `as_window` ()

Returns an `FI_Window` pointer if this widget is an `FI_Window`.

 - virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage` (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype` `box` () const

Gets the box type of the widget.
- void `box` (`FI_Boxtype` new_box)

Sets the box type for the widget.
- `FI_Callback_p` `callback` () const

Gets the current callback function for the widget.
- void `callback` (`FI_Callback` *cb)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)

Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback` *cb, void *p)

Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0` *cb)

Sets the current callback function for the widget.
- void `callback` (`FI_Callback1` *cb, long p=0)

Sets the current callback function for the widget.
- unsigned int `changed` () const

Checks if the widget value changed since the last callback.
- void `clear_active` ()

Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()

Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar` c=0)

Clears or sets the damage flags.
- void `clear_output` ()

Sets a widget to accept input.
- void `clear_visible` ()

Hides the widget.
- void `clear_visible_focus` ()

Disables keyboard focus navigation with this widget.
- `FI_Color` `color` () const

Gets the background color of the widget.
- void `color` (`FI_Color` bg)

Sets the background color of the widget.

- void `color` (`FI_Color` bg, `FI_Color` sel)
Sets the background and selection color of the widget.
- `FI_Color` `color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const `FI_Widget` *w) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- `uchar` `damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar` c)
Sets the damage bits for the widget.
- void `damage` (`uchar` c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image` * `deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image` * `deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` &img)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image` *img)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image` * `image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image` * `image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image` &img)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image` *img)

- Sets the image to use as part of the widget label when in the active state.*

 - int `image_bound` () const
 - Returns whether the image is managed by the widget.*
 - int `inside` (const `FI_Widget` *wgt) const
 - Checks if this widget is a child of wgt.*
 - int `is_label_copied` () const
 - Returns whether the current label was assigned with `copy_label()`.*
 - const char * `label` () const
 - Gets the current label text.*
 - void `label` (const char *text)
 - Sets the current label pointer.*
 - void `label` (`FI_Labeltype` a, const char *b)
 - Shortcut to set the label text and type in one call.*
 - `FI_Color` `labelcolor` () const
 - Gets the label color.*
 - void `labelcolor` (`FI_Color` c)
 - Sets the label color.*
 - `FI_Font` `labelfont` () const
 - Gets the font to use.*
 - void `labelfont` (`FI_Font` f)
 - Sets the font to use.*
 - `FI_Fontsize` `labelsize` () const
 - Gets the font size in pixels.*
 - void `labelsize` (`FI_Fontsize` pix)
 - Sets the font size in pixels.*
 - `FI_Labeltype` `labeltype` () const
 - Gets the label type.*
 - void `labeltype` (`FI_Labeltype` a)
 - Sets the label type.*
 - void `measure_label` (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
 - bool `needs_keyboard` () const
 - Returns whether this widget needs a keyboard.*
 - void `needs_keyboard` (bool needs)
 - Sets whether this widget needs a keyboard.*
 - unsigned int `output` () const
 - Returns if a widget is used for output only.*
 - `FI_Group` * `parent` () const
 - Returns a pointer to the parent widget.*
 - void `parent` (`FI_Group` *p)
 - Internal use only - "for hacks only".*
 - void `position` (int X, int Y)
 - Repositions the window or widget.*
 - void `redraw` ()
 - Schedules the drawing of the widget.*
 - void `redraw_label` ()
 - Schedules the drawing of the label.*
 - `FI_Color` `selection_color` () const
 - Gets the selection color.*
 - void `selection_color` (`FI_Color` a)
 - Sets the selection color.*

- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `Fl_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `Fl_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`Fl_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const

- Returns whether a widget and all its parents are visible.*

 - int **w** () const

Gets the widget width.
- **FI_When** **when** () const
- Returns the conditions under which the callback is called.*

 - void **when** (uchar i)

Sets the flags used to decide when a callback is called.
- **FI_Window** * **window** () const
- Returns a pointer to the nearest parent window up the widget hierarchy.*

 - int **x** () const

Gets the widget position in its window.
- int **y** () const
- Gets the widget position in its window.*

 - virtual ~**FI_Widget** ()

Destroys the widget.

Protected Member Functions

- void **draw** () **FL_OVERRIDE**
- Draws the widget.*

Protected Member Functions inherited from **FI_Group**

- **FI_Rect** * **bounds** ()
- Returns the internal array of widget sizes and positions.*

 - void **draw_child** (**FI_Widget** &widget) const

Forces a child to redraw.
- void **draw_children** ()
- Draws all children of the group.*

 - void **draw_outside_label** (const **FI_Widget** &widget) const

Parents normally call this to draw outside labels of child widgets.
- virtual int **on_insert** (**FI_Widget** *, int)
- Allow derived groups to act when a widget is added as a child.*

 - virtual int **on_move** (int, int)

Allow derived groups to act when a widget is moved within the group.
- virtual void **on_remove** (int)
- Allow derived groups to act when a child widget is removed from the group.*

 - int * **sizes** ()

Returns the internal array of widget sizes and positions.
- void **update_child** (**FI_Widget** &widget) const
- Draws a child only if it needs it.*

Protected Member Functions inherited from **FI_Widget**

- void **clear_flag** (unsigned int c)
- Clears a flag in the flags mask.*

 - void **draw_backdrop** () const

*If **FL_ALIGN_IMAGE_BACKDROP** is set, the image or deimage will be drawn.*
- void **draw_box** () const
- Draws the widget box according its box style.*

 - void **draw_box** (**FI_Boxtype** t, **FI_Color** c) const

Draws a box of type t, of color c at the widget's position and size.

- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Protected Attributes

- **FI_Repeat_Button** **down_button_**
- **FI_Spinner_Input** **input_**
- **FI_Repeat_Button** **up_button_**

Additional Inherited Members

Static Public Member Functions inherited from FI_Group

- static **FI_Group** * **current** ()
Returns the currently active group.
- static void **current** (**FI_Group** *g)
Sets the current group.

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (**FI_Widget** *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [Fl_Widget](#)

- enum {
 - [INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
 - [FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 - ,
 - [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 - ,
 - [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 - ,
 - [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#) = 1<<19 ,
 - [NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
 - [AUTO_DELETE_USER_DATA](#) = 1<<23 ,
 - [MAXIMIZED](#) = 1<<24 , [POPOP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
 - [USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.132.1 Detailed Description

This widget is a combination of a numerical input widget and repeat buttons. The user can either type into the input area or use the buttons to change the value.

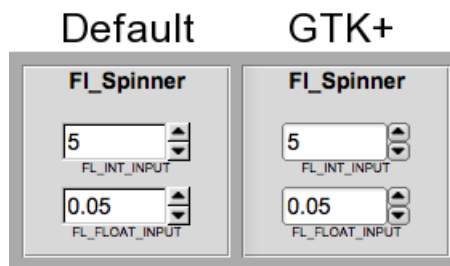


Figure 12.45 [Fl_Spinner](#) widget

12.132.2 Constructor & Destructor Documentation

12.132.2.1 [Fl_Spinner\(\)](#)

```
Fl_Spinner::Fl_Spinner (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Spinner](#) widget using the given position, size, and label string. The inherited destructor destroys the widget and any value associated with it.

12.132.3 Member Function Documentation

12.132.3.1 [draw\(\)](#)

```
void Fl_Spinner::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                // calls Fl_Scrollbar::draw()
```


Reimplemented from [Fl_Group](#).

12.132.3.2 handle()

```
int Fl_Spinner::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Group](#).

12.132.3.3 resize()

```
void Fl_Spinner::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the [Fl_Group](#) widget and all of its children.

The [Fl_Group](#) widget first resizes itself, and then it moves and resizes all its children according to the rules documented for [Fl_Group::resizable\(Fl_Widget*\)](#)

See also

[Fl_Group::resizable\(Fl_Widget*\)](#)

[Fl_Group::resizable\(\)](#)

[Fl_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [Fl_Group](#).

12.132.3.4 step() [1/2]

```
double Fl_Spinner::step ( ) const [inline]
```

Gets the amount to change the value when the user clicks a button.

See also

[Fl_Spinner::step\(double\)](#)

12.132.3.5 step() [2/2]

```
void Fl_Spinner::step (
    double s )
```

Sets or returns the amount to change the value when the user clicks a button.

Before setting step to a non-integer value, the spinner [type\(\)](#) should be changed to floating point.

See also

double [Fl_Spinner::step\(\) const](#)

12.132.3.6 type() [1/2]

```
uchar Fl_Spinner::type ( ) const [inline]
```

Gets the numeric representation in the input field.

See also

[Fl_Spinner::type\(uchar\)](#)

12.132.3.7 type() [2/2]

```
void Fl_Spinner::type (
    uchar v )
```

Sets the numeric representation in the input field.

Valid values are FL_INT_INPUT and FL_FLOAT_INPUT. Also changes the [format\(\)](#) template. Setting a new spinner type via a superclass pointer will not work.

Note

[type\(\)](#) is not a virtual function.

12.132.3.8 value()

```
void Fl_Spinner::value (
    double v ) [inline]
```

Sets the current value of the input widget.

Before setting value to a non-integer value, the spinner [type\(\)](#) should be changed to floating point.

12.132.3.9 wrap() [1/2]

```
int Fl_Spinner::wrap ( ) const [inline]
```

Gets the wrap mode of the [Fl_Spinner](#) widget.

See also

void [wrap\(int\)](#)

Since

1.4.0

12.132.3.10 wrap() [2/2]

```
void Fl_Spinner::wrap (
    int set ) [inline]
```

Sets whether the spinner wraps around at upper and lower bounds.

If wrap mode is on the spinner value is set to the [minimum\(\)](#) or [maximum\(\)](#) if the value exceeds the upper or lower bounds, resp., if it was changed by one of the buttons or the FL_Up or FL_Down keys.

The spinner stops at the upper and lower bounds if wrap mode is off.

The default wrap mode is on for backwards compatibility with FLTK 1.3.x and older versions.

Note

Wrap mode does not apply to the input field if the input value is edited directly as a number. The input value is always clipped to the allowed range as if wrap mode was off when the input field is left (i.e. loses focus).

See also

[minimum\(\)](#), [maximum\(\)](#)

Parameters

in	set	non-zero sets wrap mode, zero resets wrap mode
----	-----	--

Since

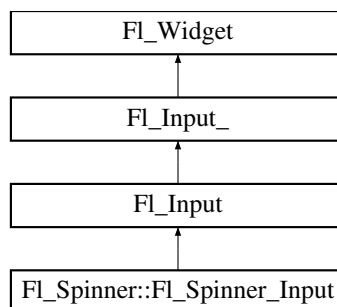
1.4.0

The documentation for this class was generated from the following files:

- Fl_Spinner.H
- Fl_Spinner.cxx

12.133 Fl_Spinner::Fl_Spinner_Input Class Reference

Inheritance diagram for Fl_Spinner::Fl_Spinner_Input:

**Public Member Functions**

- **Fl_Spinner_Input** (int X, int Y, int W, int H)
- int **handle** (int event) **FL_OVERRIDE**
Handles events of Fl_Spinner's embedded input widget.

Public Member Functions inherited from Fl_Input

- **Fl_Input** (int, int, int, int, const char *s=0)
Creates a new Fl_Input widget using the given position, size, and label string.

Public Member Functions inherited from [FI_Input_](#)

- int [append](#) (const char *t, int l=0, char keep_selection=0)
Append text at the end.
- bool [can_redo](#) () const
Check if there is a redo action available.
- bool [can_undo](#) () const
Check if the last operation can be undone.
- int [copy](#) (int clipboard)
Put the current selection into the clipboard.
- int [copy_cuts](#) ()
Copies the yank buffer to the clipboard.
- [FI_Color](#) [cursor_color](#) () const
Gets the color of the cursor.
- void [cursor_color](#) ([FI_Color](#) n)
Sets the color of the cursor.
- int [cut](#) ()
Deletes the current selection.
- int [cut](#) (int a, int b)
Deletes all characters between index a and b.
- int [cut](#) (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- double [dvalue](#) () const
Returns the widget text interpreted as a floating point number.
- [FI_Input_](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Input_](#) widget.
- unsigned int [index](#) (int i) const
Returns the character at index i.
- int [input_type](#) () const
Gets the input field type.
- void [input_type](#) (int t)
Sets the input field type.
- int [insert](#) (const char *t, int l=0)
Inserts text at the cursor position.
- int [insert_position](#) () const
Gets the position of the text cursor.
- int [insert_position](#) (int p)
Sets the cursor position and mark.
- int [insert_position](#) (int p, int m)
Sets the index for the cursor and mark.
- int [ivalue](#) () const
Returns the widget text interpreted as a signed integer.
- int [mark](#) () const
Gets the current selection mark.
- int [mark](#) (int m)
Sets the current selection mark.
- int [maximum_size](#) () const
Gets the maximum length of the input field in characters.
- void [maximum_size](#) (int m)
Sets the maximum length of the input field in characters.
- int [position](#) () const

- `int position` (`int p`)
- `int position` (`int p`, `int m`)
- `int readonly` () `const`
Gets the read-only state of the input field.
- `void readonly` (`int b`)
Sets the read-only state of the input field.
- `int redo` ()
Redo previous undo operation.
- `int replace` (`int b`, `int e`, `const char *text`, `int ilen=0`)
Deletes text from `b` to `e` and inserts the new string `text`.
- `void resize` (`int`, `int`, `int`, `int`) `FL_OVERRIDE`
Changes the size of the widget.
- `int shortcut` () `const`
Return the shortcut key associated with this widget.
- `void shortcut` (`int s`)
Sets the shortcut key associated with this widget.
- `int size` () `const`
Returns the number of bytes in `value()`.
- `void size` (`int W`, `int H`)
Sets the width and height of this widget.
- `int static_value` (`const char *`)
Changes the widget text.
- `int static_value` (`const char *`, `int`)
Changes the widget text.
- `int tab_nav` () `const`
Gets whether the Tab key causes focus navigation in multiline input fields or not.
- `void tab_nav` (`int val`)
Sets whether the Tab key does focus navigation, or inserts tab characters into `Fl_Multiline_Input`.
- `Fl_Color textcolor` () `const`
Gets the color of the text in the input field.
- `void textcolor` (`Fl_Color n`)
Sets the color of the text in the input field.
- `Fl_Font textfont` () `const`
Gets the font of the text in the input field.
- `void textfont` (`Fl_Font s`)
Sets the font of the text in the input field.
- `Fl_Fontsize textsize` () `const`
Gets the size of the text in the input field.
- `void textsize` (`Fl_Fontsize s`)
Sets the size of the text in the input field.
- `int undo` ()
Undoes previous changes to the text buffer.
- `const char * value` () `const`
Returns the text displayed in the widget.
- `int value` (`const char *`)
Changes the widget text.
- `int value` (`const char *`, `int`)
Changes the widget text.
- `int value` (`double value`)
Changes the widget text to a floating point number ("%g").
- `int value` (`int value`)

- Changes the widget text to a signed integer number.*

 - int `wrap` () const
 - Gets the word wrapping state of the input field.*
 - void `wrap` (int b)
 - Sets the word wrapping state of the input field.*
 - `~FI_Input_` ()
 - Destroys the widget.*

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
- Activates the widget.*
- unsigned int `active` () const
- Returns whether the widget is active.*
- int `active_r` () const
- Returns whether the widget and all of its parents are active.*
- `FI_Align align` () const
- Gets the label alignment.*
- void `align` (`FI_Align alignment`)
- Sets the label alignment.*
- long `argument` () const
- Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
- Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FI_Gl_Window` * `as_gl_window` ()
- Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.*
- virtual class `FI_Gl_Window` const * `as_gl_window` () const
- virtual `FI_Group` * `as_group` ()
- Returns an `FI_Group` pointer if this widget is an `FI_Group`.*
- virtual `FI_Group` const * `as_group` () const
- virtual `FI_Window` * `as_window` ()
- Returns an `FI_Window` pointer if this widget is an `FI_Window`.*
- virtual `FI_Window` const * `as_window` () const
- void `bind_deimage` (`FI_Image *img`)
- Sets the image to use as part of the widget label when in the inactive state.*
- void `bind_deimage` (int f)
- Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void `bind_image` (`FI_Image *img`)
- Sets the image to use as part of the widget label when in the active state.*
- void `bind_image` (int f)
- Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- `FI_Boxtype box` () const
- Gets the box type of the widget.*
- void `box` (`FI_Boxtype new_box`)
- Sets the box type for the widget.*
- `FI_Callback_p callback` () const
- Gets the current callback function for the widget.*
- void `callback` (`FI_Callback *cb`)
- Sets the current callback function for the widget.*

- void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
- void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
- void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
- unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
- void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
- void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
- void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
- void `clear_output` ()
 - Sets a widget to accept input.*
- void `clear_visible` ()
 - Hides the widget.*
- void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
- `FI_Color` `color` () const
 - Gets the background color of the widget.*
- void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
- void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
- `FI_Color` `color2` () const
 - For back compatibility only.*
- void `color2` (unsigned a)
 - For back compatibility only.*
- int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
- void `copy_label` (const char *new_label)
 - Sets the current label.*
- void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
- `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
- void `damage` (`uchar` c)
 - Sets the damage bits for the widget.*
- void `damage` (`uchar` c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
- int `damage_resize` (int, int, int, int)
 - Internal use only.*
- void `deactivate` ()
 - Deactivates the widget.*
- `FI_Image` * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
- const `FI_Image` * `deimage` () const

- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage (FI_Image &img)`

Sets the image to use as part of the widget label when in the inactive state.

 - void `deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.

 - int `deimage_bound ()` const

Returns whether the inactive image is managed by the widget.

 - void `do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with default arguments.

 - void `do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.

 - void `do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.

 - void `draw_label (int, int, int, int, FI_Align) const`

Draws the label in an arbitrary bounding box with an arbitrary alignment.

 - int `h ()` const

Gets the widget height.

 - virtual void `hide ()`

Makes a widget invisible.

 - `FI_Image * image ()`

Gets the image that is used as part of the widget label when in the active state.

 - const `FI_Image * image ()` const

Gets the image that is used as part of the widget label when in the active state.

 - void `image (FI_Image &img)`

Sets the image to use as part of the widget label when in the active state.

 - void `image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.

 - int `image_bound ()` const

Returns whether the image is managed by the widget.

 - int `inside (const FI_Widget *wgt) const`

Checks if this widget is a child of wgt.

 - int `is_label_copied ()` const

Returns whether the current label was assigned with `copy_label()`.

 - const char * `label ()` const

Gets the current label text.

 - void `label (const char *text)`

Sets the current label pointer.

 - void `label (FI_Labeltype a, const char *b)`

Shortcut to set the label text and type in one call.

 - `FI_Color labelcolor ()` const

Gets the label color.

 - void `labelcolor (FI_Color c)`

Sets the label color.

 - `FI_Font labelfont ()` const

Gets the font to use.

 - void `labelfont (FI_Font f)`

Sets the font to use.

 - `FI_Fontsize labelsize ()` const

Gets the font size in pixels.

 - void `labelsize (FI_Fontsize pix)`

Sets the font size in pixels.

- [FI_Labeltype labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group * parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group *p](#))
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- [FI_Color selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()
Makes a widget visible.
- void [size](#) (int W, int H)
Changes the size of the widget.
- int [take_focus](#) ()
Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const
Returns if the widget is able to take events.
- int [test_shortcut](#) ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const

- Gets the current tooltip text.*

 - void `tooltip` (const char *text)

Sets the current tooltip text.
- `FI_Window * top_window` () const

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const

Gets the widget type.
- void `type` (uchar t)

Sets the widget type.
- int `use_accents_menu` ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const

Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)

Sets the user data for this widget.
- void `user_data` (void *v)

Sets the user data for this widget.
- unsigned int `visible` () const

Returns whether a widget is visible.
- unsigned int `visible_focus` () const

Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

Modifies keyboard focus navigation.
- int `visible_r` () const

Returns whether a widget and all its parents are visible.
- int `w` () const

Gets the widget width.
- `FI_When when` () const

Returns the conditions under which the callback is called.
- void `when` (uchar i)

Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const

Gets the widget position in its window.
- int `y` () const

Gets the widget position in its window.
- virtual `~FI_Widget` ()

Destroys the widget.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)

The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)

Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)

Returns true if the given text t contains the entered '&x' shortcut.

Static Public Attributes inherited from FI_Input

- static const char * **copy_menu_text** = "Copy"
[this text may be customized at run-time]
- static const char * **cut_menu_text** = "Cut"
[this text may be customized at run-time]
- static const char * **paste_menu_text** = "Paste"
[this text may be customized at run-time]

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
, **OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
, **MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
, **GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }

flags possible values enumeration.

Protected Member Functions inherited from FI_Input

- void **draw** () **FL_OVERRIDE**
Draws the widget.
- int **handle_key** ()
Handles a keystroke.
- int **handle_rmb** ()
Handle right mouse button down events.

Protected Member Functions inherited from FI_Input_

- int **apply_undo** ()
Apply the current undo/redo operation.
- void **drawtext** (int, int, int, int)
Draws the text in the passed bounding box.
- void **drawtext** (int, int, int, int, bool draw_active)
Draws the text in the passed bounding box.
- void **handle_mouse** (int, int, int, int, int keepmark=0)
Handles mouse clicks and mouse moves.
- int **handletext** (int e, int, int, int, int)
Handles all kinds of text field related events.
- int **line_end** (int i) const
Finds the end of a line.
- int **line_start** (int i) const
Finds the start of a line.
- int **linesPerPage** ()
- void **maybe_do_callback** (**FI_Callback_Reason** reason=FL_REASON_UNKNOWN)

- int [up_down_position](#) (int, int keepmark=0)
Moves the cursor to the column given by up_down_pos.
- int [word_end](#) (int i) const
Finds the end of a word.
- int [word_start](#) (int i) const
Finds the start of a word.
- int [xscroll](#) () const
- int [yscroll](#) () const
- void [yscroll](#) (int yOffset)

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int [flags](#) () const
Gets the widget flags mask.
- void [h](#) (int v)
Internal use only.
- void [set_flag](#) (unsigned int c)
Sets a flag in the flags mask.
- void [w](#) (int v)
Internal use only.
- void [x](#) (int v)
Internal use only.
- void [y](#) (int v)
Internal use only.

12.133.1 Member Function Documentation

12.133.1.1 handle()

```
int Fl_Spinner::Fl_Spinner_Input::handle (
    int event ) [virtual]
```

Handles events of [Fl_Spinner](#)'s embedded input widget.

Works like [Fl_Input::handle\(\)](#) but ignores FL_Up and FL_Down keys so they can be handled by the parent widget ([Fl_Spinner](#)).

Reimplemented from [Fl_Input](#).

The documentation for this class was generated from the following files:

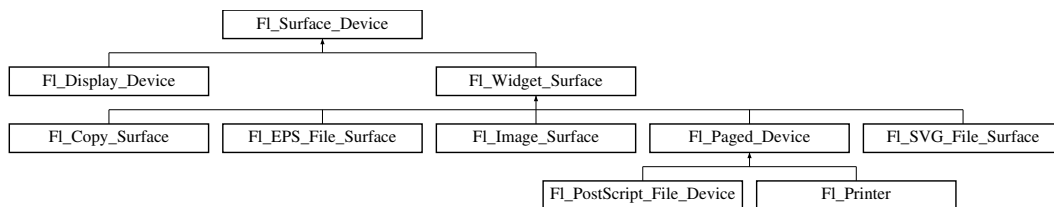
- [Fl_Spinner.H](#)
- [Fl_Spinner.cxx](#)

12.134 Fl_Surface_Device Class Reference

A drawing surface that's susceptible to receive graphical output.

```
#include <Fl_Device.H>
```

Inheritance diagram for [Fl_Surface_Device](#):



Public Member Functions

- [Fl_Graphics_Driver * driver \(\)](#)
Returns the graphics driver of this drawing surface.
- virtual bool [is_current \(\)](#)
Is this surface the current drawing surface?
- virtual void [set_current \(void\)](#)
Make this surface the current drawing surface.
- virtual [~Fl_Surface_Device \(\)](#)
The destructor.

Static Public Member Functions

- static [Fl_Surface_Device * pop_current \(\)](#)
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void [push_current \(Fl_Surface_Device *new_current\)](#)
Pushes new_current on top of the stack of current drawing surfaces, and makes it current.
- static [Fl_Surface_Device * surface \(\)](#)
The current drawing surface.

Protected Member Functions

- void [driver \(Fl_Graphics_Driver *graphics_driver\)](#)
Sets the graphics driver of this drawing surface.
- virtual void [end_current \(\)](#)
FLTK calls this each time a surface ceases to be the current drawing surface.
- [Fl_Surface_Device \(Fl_Graphics_Driver *graphics_driver\)](#)
Constructor that sets the graphics driver to use for the created surface.

12.134.1 Detailed Description

A drawing surface that's susceptible to receive graphical output.

Any FLTK application has at any time a current drawing surface to which all drawing requests are directed. The current surface is given by [Fl_Surface_Device::surface\(\)](#). When `main()` begins running, the current drawing surface has been set to the computer's display, an instance of the [Fl_Display_Device](#) class.

A drawing surface other than the computer's display, is typically used as follows:

1. Create `surface`, an object from a particular [Fl_Surface_Device](#) derived class (e.g., [Fl_Copy_Surface](#), [Fl_Printer](#)).
2. Call `Fl_Surface_Device::push_current(surface)`; to redirect all graphics requests to `surface` which becomes the new current drawing surface (not necessary with classes [Fl_Printer](#) / [Fl_PostScript_File_Device](#) because it is done by [Fl_Paged_Device::begin_page\(\)](#)).
3. At this point all of the [Drawing functions](#) (e.g., `fl_rect()`) or the [Color & Font functions](#) or [Drawing Images](#) functions (e.g., `fl_draw_image()`, [Fl_Image::draw\(\)](#)) operate on the new current drawing surface. Drawing surfaces from [Fl_Widget_Surface](#) derived classes allow additional ways to draw to them (e.g., [Fl_Printer::print_widget\(\)](#), [Fl_Image_Surface::draw\(\)](#)).
4. After all drawing requests have been performed, redirect graphics requests back to their previous destination with `Fl_Surface_Device::pop_current()`; (not necessary with classes [Fl_Printer](#) / [Fl_PostScript_File_Device](#)).
5. Delete `surface`.

For back-compatibility, it is also possible to use the [Fl_Surface_Device::set_current\(\)](#) member function to change the current drawing surface, once to the new surface, once to the previous one.

Class [Fl_Surface_Device](#) can also be derived to define new kinds of graphical output usable with FLTK drawing functions. An example would be to draw to a PDF file. This would require to create a new class, say `PDF_File_Surface`, derived from class [Fl_Surface_Device](#), and another new class, say `PDF_Graphics_Driver`, derived from class [Fl_Graphics_Driver](#). Class `PDF_Graphics_Driver` should implement all virtual methods of the [Fl_Graphics_Driver](#) class to support all FLTK drawing functions and have them draw into PDF files. Alternatively, class `PDF_Graphics_Driver` could implement only some virtual methods, and only part of the FLTK drawing API would be usable when drawing to PDF files.

12.134.2 Member Function Documentation

12.134.2.1 end_current()

```
virtual void Fl_Surface_Device::end_current ( ) [inline], [protected], [virtual]
```

FLTK calls this each time a surface ceases to be the current drawing surface.

This member function is mostly of interest to developers of new [Fl_Surface_Device](#) derived classes. It allows to perform surface-specific operations necessary when this surface ceases to be current. Each implementation should end with a call to [Fl_Surface_Device::end_current\(\)](#).

Reimplemented in [Fl_PostScript_File_Device](#).

12.134.2.2 is_current()

```
bool Fl_Surface_Device::is_current ( ) [virtual]
```

Is this surface the current drawing surface?

Reimplemented in [Fl_Copy_Surface](#), [Fl_Image_Surface](#), and [Fl_Printer](#).

12.134.2.3 pop_current()

```
Fl_Surface_Device * Fl_Surface_Device::pop_current ( ) [static]
```

Removes the top element from the current drawing surface stack, and makes the new top element current.

Returns

A pointer to the new current drawing surface.

See also

[Fl_Surface_Device::push_current\(Fl_Surface_Device *\)](#)

Version

1.4.0

12.134.2.4 push_current()

```
void Fl_Surface_Device::push_current (
    Fl_Surface_Device * new_current ) [static]
```

Pushes `new_current` on top of the stack of current drawing surfaces, and makes it current.

`new_current` will receive all future graphics requests.

Any call to [push_current\(\)](#) must be matched by a subsequent call to [Fl_Surface_Device::pop_current\(\)](#). The max height of this stack is 16.

Version

1.4.0

12.134.2.5 set_current()

```
void Fl_Surface_Device::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests. Starting from FLTK 1.4.0, the preferred API to change the current drawing surface is [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Note

It's recommended to use this function only as follows :

- The current drawing surface is the display;
- make current another surface, e.g., an [Fl_Printer](#) or an [Fl_Image_Surface](#) object, calling [set_current\(\)](#) on this object;
- draw to that surface;
- make the display current again with [Fl_Display_Device::display_device\(\)->set_current\(\)](#); . Don't do any other call to [set_current\(\)](#) before this one.

Other scenarios of drawing surface changes should be performed via [Fl_Surface_Device::push_current\(\)](#) / [Fl_Surface_Device::pop_current\(\)](#).

Reimplemented in [Fl_Copy_Surface](#), [Fl_Image_Surface](#), [Fl_PostScript_File_Device](#), and [Fl_Printer](#).

12.134.2.6 surface()

```
static Fl_Surface_Device * Fl_Surface_Device::surface ( ) [inline], [static]
```

The current drawing surface.

In other words, the [Fl_Surface_Device](#) object that currently receives all graphics requests.

Note

It's possible to transiently remove the GUI scaling factor in place in the current drawing surface with [fl_override_scale\(\)](#).

The documentation for this class was generated from the following files:

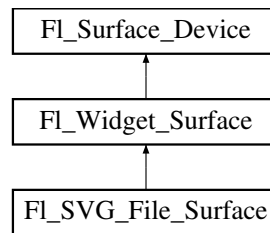
- [Fl_Device.H](#)
- [Fl_Device.cxx](#)

12.135 Fl_SVG_File_Surface Class Reference

A drawing surface producing a Scalable Vector Graphics (SVG) file.

```
#include <Fl_SVG_File_Surface.H>
```

Inheritance diagram for Fl_SVG_File_Surface:



Public Member Functions

- int [close](#) ()
Closes the FILE pointer where SVG data is output.
- FILE * [file](#) ()
Returns the underlying FILE pointer.
- [Fl_SVG_File_Surface](#) (int width, int height, FILE *svg, int(*closef)(FILE *)=NULL)
Constructor of the SVG drawing surface.
- void [origin](#) (int *x, int *y) [FL_OVERRIDE](#)
Computes the coordinates of the current origin of graphics functions.
- void [origin](#) (int x, int y) [FL_OVERRIDE](#)
Sets the position of the origin of graphics in the drawable part of the drawing surface.
- int [printable_rect](#) (int *w, int *h) [FL_OVERRIDE](#)
Computes the width and height of the drawable area of the drawing surface.
- void [translate](#) (int x, int y) [FL_OVERRIDE](#)
Translates the current graphics origin accounting for the current rotation.
- void [untranslate](#) () [FL_OVERRIDE](#)
Undoes the effect of a previous [translate\(\)](#) call.
- [~Fl_SVG_File_Surface](#) ()
Destructor.

Public Member Functions inherited from [Fl_Widget_Surface](#)

- void [draw](#) ([Fl_Widget](#) *widget, int delta_x=0, int delta_y=0)
Draws the widget on the drawing surface.
- void [draw_decorated_window](#) ([Fl_Window](#) *win, int x_offset=0, int y_offset=0)
Draws a window with its title bar and frame if any.
- void [print_window_part](#) ([Fl_Window](#) *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Draws a rectangular part of an on-screen window.

Public Member Functions inherited from [Fl_Surface_Device](#)

- [Fl_Graphics_Driver](#) * [driver](#) ()
Returns the graphics driver of this drawing surface.
- virtual bool [is_current](#) ()
Is this surface the current drawing surface?
- virtual void [set_current](#) (void)
Make this surface the current drawing surface.
- virtual [~Fl_Surface_Device](#) ()
The destructor.

Additional Inherited Members

Static Public Member Functions inherited from Fl_Surface_Device

- static [Fl_Surface_Device](#) * [pop_current](#) ()
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static void [push_current](#) ([Fl_Surface_Device](#) *[new_current](#))
Pushes [new_current](#) on top of the stack of current drawing surfaces, and makes it current.
- static [Fl_Surface_Device](#) * [surface](#) ()
The current drawing surface.

Protected Member Functions inherited from Fl_Widget_Surface

- [Fl_Widget_Surface](#) ([Fl_Graphics_Driver](#) *[d](#))
The constructor.

Protected Member Functions inherited from Fl_Surface_Device

- void [driver](#) ([Fl_Graphics_Driver](#) *[graphics_driver](#))
Sets the graphics driver of this drawing surface.
- virtual void [end_current](#) ()
FLTK calls this each time a surface ceases to be the current drawing surface.
- [Fl_Surface_Device](#) ([Fl_Graphics_Driver](#) *[graphics_driver](#))
Constructor that sets the graphics driver to use for the created surface.

Protected Attributes inherited from Fl_Widget_Surface

- int [x_offset](#)
horizontal offset to the origin of graphics coordinates
- int [y_offset](#)
vertical offset to the origin of graphics coordinates

12.135.1 Detailed Description

A drawing surface producing a Scalable Vector Graphics (SVG) file.

This drawing surface allows to store any FLTK graphics in vectorial form in a "Scalable Vector Graphics" file.

Usage example:

```
Fl_Window *win = ...// Window to draw to a .svg file
int ww = win->decorated_w();
int wh = win->decorated_h();
FILE *svg = fl_fopen("/path/to/mywindow.svg", "w");
if (svg) {
    Fl_SVG_File_Surface *surface = new Fl_SVG_File_Surface(ww, wh, svg);
    Fl_Surface_Device::push_current(surface);
    fl_color(FL_WHITE);
    fl_rectf(0, 0, ww, wh);
    surface->draw_decorated_window(win);
    Fl_Surface_Device::pop_current();
    delete surface; // the .svg file is not complete until the destructor was run
    fclose(svg);
}
```

Note

FLTK uses the PNG and JPEG libraries to encode images to the SVG format. For this reason, class [Fl_SVG_File_Surface](#) is placed in the `fltk_images` library. If JPEG is not available at application build time, PNG is enough (but produces a quite larger output). If PNG isn't available either, images don't appear in the SVG output.

12.135.2 Constructor & Destructor Documentation

12.135.2.1 Fl_SVG_File_Surface()

```
Fl_SVG_File_Surface::Fl_SVG_File_Surface (
    int width,
    int height,
    FILE * svg,
    int(*) (FILE *) closef = NULL )
```

Constructor of the SVG drawing surface.

Parameters

<i>width,height</i>	Width and height of the graphics area in FLTK drawing units
<i>svg</i>	A writable FILE pointer where the SVG data are to be sent. The resulting SVG data are not complete until after destruction of the Fl_SVG_File_Surface object or after calling close() .
<i>closef</i>	If not NULL, the destructor and close() will call <code>closef(svg)</code> after all SVG data has been sent. If NULL, <code>fclose(svg)</code> is called instead. This allows to close the FILE pointer by, e.g., <code>pclose</code> , or, using a function such as <code>"int keep_open(FILE*) {return 0;}"</code> , to keep it open after completion of all output to <i>svg</i> . Function <code>closef</code> should return non zero to indicate an error.

12.135.2.2 ~Fl_SVG_File_Surface()

```
Fl_SVG_File_Surface::~~Fl_SVG_File_Surface ( )
```

Destructor.

The underlying FILE pointer is processed as by [close\(\)](#).

12.135.3 Member Function Documentation

12.135.3.1 close()

```
int Fl_SVG_File_Surface::close ( )
```

Closes the FILE pointer where SVG data is output.

The underlying FILE is closed by function `fclose()` unless another function was set at object's construction time. The only operation possible after this on the [Fl_SVG_File_Surface](#) object is its destruction.

Returns

The value returned by the closing function call.

12.135.3.2 origin() [1/2]

```
void Fl_SVG_File_Surface::origin (
    int * x,
    int * y ) [virtual]
```

Computes the coordinates of the current origin of graphics functions.

Parameters

out	<i>x,y</i>	If non-null, <i>*x</i> and <i>*y</i> are set to the horizontal and vertical coordinates of the graphics origin.
-----	------------	---

Reimplemented from [Fl_Widget_Surface](#).

12.135.3.3 origin() [2/2]

```
void Fl_SVG_File_Surface::origin (
    int x,
```

```
int y ) [virtual]
```

Sets the position of the origin of graphics in the drawable part of the drawing surface.

Arguments should be expressed relatively to the result of a previous `printable_rect()` call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the drawable area. Successive `origin()` calls don't combine their effects. `Origin()` calls are not affected by `rotate()` calls (for classes derived from `FI_Paged_Device`).

Parameters

in	x,y	Horizontal and vertical positions in the drawing surface of the desired origin of graphics.
----	-----	---

Reimplemented from [FI_Widget_Surface](#).

12.135.3.4 printable_rect()

```
int Fl_SVG_File_Surface::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the drawable area of the drawing surface.

Values are in the same unit as that used by FLTK drawing functions and are unchanged by calls to `origin()`. If the object is derived from class `FI_Paged_Device`, values account for the user-selected paper type and print orientation and are changed by `scale()` calls.

Returns

0 if OK, non-zero if any error

Reimplemented from [FI_Widget_Surface](#).

12.135.3.5 translate()

```
void Fl_SVG_File_Surface::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

Each `translate()` call must be matched by an `untranslate()` call. Successive `translate()` calls add up their effects.

Reimplemented from [FI_Widget_Surface](#).

12.135.3.6 untranslate()

```
void Fl_SVG_File_Surface::untranslate (
    void ) [virtual]
```

Undoes the effect of a previous `translate()` call.

Reimplemented from [FI_Widget_Surface](#).

The documentation for this class was generated from the following file:

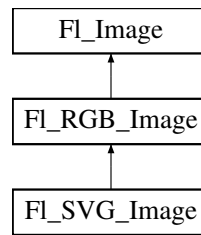
- `FI_SVG_File_Surface.H`

12.136 FI_SVG_Image Class Reference

The [FI_SVG_Image](#) class supports loading, caching and drawing of scalable vector graphics (SVG) images.

```
#include <Fl_SVG_Image.H>
```

Inheritance diagram for `FI_SVG_Image`:



Public Member Functions

- [FI_SVG_Image * as_svg_image \(\)](#) [FL_OVERRIDE](#)
Returns whether an image is an [FI_SVG_Image](#) or not.
- void [color_average \(FI_Color c, float i\)](#) [FL_OVERRIDE](#)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [FI_Image * copy \(\)](#) const
- [FI_Image * copy \(int W, int H\)](#) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void [desaturate \(\)](#) [FL_OVERRIDE](#)
The [desaturate\(\)](#) method converts an image to grayscale.
- void [draw \(int X, int Y\)](#)
- void [draw \(int X, int Y, int W, int H, int cx=0, int cy=0\)](#) [FL_OVERRIDE](#)
Draws the image to the current drawing surface with a bounding box.
- [FI_SVG_Image \(const char *filename\)](#)
Load an SVG image from a file.
- [FI_SVG_Image \(const char *sharedname, const char *svg_data\)](#)
Load an SVG image from memory.
- [FI_SVG_Image \(const char *sharedname, const unsigned char *svg_data, size_t length\)](#)
Load an SVG image from memory.
- void [normalize \(\)](#) [FL_OVERRIDE](#)
Makes sure the object is fully initialized.
- void [resize \(int width, int height\)](#)
Have the svg data (re-)rasterized using the given width and height values.
- virtual [~FI_SVG_Image \(\)](#)
The destructor frees all memory and server resources that are used by the SVG image.

Public Member Functions inherited from [FI_RGB_Image](#)

- int [cache_h \(\)](#)
- int [cache_w \(\)](#)
- [FI_Image * copy \(\)](#) const
- void [draw \(int X, int Y\)](#)
- [FI_RGB_Image \(const FI_Pixmap *pxm, FI_Color bg=FL_GRAY\)](#)
The constructor creates a new RGBA image from the specified [FI_Pixmap](#).
- [FI_RGB_Image \(const uchar *bits, int bits_length, int W, int H, int D, int LD\)](#)
The constructor creates a new image from the specified data.
- [FI_RGB_Image \(const uchar *bits, int W, int H, int D=3, int LD=0\)](#)
The constructor creates a new image from the specified data.
- void [label \(FI_Menu_Item *m\)](#) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a menu item.
- void [label \(FI_Widget *w\)](#) [FL_OVERRIDE](#)
This method is an obsolete way to set the image attribute of a widget or menu item.
- void [uncache \(\)](#) [FL_OVERRIDE](#)

If the image has been cached for display, delete the cache data.

- `~FI_RGB_Image ()` [FL_OVERRIDE](#)

The destructor frees all memory and server resources that are used by the image.

Public Member Functions inherited from [FI_Image](#)

- virtual class [FI_Shared_Image](#) * `as_shared_image ()`
Returns whether an image is an [FI_Shared_Image](#) or not.
- [FI_Image](#) * `copy ()` const
Creates a copy of the image in the same size.
- int `count ()` const
Returns the number of data values associated with the image.
- int `d ()` const
Returns the image depth.
- const char *const * `data ()` const
Returns a pointer to the current image data array.
- int `data_h ()` const
Returns the height of the image data.
- int `data_w ()` const
Returns the width of the image data.
- void `draw (int X, int Y)`
Draws the image to the current drawing surface.
- int `fail ()` const
Returns a value that is not 0 if there is currently no image available.
- [FI_Image](#) (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int `h ()` const
Returns the current image drawing height in FLTK units.
- void `inactive ()`
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- int `ld ()` const
Returns the current line data size in bytes.
- virtual void `release ()`
Releases an [FI_Image](#) - the same as 'delete this'.
- virtual void `scale (int width, int height, int proportional=1, int can_expand=0)`
Sets the drawing size of the image.
- int `w ()` const
Returns the current image drawing width in FLTK units.
- virtual `~FI_Image ()`
The destructor is a virtual method that frees all memory used by the image.

Public Attributes

- bool `proportional`
Set this to `false` to allow image re-scaling that alters the image aspect ratio.

Public Attributes inherited from [FI_RGB_Image](#)

- int `alloc_array`
If non-zero, the object's data array is delete[]'d when deleting the object.
- const uchar * `array`
Points to the start of the object's data array.

Additional Inherited Members

Static Public Member Functions inherited from [FI_RGB_Image](#)

- static `size_t` [max_size](#) ()
Returns the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.
- static void [max_size](#) (`size_t` size)
Sets the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.

Static Public Member Functions inherited from [FI_Image](#)

- static `FI_Labeltype` [define_FL_IMAGE_LABEL](#) ()
- static `FI_RGB_Scaling` [RGB_scaling](#) ()
Returns the currently used RGB image scaling method.
- static void [RGB_scaling](#) (`FI_RGB_Scaling`)
Sets the RGB image scaling method used for copy(int, int).
- static `FI_RGB_Scaling` [scaling_algorithm](#) ()
Gets what algorithm is used when resizing a source image to draw it.
- static void [scaling_algorithm](#) (`FI_RGB_Scaling` algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Static Public Attributes inherited from [FI_Image](#)

- static const int `ERR_FILE_ACCESS` = -2
- static const int `ERR_FORMAT` = -3
- static const int `ERR_MEMORY_ACCESS` = -4
- static const int `ERR_NO_IMAGE` = -1
- static bool `register_images_done` = false
True after [fi_register_images\(\)](#) was called, false before.

Protected Member Functions inherited from [FI_Image](#)

- void `d` (int D)
Sets the current image depth.
- void `data` (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void `draw_empty` (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int `draw_scaled` (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void `h` (int H)
Sets the height of the image data.
- void `ld` (int LD)
Sets the current line data size in bytes.
- void `w` (int W)
Sets the width of the image data.

Static Protected Member Functions inherited from [FI_Image](#)

- static void `labeltype` (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void `measure` (const [FI_Label](#) *lo, int &lw, int &lh)

12.136.1 Detailed Description

The `Fl_SVG_Image` class supports loading, caching and drawing of scalable vector graphics (SVG) images. The FLTK library performs parsing and rasterization of SVG data using a modified version of the `nanosvg` software (<https://github.com/memononen/nanosvg>). The software modification allows the option to change the image ratio while performing rasterization.

Use `Fl_Image::fail()` to check if the `Fl_SVG_Image` failed to load. `fail()` returns `ERR_FILE_ACCESS` if the file could not be opened or read, and `ERR_FORMAT` if the SVG format could not be decoded. If the image has loaded correctly, `w()`, `h()`, and `d()` should return values greater than zero.

Rasterization is not done until the image is first drawn or `resize()` or `normalize()` is called. Therefore, `array` is NULL until then. The delayed rasterization ensures an `Fl_SVG_Image` is always rasterized to the exact screen resolution at which it is drawn.

The `Fl_SVG_Image` class draws images computed by `nanosvg` with the following known limitations

- text between `<text>` and `</text>` marks,
- image elements, and
- `<use>` statements

are not rendered.

The FLTK library can optionally be built without SVG support; in that case, class `Fl_SVG_Image` is unavailable.

Example of displaying a hard-coded svg file:

```
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Box.H>
#include <FL/Fl_SVG_Image.H>

// A black rotated rectangle
const char *svg_data = "<svg viewBox=\"0 0 200 200\" version = \"1.1\">\n"
    "<rect x=\"25\" y=\"50\" width=\"150\" height=\"100\" fill=\"black\" \"\n"
    "transform=\"rotate(45 100 100)\"> </svg>\n";

int main(int argc, char **argv) {
    Fl_SVG_Image *svg = new Fl_SVG_Image(0, svg_data); // create SVG object
    Fl_Window *win = new Fl_Window(720, 486, "svg test");
    Fl_Box *box = new Fl_Box(0, 0, win->w(), win->h());
    box->image(svg); // assign svg object to Fl_Box
    win->end();
    win->show(argc, argv);
    return(Fl::run());
}
```

Example of displaying an svg image from a file:

```
#include <errno.h> // errno
#include <string.h> // strerror
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Box.H>
#include <FL/Fl_SVG_Image.H>
#include <FL/fl_message.H>

int main(int argc, char **argv) {
    Fl_Window *win = new Fl_Window(720, 486, "svg test");
    Fl_Box *box = new Fl_Box(0, 0, win->w(), win->h());

    // Load svg image from disk, assign to a box
    const char *svgpath = "/var/tmp/simple.svg";
    Fl_SVG_Image *svg = new Fl_SVG_Image(svgpath); // load SVG object from disk
    switch (svg->fail()) {
        case Fl_Image::ERR_FILE_ACCESS:
            // File couldn't load? show path + os error to user
            fl_alert("%s: %s", svgpath, strerror(errno));
            return 1;
        case Fl_Image::ERR_FORMAT:
            // Parsing error
            fl_alert("%s: couldn't decode image", svgpath);
            return 1;
    }
    box->image(svg); // assign svg object to box

    win->end();
    win->show(argc, argv);
    return(Fl::run());
}
```

Example of fitting an svg image to a resizable `Fl_Box`:

```
#include <FL/Fl_Window.H>
#include <FL/Fl_SVG_Image.H>
#include <FL/Fl_Box.H>

class resizable_box : public Fl_Box {
```

```

public:
    resizable_box(int w, int h) : Fl_Box(0, 0, w, h, NULL) {}
    virtual void resize(int x, int y, int w, int h) {
        image()->scale(w, h, 1, 1); // p3 = proportional, p4 = can_expand
        Fl_Box::resize(x, y, w, h);
    }
};

int main(int argc, char **argv) {
    Fl_Window *win = new Fl_Window(130, 130);
    resizable_box *box = new resizable_box(win->w(), win->h());
    Fl_SVG_Image *svg = new Fl_SVG_Image("/path/to/image.svg");
    box->image(svg);
    svg->scale(box->w(), box->h());
    win->end();
    win->resizable(win);
    win->show(argc, argv);
    return Fl::run();
}

```

12.136.2 Constructor & Destructor Documentation

12.136.2.1 Fl_SVG_Image() [1/3]

```

Fl_SVG_Image::Fl_SVG_Image (
    const char * filename )

```

Load an SVG image from a file.

This constructor loads the SVG image from a .svg or .svgz file. The reader recognizes if the data is compressed, and decompresses it if zlib is available (HAVE_LIBZ).

Parameters

<i>filename</i>	the filename for a .svg or .svgz file
-----------------	---------------------------------------

12.136.2.2 Fl_SVG_Image() [2/3]

```

Fl_SVG_Image::Fl_SVG_Image (
    const char * sharedname,
    const char * svg_data )

```

Load an SVG image from memory.

This constructor loads the SVG image from a block of memory. This version is commonly used for uncompressed text data, but the reader recognizes if the data is compressed, and decompresses it if zlib is available (HAVE_LIBZ).

Parameters

<i>sharedname</i>	if not NULL, a shared image will be generated with this name
<i>svg_data</i>	a pointer to the memory location of the SVG image data

Note

In-memory SVG data is parsed by the object constructor and is no longer needed after construction.

12.136.2.3 Fl_SVG_Image() [3/3]

```

Fl_SVG_Image::Fl_SVG_Image (
    const char * name,
    const unsigned char * svg_data,
    size_t length )

```

Load an SVG image from memory.

This constructor loads the SVG image from a block of memory. This version is commonly used for compressed binary data, but the reader recognizes if the data is uncompressed, and reads it as a text block.

Parameters

<i>name</i>	if not NULL, a shared image will be generated with this name
<i>svg_data</i>	a pointer to the memory location of the SVG image data
<i>length</i>	of <i>svg_data</i> or 0 if the length is unknown. This will protect memory outside of the <i>svg_data</i> array from illegal read operations for compressed SVG data

Note

In-memory SVG data is parsed by the object constructor and is no longer needed after construction.

12.136.3 Member Function Documentation

12.136.3.1 as_svg_image()

```
Fl_SVG_Image * Fl_SVG_Image::as_svg_image ( ) [inline], [virtual]
```

Returns whether an image is an [Fl_SVG_Image](#) or not.

This virtual method returns a pointer to the [Fl_SVG_Image](#) if this object is an instance of [Fl_SVG_Image](#) or NULL if not.

Reimplemented from [Fl_RGB_Image](#).

12.136.3.2 color_average()

```
void Fl_SVG_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.

The first argument specifies the FLTK color to be used.

The second argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_RGB_Image](#).

12.136.3.3 copy()

```
Fl_Image * Fl_SVG_Image::copy (
    int W,
    int H ) const [virtual]
```

Creates a resized copy of the image.

The new image should be released when you are done with it.

Note: since FLTK 1.4.0 you can use [Fl_Image::release\(\)](#) for all types of images (i.e. all subclasses of [Fl_Image](#)) instead of operator *delete* for [Fl_Image](#)'s and [Fl_Image::release\(\)](#) for [Fl_Shared_Image](#)'s.

The new image data will be converted to the requested size. RGB images are resized using the algorithm set by [Fl_Image::RGB_scaling\(\)](#).

For the new image the following equations are true:

- $w() == \text{data_}w() == \bar{W}$
- $h() == \text{data_}h() == H$

Parameters

in	<i>W,H</i>	Requested width and height of the new image
----	------------	---

Note

The returned image can be safely cast to the same image type as that of the source image provided this type is one of [Fl_RGB_Image](#), [Fl_SVG_Image](#), [Fl_Pixmap](#), [Fl_Bitmap](#), [Fl_Tiled_Image](#), [Fl_Anim_GIF_Image](#) and [Fl_Shared_Image](#). Returned objects copied from images of other, derived, image classes belong to the parent class appearing in this list. For example, the copy of an [Fl_GIF_Image](#) is an object of class [Fl_Pixmap](#).

Since FLTK 1.4.0 this method is 'const'. If you derive your own class from [Fl_Image](#) or any subclass your overridden methods of '[Fl_Image::copy\(\) const](#)' and '[Fl_Image::copy\(int, int\) const](#)' **must** also be 'const' for inheritance to work properly. This is different than in FLTK 1.3.x and earlier where these methods have not been 'const'.

Reimplemented from [Fl_RGB_Image](#).

12.136.3.4 desaturate()

```
void Fl_SVG_Image::desaturate ( ) [virtual]
```

The [desaturate\(\)](#) method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_RGB_Image](#).

12.136.3.5 draw()

```
void Fl_SVG_Image::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image to the current drawing surface with a bounding box.

Arguments X, Y, W, H specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the cx and cy arguments.

In other words: `fl_push_clip(X,Y,W,H)` is applied, the image is drawn with its upper-left corner at X-cx, Y-cy and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from [Fl_RGB_Image](#).

12.136.3.6 normalize()

```
void Fl_SVG_Image::normalize ( ) [virtual]
```

Makes sure the object is fully initialized.

This function rasterizes the SVG image, and consequently initializes its [array](#) member, if that was not done before.

Reimplemented from [Fl_RGB_Image](#).

12.136.3.7 resize()

```
void Fl_SVG_Image::resize (
    int width,
    int height )
```

Have the svg data (re-)rasterized using the given width and height values.

By default, the resulting image w() and h() will be close to width and height while preserving the width/height ratio of the SVG data. If [proportional](#) was set to false, the image is rasterized to the exact width and height values. In both cases, [data_w\(\)](#) and [data_h\(\)](#) values are set to w() and h(), respectively.

12.136.4 Member Data Documentation**12.136.4.1 proportional**

```
bool Fl_SVG_Image::proportional
```

Set this to `false` to allow image re-scaling that alters the image aspect ratio.

Upon object creation, `proportional` is set to `true`, and the aspect ratio is kept constant.

The documentation for this class was generated from the following files:

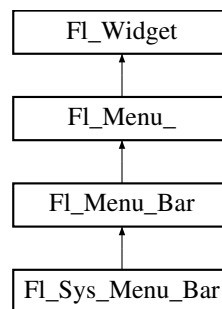
- `Fl_SVG_Image.H`
- `Fl_SVG_Image.cxx`

12.137 Fl_Sys_Menu_Bar Class Reference

A class to create and modify menus that appear on macOS in the menu bar at the top of the screen.

```
#include <Fl_Sys_Menu_Bar.H>
```

Inheritance diagram for `Fl_Sys_Menu_Bar`:



Public Types

- enum `window_menu_style_enum` { `no_window_menu` = 0, `tabbing_mode_none`, `tabbing_mode_automatic`, `tabbing_mode_preferred` }

Possible styles of the Window menu in the system menu bar.

Public Member Functions

- int `add` (const char *label, const char *shortcut, `Fl_Callback` *cb, void *user_data=0, int flags=0)
Adds a new menu item.
- int `add` (const char *label, int shortcut, `Fl_Callback` *, void *user_data=0, int flags=0)
Add a new menu item to the system menu bar.
- int `add` (const char *str)
Forms-compatible procedure to add items to the system menu bar.
- void `clear` ()
Set the `Fl_Menu_Item` array pointer to null, indicating a zero-length menu.
- int `clear_submenu` (int index)
Clears the specified submenu pointed to by index of all menu items.
- `Fl_Sys_Menu_Bar` (int x, int y, int w, int h, const char *l=0)
The constructor.
- int `insert` (int index, const char *label, const char *shortcut, `Fl_Callback` *cb, void *user_data=0, int flags=0)
Insert a new menu item.
- int `insert` (int index, const char *label, int shortcut, `Fl_Callback` *cb, void *user_data=0, int flags=0)
insert in the system menu bar a new menu item
- const `Fl_Menu_Item` * `menu` () const
Return the system menu's array of `Fl_Menu_Item`'s.
- void `menu` (const `Fl_Menu_Item` *m)
create a system menu bar using the given list of menu structs
- int `mode` (int i) const
Gets the flags of item i.

- void **mode** (int i, int fl)
Sets the flags of item i.
- void **remove** (int n)
remove an item from the system menu bar
- void **replace** (int index, const char *name)
rename an item from the system menu bar
- void **setonly** (FI_Menu_Item *item)
Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.
- void **shortcut** (int i, int s)
Changes the shortcut of item i to n.
- void **update** () **FL_OVERRIDE**
Updates the menu bar after any change to its items.
- virtual ~**FI_Sys_Menu_Bar** ()
The destructor.

Public Member Functions inherited from **FI_Menu_Bar**

- **FI_Menu_Bar** (int X, int Y, int W, int H, const char *l=0)
Creates a new FI_Menu_Bar widget using the given position, size, and label string.
- int **handle** (int) **FL_OVERRIDE**
Handles the specified event.

Public Member Functions inherited from **FI_Menu_**

- int **add** (const char *)
This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.
- int **add** (const char *, int shortcut, FI_Callback *, void *=0, int=0)
Adds a new menu item.
- int **add** (const char *a, const char *b, FI_Callback *c, void *d=0, int e=0)
See int FI_Menu_::add(const char label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)*
- void **clear** ()
Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.
- int **clear_submenu** (int index)
Clears the specified submenu pointed to by index of all menu items.
- void **copy** (const FI_Menu_Item *m, void *user_data=0)
Sets the menu array pointer with a copy of m that will be automatically deleted.
- **FI_Boxtype down_box** () const
This box type is used to surround the currently-selected items in the menus.
- void **down_box** (FI_Boxtype b)
Sets the box type used to surround the currently-selected items in the menus.
- **FI_Color down_color** () const
For back compatibility, same as selection_color()
- void **down_color** (unsigned c)
For back compatibility, same as selection_color()
- int **find_index** (const char *name) const
Find the menu item index for a given menu pathname, such as "Edit/Copy".
- int **find_index** (const FI_Menu_Item *item) const
Find the index into the menu array for a given item.
- int **find_index** (FI_Callback *cb) const
Find the index into the menu array for a given callback cb.
- const **FI_Menu_Item * find_item** (const char *name)

- Find the menu item for a given menu `pathname`, such as "Edit/Copy".*

 - const `FI_Menu_Item * find_item (FI_Callback *)`
- Find the menu item for the given callback `cb`.*

 - const `FI_Menu_Item * find_item_with_argument (long)`
- Find the menu item for the given user argument `v`.*

 - const `FI_Menu_Item * find_item_with_user_data (void *)`
- Find the menu item for the given user data `v`.*

 - `FI_Menu_ (int, int, int, int, const char * = 0)`
- Creates a new `FI_Menu_` widget using the given position, size, and label string.*

 - void `global ()`
- Make the shortcuts for this menu work no matter what window has the focus when you type it.*

 - int `insert (int index, const char *, int shortcut, FI_Callback *, void * = 0, int = 0)`
- Inserts a new menu item at the specified `index` position.*

 - int `insert (int index, const char *a, const char *b, FI_Callback *c, void *d = 0, int e = 0)`
- See int `FI_Menu_::insert(const char* label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)`*

 - int `item_pathname (char *name, int namelen, const FI_Menu_Item *finditem = 0) const`
- Get the menu 'pathname' for the specified menuitem.*

 - const `FI_Menu_Item * menu () const`
- Returns a pointer to the array of `FI_Menu_Items`.*

 - void `menu (const FI_Menu_Item *m)`
- Sets the menu array pointer directly.*

 - `FI_Boxtype menu_box () const`
- Get the box type for the menu popup windows.*

 - void `menu_box (FI_Boxtype b)`
- Set the box type for the menu popup windows.*

 - const `FI_Menu_Item * menu_end ()`
- Finishes menu modifications and returns `menu()`.*

 - int `mode (int i) const`
- Gets the flags of item `i`.*

 - void `mode (int i, int fl)`
- Sets the flags of item `i`.*

 - const `FI_Menu_Item * mvalue () const`
- Returns a pointer to the last menu item that was picked.*

 - const `FI_Menu_Item * picked (const FI_Menu_Item *)`
- When user picks a menu item, call this.*

 - const `FI_Menu_Item * prev_mvalue () const`
- Returns a pointer to the menu item that was picked before the current one was picked.*

 - void `remove (int)`
- Deletes item `i` from the menu.*

 - void `replace (int, const char *)`
- Changes the text of item `i`.*

 - void `setonly (FI_Menu_Item *item)`
- Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.*

 - void `shortcut (int i, int s)`
- Changes the shortcut of item `i` to `s`.*

 - int `size () const`
- This returns the number of `FI_Menu_Item` structures that make up the menu, correctly counting submenus.*

 - void `size (int W, int H)`
- Returns the menu item with the entered shortcut (key value).*

 - const `FI_Menu_Item * test_shortcut ()`
- Returns the menu item with the entered shortcut (key value).*

 - const `char * text () const`

- Returns the title of the last item chosen.*

 - const char * **text** (int i) const

Returns the title of item i.
- **FI_Color** **textcolor** () const

Get the current color of menu item labels.
- void **textcolor** (**FI_Color** c)

Sets the current color of menu item labels.
- **FI_Font** **textfont** () const

Gets the current font of menu item labels.
- void **textfont** (**FI_Font** c)

Sets the current font of menu item labels.
- **FI_Fontsize** **textsize** () const

Gets the font size of menu item labels.
- void **textsize** (**FI_Fontsize** c)

Sets the font size of menu item labels.
- int **value** () const

Returns the index into menu() of the last item chosen by the user.
- int **value** (const **FI_Menu_Item** *)

The value is the index into menu() of the last item chosen by the user.
- int **value** (int i)

The value is the index into menu() of the last item chosen by the user.

Public Member Functions inherited from **FI_Widget**

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- **FI_Align** **align** () const
 - Gets the label alignment.*
- void **align** (**FI_Align** alignment)
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class **FI_GI_Window** * **as_gl_window** ()
 - Returns an **FI_GI_Window** pointer if this widget is an **FI_GI_Window**.*
- virtual class **FI_GI_Window** const * **as_gl_window** () const
- virtual **FI_Group** * **as_group** ()
 - Returns an **FI_Group** pointer if this widget is an **FI_Group**.*
- virtual **FI_Group** const * **as_group** () const
- virtual **FI_Window** * **as_window** ()
 - Returns an **FI_Window** pointer if this widget is an **FI_Window**.*
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (**FI_Image** *img)
 - Sets the image to use as part of the widget label when in the inactive state.*

- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- FI_Boxtype `box` () const
Gets the box type of the widget.
- void `box` (FI_Boxtype new_box)
Sets the box type for the widget.
- FI_Callback_p `callback` () const
Gets the current callback function for the widget.
- void `callback` (FI_Callback *cb)
Sets the current callback function for the widget.
- void `callback` (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void `callback` (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void `callback` (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void `callback` (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- FI_Color `color` () const
Gets the background color of the widget.
- void `color` (FI_Color bg)
Sets the background color of the widget.
- void `color` (FI_Color bg, FI_Color sel)
Sets the background and selection color of the widget.
- FI_Color `color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const FI_Widget *w) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)

- Sets the current tooltip text.*

 - `uchar damage () const`

Returns non-zero if `draw()` needs to be called.
 - `void damage (uchar c)`

Sets the damage bits for the widget.
 - `void damage (uchar c, int x, int y, int w, int h)`

Sets the damage bits for an area inside the widget.
 - `int damage_resize (int, int, int, int)`

Internal use only.
 - `void deactivate ()`

Deactivates the widget.
 - `FI_Image * deimage ()`

Gets the image that is used as part of the widget label when in the inactive state.
 - `const FI_Image * deimage () const`

Gets the image that is used as part of the widget label when in the inactive state.
 - `void deimage (FI_Image &img)`

Sets the image to use as part of the widget label when in the inactive state.
 - `void deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
 - `int deimage_bound () const`

Returns whether the inactive image is managed by the widget.
 - `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with default arguments.
 - `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
 - `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
 - `void draw_label (int, int, int, int, FI_Align) const`

Draws the label in an arbitrary bounding box with an arbitrary alignment.
 - `int h () const`

Gets the widget height.
 - `virtual void hide ()`

Makes a widget invisible.
 - `FI_Image * image ()`

Gets the image that is used as part of the widget label when in the active state.
 - `const FI_Image * image () const`

Gets the image that is used as part of the widget label when in the active state.
 - `void image (FI_Image &img)`

Sets the image to use as part of the widget label when in the active state.
 - `void image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.
 - `int image_bound () const`

Returns whether the image is managed by the widget.
 - `int inside (const FI_Widget *wgt) const`

Checks if this widget is a child of `wgt`.
 - `int is_label_copied () const`

Returns whether the current label was assigned with `copy_label()`.
 - `const char * label () const`

Gets the current label text.
 - `void label (const char *text)`

Sets the current label pointer.

- void `label` (`FI_Labeltype` a, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color` `labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font` `labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool` needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () `const`
Returns if a widget is used for output only.
- `FI_Group` * `parent` () `const`
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (`int` X, `int` Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (`int` x, `int` y, `int` w, `int` h)
Changes the size or position of the widget.
- `FI_Color` `selection_color` () `const`
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()

- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
 - void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
 - virtual void `show` ()
Makes a widget visible.
 - void `size` (int W, int H)
Changes the size of the widget.
 - int `take_focus` ()
Gives the widget the keyboard focus.
 - unsigned int `takeevents` () const
Returns if the widget is able to take events.
 - int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
 - const char * `tooltip` () const
Gets the current tooltip text.
 - void `tooltip` (const char *text)
Sets the current tooltip text.
 - `Fl_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
 - `Fl_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
 - `uchar` `type` () const
Gets the widget type.
 - void `type` (`uchar` t)
Sets the widget type.
 - int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
 - void * `user_data` () const
Gets the user data for this widget.
 - void `user_data` (`Fl_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
 - void `user_data` (void *v)
Sets the user data for this widget.
 - unsigned int `visible` () const
Returns whether a widget is visible.
 - unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
 - void `visible_focus` (int v)
Modifies keyboard focus navigation.
 - int `visible_r` () const
Returns whether a widget and all its parents are visible.
 - int `w` () const
Gets the widget width.
 - `Fl_When` `when` () const
Returns the conditions under which the callback is called.
 - void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
 - `Fl_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.

- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Static Public Member Functions

- static void `about` (`FI_Callback` *cb, void *data)
Attaches a callback to the "About myprog" item of the system application menu.
- static void `create_window_menu` ()
Adds a Window menu, to the end of the system menu bar.
- static `window_menu_style_enum` `window_menu_style` ()
Get the style of the Window menu in the system menu bar.
- static void `window_menu_style` (`window_menu_style_enum` style)
Set the desired style of the Window menu in the system menu bar.

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from `FI_Menu_`

- int `item_pathname_` (char *name, int namelen, const `FI_Menu_Item` *finditem, const `FI_Menu_Item` *menu=0) const

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.

- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Additional Inherited Members

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Protected Attributes inherited from `FI_Menu_`

- `uchar` `alloc`
- `uchar` `down_box_`
- `FI_Boxtype` `menu_box_`
- `FI_Color` `textcolor_`
- `FI_Font` `textfont_`
- `FI_Fontsize` `textsize_`

12.137.1 Detailed Description

A class to create and modify menus that appear on macOS in the menu bar at the top of the screen.

On other than macOS platforms, `Fl_Sys_Menu_Bar` is a synonym of class `Fl_Menu_Bar`.

On the macOS platform, replace `Fl_Menu_Bar` with `Fl_Sys_Menu_Bar`, and a system menu at the top of the screen will be available. This menu will match an array of `Fl_Menu_Item`'s exactly as in all other FLTK menus (except for the submenu with the application's own name and the 'Window' menu; see below). There is, though, an important difference between an `Fl_Sys_Menu_Bar` object under macOS and under other platforms: only a single object from this class can be created, because macOS uses a single system menu bar. Therefore, porting to macOS an app that creates, on other platforms, several `Fl_Menu_Bar` objects, one for each of several windows, is more complex than just replacing `Fl_Menu_Bar` by `Fl_Sys_Menu_Bar`.

On the macOS platform, the system menu bar of any FLTK app begins with the Application menu which the FLTK library automatically constructs. Functions `Fl_Mac_App_Menu::custom_application_menu_items()` and `Fl_Sys_Menu_Bar::about()` can be used to further customize the Application menu. The FLTK library also automatically constructs and handles a Window menu which can be further customized (or even removed) calling `Fl_Sys_Menu_Bar::window_menu_style(window_menu_style_enum style)`. Other member functions of this class allow the app to generate the rest of the system menu bar. It is recommended to localize the system menu bar using the standard Mac OS X localization procedure (see [Internationalization](#)).

Changes to the menu state are immediately visible in the menubar when they are made using member functions of the `Fl_Sys_Menu_Bar` class. Other changes (e.g., by a call to `Fl_Menu_Item::set()`) should be followed by a call to `update()` to be visible in the menubar across all platforms. macOS global variable `fl_sys_menu_bar` points to the unique, current system menu bar.

A few FLTK menu features are not supported by the Mac System menu:

- no symbolic labels
- no embossed labels
- no font sizes

As described above, the submenu with the application's own name (usually the second submenu from the left, immediately following the "Apple" submenu) is a special case, and can be managed with `Fl_Mac_App_Menu::custom_application_menu_items()`. For example, to make your own "Appname -> Preferences" dialog, you might use:

```
#include <FL/platform.H> // for Fl_Mac_App_Menu class
#include <FL/Fl_Sys_Menu_Bar.H> // for Fl_Menu_Item
:
void prefs_cb(Fl_Widget *w, void *data) {
    // ..Open your preferences dialog here..
}
:
int main(..) {
    :
    // Items to add to the application menu
    static Fl_Menu_Item appitems[] = {
        { "Preferences", 0, prefs_cb, 0, 0 },
        { 0 }, { 0 }
    };
    Fl_Mac_App_Menu::custom_application_menu_items(appitems); // adds it
}
}
```

..the result being:

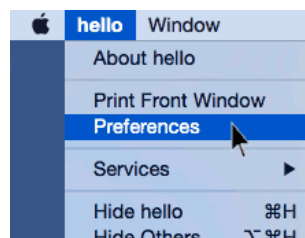


Figure 12.46 Mac Application submenu

12.137.2 Member Enumeration Documentation

12.137.2.1 window_menu_style_enum

```
enum Fl_Sys_Menu_Bar::window_menu_style_enum
```

Possible styles of the Window menu in the system menu bar.

Enumerator

<code>no_window_menu</code>	No Window menu in the system menu bar.
<code>tabbing_mode_none</code>	No tabbed windows, but the system menu bar contains a Window menu.
<code>tabbing_mode_automatic</code>	Windows are created by themselves but can be tabbed later.
<code>tabbing_mode_preferred</code>	Windows are tabbed when created.

12.137.3 Constructor & Destructor Documentation

12.137.3.1 Fl_Sys_Menu_Bar()

```
Fl_Sys_Menu_Bar::Fl_Sys_Menu_Bar (
    int x,
    int y,
    int w,
    int h,
    const char * l = 0 )
```

The constructor.

On Mac OS X, all arguments are unused. On other platforms they are used as by [Fl_Menu_Bar::Fl_Menu_Bar\(\)](#).

12.137.4 Member Function Documentation

12.137.4.1 about()

```
void Fl_Sys_Menu_Bar::about (
    Fl_Callback * cb,
    void * data ) [static]
```

Attaches a callback to the "About myprog" item of the system application menu.

This cross-platform function is effective only under the MacOS platform.

Parameters

<i>cb</i>	a callback that will be called by "About myprog" menu item with NULL 1st argument.
<i>data</i>	a pointer transmitted as 2nd argument to the callback.

12.137.4.2 add() [1/3]

```
int Fl_Sys_Menu_Bar::add (
    const char * label,
    const char * shortcut,
    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 ) [inline]
```

Adds a new menu item.

See also

[Fl_Menu_::add\(const char* label, int shortcut, Fl_Callback*, void *user_data=0, int flags=0\)](#)

12.137.4.3 add() [2/3]

```
int Fl_Sys_Menu_Bar::add (
    const char * label,
    int shortcut,
```

```

    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 )

```

Add a new menu item to the system menu bar.

Add to the system menu bar a new menu item, with a title string, shortcut int, callback, argument to the callback, and flags.

Parameters

<i>label</i>	- new menu item's label
<i>shortcut</i>	- new menu item's integer shortcut (can be 0 for none, or e.g. FL_ALT+'x')
<i>cb</i>	- callback to be invoked when item selected (can be 0 for none, in which case the menu bar's callback() can be used instead)
<i>user_data</i>	- argument to the callback
<i>flags</i>	- item's flags, e.g. FL_MENU_TOGGLE , etc.

Returns

the index into the menu() array, where the entry was added

See also

[Fl_Menu_::add\(const char* label, int shortcut, Fl_Callback *cb, void *user_data, int flags\)](#)

12.137.4.4 add() [3/3]

```

int Fl_Sys_Menu_Bar::add (
    const char * str )

```

Forms-compatible procedure to add items to the system menu bar.

Returns

the index into the menu() array, where the entry was added

See also

[Fl_Menu_::add\(const char* str\)](#)

12.137.4.5 clear()

```

void Fl_Sys_Menu_Bar::clear ( )

```

Set the [Fl_Menu_Item](#) array pointer to null, indicating a zero-length menu.

See also

[Fl_Menu_::clear\(\)](#)

12.137.4.6 clear_submenu()

```

int Fl_Sys_Menu_Bar::clear_submenu (
    int index )

```

Clears the specified submenu pointed to by index of all menu items.

See also

[Fl_Menu_::clear_submenu\(int index\)](#)

12.137.4.7 create_window_menu()

```
void Fl_Sys_Menu_Bar::create_window_menu ( ) [static]
```

Adds a Window menu, to the end of the system menu bar.

FLTK apps typically don't need to call this function which is automatically called by the library the first time a window is shown. The default system menu bar contains a Window menu with a "Merge All Windows" item. Other Window menu styles can be obtained calling `Fl_Sys_Menu_Bar::window_menu_style(window_menu_style_enum)` before the first `Fl_Window::show()`. Alternatively, an app can call `create_window_menu()` after having populated the system menu bar, for example with `menu(const Fl_Menu_Item *)`, and before the first `Fl_Window::show()`. This function does nothing on non MacOS platforms.

Version

1.4

12.137.4.8 draw()

```
void Fl_Sys_Menu_Bar::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                // calls Fl_Scrollbar::draw()
```

Reimplemented from `Fl_Menu_Bar`.

12.137.4.9 insert() [1/2]

```
int Fl_Sys_Menu_Bar::insert (
    int index,
    const char * label,
    const char * shortcut,
    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 ) [inline]
```

Insert a new menu item.

See also

`Fl_Menu_::insert(int index, const char* label, const char* shortcut, Fl_Callback *cb, void *user_data=0, int flags=0)`

12.137.4.10 insert() [2/2]

```
int Fl_Sys_Menu_Bar::insert (
    int index,
    const char * label,
    int shortcut,
    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 )
```

insert in the system menu bar a new menu item

Insert in the system menu bar a new menu item, with a title string, shortcut int, callback, argument to the callback, and flags.

Returns

the index into the menu() array, where the entry was inserted

See also

[Fl_Menu_::insert\(int index, const char* label, int shortcut, Fl_Callback *cb, void *user_data, int flags\)](#)

12.137.4.11 menu()

```
void Fl_Sys_Menu_Bar::menu (
    const Fl_Menu_Item * m )
```

create a system menu bar using the given list of menu structs

Author

Matthias Melcher

Parameters

<i>m</i>	Zero-ending list of Fl_Menu_Item 's
----------	---

12.137.4.12 mode()

```
void Fl_Sys_Menu_Bar::mode (
    int i,
    int fl )
```

Sets the flags of item i.

See also

[Fl_Menu_::mode\(int i, int fl\)](#)

12.137.4.13 remove()

```
void Fl_Sys_Menu_Bar::remove (
    int index )
```

remove an item from the system menu bar

Parameters

<i>index</i>	the index of the item to remove
--------------	---------------------------------

12.137.4.14 replace()

```
void Fl_Sys_Menu_Bar::replace (
    int index,
    const char * name )
```

rename an item from the system menu bar

Parameters

<i>index</i>	the index of the item to rename
<i>name</i>	the new item name as a UTF8 string

12.137.4.15 update()

```
void Fl_Sys_Menu_Bar::update ( ) [virtual]
```

Updates the menu bar after any change to its items.

This is useful when the menu bar can be an [Fl_Sys_Menu_Bar](#) object.
Reimplemented from [Fl_Menu_Bar](#).

12.137.4.16 window_menu_style()

```
void Fl_Sys_Menu_Bar::window_menu_style (
    Fl_Sys_Menu_Bar::window_menu_style_enum style ) [static]
```

Set the desired style of the Window menu in the system menu bar.

This function, to be called before the first call to [Fl_Window::show\(\)](#), allows to control whether the system menu bar should contain a Window menu, and if yes, whether new windows should be displayed in tabbed form. These are the effects of various values for *style* :

- `no_window_menu` : don't add a Window menu to the system menu bar
- `tabbing_mode_none` : add a simple Window menu to the system menu bar
- `tabbing_mode_automatic` : the window menu also contains "Merge All Windows" to group all windows in a single tabbed display mode. This is the **default** Window menu style for FLTK apps.
- `tabbing_mode_preferred` : new windows are displayed in tabbed mode when first created

The Window menu, if present, is entirely created and controlled by the FLTK library. Mac OS version 10.12 or later must be running for windows to be displayed in tabbed form. Under non MacOS platforms, this function does nothing.

Version

1.4

The documentation for this class was generated from the following files:

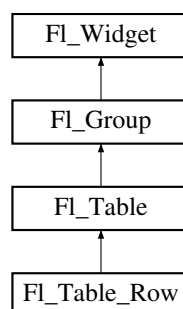
- [Fl_Sys_Menu_Bar.H](#)
- [Fl_Sys_Menu_Bar.cxx](#)

12.138 Fl_Table Class Reference

A table of widgets or other content.

```
#include <Fl_Table.H>
```

Inheritance diagram for [Fl_Table](#):



Public Types

- enum [TableContext](#) {
[CONTEXT_NONE](#) = 0 , [CONTEXT_STARTPAGE](#) = 0x01 , [CONTEXT_ENDPAGE](#) = 0x02 , [CONTEXT_ROW_HEADER](#)
 = 0x04 ,
[CONTEXT_COL_HEADER](#) = 0x08 , [CONTEXT_CELL](#) = 0x10 , [CONTEXT_TABLE](#) = 0x20 , [CONTEXT_RC_RESIZE](#)
 = 0x40 }

The context bit flags for [Fl_Table](#) related callbacks.

Public Member Functions

- void **add** (FI_Widget &wgt)

The specified widget is removed from its current group (if any) and added to the end of FI_Table's group.
- void **add** (FI_Widget *wgt)

The specified widget is removed from its current group (if any) and added to the end of FI_Table's group.
- FI_Widget *const * **array** ()

Returns a pointer to the array of children.
- void **begin** ()
- void **callback** (FI_Widget *, void *)

Callbacks will be called depending on the setting of FI_Widget::when().
- int **callback_col** ()

Returns the current column the event occurred on.
- TableContext **callback_context** ()

Returns the current 'table context'.
- int **callback_row** ()

Returns the current row the event occurred on.
- FI_Widget * **child** (int n) const

Returns the child widget by an index.
- int **children** () const

Returns the number of children in the table.
- virtual void **clear** ()

Clears the table to zero rows (rows(0)), zero columns (cols(0)), and clears any widgets (table->clear()) that were added with begin()/end() or add()/insert()/etc.
- int **col_header** ()

Returns if column headers are enabled or not.
- void **col_header** (int flag)

Enable or disable column headers.
- FI_Color **col_header_color** ()

Gets the color for column headers.
- void **col_header_color** (FI_Color val)

Sets the color for column headers and redraws the table.
- int **col_header_height** ()

Gets the column header height.
- void **col_header_height** (int height)

Sets the height in pixels for column headers and redraws the table.
- int **col_position** ()

Returns the current column scroll position as a column number.
- void **col_position** (int col)

Sets the horizontal scroll position so 'col' is at the left, and causes the screen to redraw.
- int **col_resize** ()

Returns if column resizing by the user is allowed.
- void **col_resize** (int flag)

Allows/disallows column resizing by the user.
- int **col_resize_min** ()

Returns the current column minimum resize value.
- void **col_resize_min** (int val)

Sets the current column minimum resize value.
- int **col_width** (int col)

Returns the current width of the specified column in pixels.
- void **col_width** (int col, int width)

- Sets the width of the specified column in pixels, and the table is redrawn.*

 - void `col_width_all` (int width)

Convenience method to set the width of all columns to the same value, in pixels.
- int `cols` ()
 - *Get the number of columns in the table.*
- virtual void `cols` (int val)
 - *Set the number of columns in the table and redraw.*
- void `do_callback` (`TableContext` context, int row, int col)
 - *Calls the widget callback.*
- void `end` ()
- int `find` (const `FL_Widget` &wgt) const
- int `find` (const `FL_Widget` *wgt) const
- `FL_Table` (int X, int Y, int W, int H, const char *|=0)
 - *The constructor for `FL_Table`.*
- void `get_selection` (int &row_top, int &col_left, int &row_bot, int &col_right)
 - *Gets the region of cells selected (highlighted).*
- void `init_sizes` ()
 - *Resets the internal array of widget sizes and positions.*
- void `insert` (`FL_Widget` &wgt, `FL_Widget` *w2)
 - *The specified widget is removed from its current group (if any) and inserted into `FL_Table`'s group before widget 'w2'.*
- void `insert` (`FL_Widget` &wgt, int n)
 - *The specified widget is removed from its current group (if any) and inserted into the `FL_Table`'s group at position 'n'.*
- int `is_interactive_resize` ()
 - *Returns 1 if someone is interactively resizing a row or column.*
- int `is_selected` (int r, int c)
 - *See if the cell at row r and column c is selected.*
- int `move_cursor` (int R, int C)
 - *Same as `move_cursor(R,C,1)`.*
- int `move_cursor` (int R, int C, int shiftselect)
 - *Moves the selection cursor a relative number of rows/columns specified by R/C.*
- void `remove` (`FL_Widget` &wgt)
 - *The specified widget is removed from `FL_Table`'s group.*
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`
 - *Handle resize events if user resizes parent window.*
- int `row_header` ()
 - *Returns if row headers are enabled or not.*
- void `row_header` (int flag)
 - *Enables/disables showing the row headers.*
- `FL_Color` `row_header_color` ()
 - *Returns the current row header color.*
- void `row_header_color` (`FL_Color` val)
 - *Sets the row header color and causes the screen to redraw.*
- int `row_header_width` ()
 - *Returns the current row header width (in pixels).*
- void `row_header_width` (int width)
 - *Sets the row header width to n and causes the screen to redraw.*
- int `row_height` (int row)
 - *Returns the current height of the specified row as a value in pixels.*
- void `row_height` (int row, int height)
 - *Sets the height of the specified row in pixels, and the table is redrawn.*
- void `row_height_all` (int height)

- Convenience method to set the height of all rows to the same value, in pixels.*

 - int **row_position** ()
 - Returns the current row scroll position as a row number.*
 - void **row_position** (int row)
 - Sets the vertical scroll position so 'row' is at the top, and causes the screen to redraw.*
 - int **row_resize** ()
 - Returns if row resizing by the user is allowed.*
 - void **row_resize** (int flag)
 - Allows/disallows row resizing by the user.*
 - int **row_resize_min** ()
 - Returns the current row minimum resize value.*
 - void **row_resize_min** (int val)
 - Sets the current row minimum resize value.*
 - int **rows** ()
 - Returns the number of rows in the table.*
 - virtual void **rows** (int val)
 - Sets the number of rows in the table, and the table is redrawn.*
 - int **scrollbar_size** () const
 - Gets the current size of the scrollbars' troughs, in pixels.*
 - void **scrollbar_size** (int newSize)
 - Sets the pixel size of the scrollbars' troughs to newSize, in pixels.*
 - void **set_selection** (int row_top, int col_left, int row_bot, int col_right)
 - Sets the region of cells to be selected (highlighted).*
 - int **tab_cell_nav** () const
 - Get state of table's 'Tab' key cell navigation flag.*
 - void **tab_cell_nav** (int val)
 - Flag to control if Tab navigates table cells or not.*
 - void **table_box** (FI_Boxtype val)
 - Sets the kind of box drawn around the data table, the default being FL_NO_BOX.*
 - FI_Boxtype **table_box** (void)
 - Returns the current box type used for the data table.*
 - int **top_row** ()
 - Returns the current top row shown in the table.*
 - void **top_row** (int row)
 - Sets which row should be at the top of the table, scrolling as necessary, and the table is redrawn.*
 - void **visible_cells** (int &r1, int &r2, int &c1, int &c2)
 - Returns the range of row and column numbers for all visible and partially visible cells in the table.*
 - void **when** (FI_When flags)
 - The FI_Widget::when() function is used to set a group of flags, determining when the widget callback is called:*
 - ~FI_Table ()
 - The destructor for FI_Table.*

Public Member Functions inherited from FI_Group

- FI_Widget *& **_ddfdesign_kludge** ()
 - This is for forms compatibility only.*
- void **add** (FI_Widget &)
 - The widget is removed from its current group (if any) and then added to the end of this group.*
- void **add** (FI_Widget *o)
 - See void FI_Group::add(FI_Widget &w)*
- void **add_resizable** (FI_Widget &o)

- Adds a widget to the group and makes it the resizable widget.*

 - `FL_Widget *const * array () const`
Returns a pointer to the array of children.
 - `FL_Group const * as_group () const FL_OVERRIDE`
 - `FL_Group * as_group () FL_OVERRIDE`
Returns an `FL_Group` pointer if this widget is an `FL_Group`.
 - `void begin ()`
Sets the current group so you can build the widget tree by just constructing the widgets.
 - `FL_Widget * child (int n) const`
Returns `array()[n]`.
 - `int children () const`
Returns how many child widgets the group has.
 - `void clear ()`
Deletes all child widgets from memory recursively.
 - `unsigned int clip_children ()`
Returns the current clipping mode.
 - `void clip_children (int c)`
Controls whether the group widget clips the drawing of child widgets to its bounding box.
 - `virtual int delete_child (int n)`
Removes the widget at `index` from the group and deletes it.
 - `void end ()`
Exactly the same as `current(this->parent())`.
 - `int find (const FL_Widget &o) const`
*See `int FL_Group::find(const FL_Widget *w) const`.*
 - `int find (const FL_Widget *) const`
Searches the child array for the widget and returns the index.
 - `FL_Group (int, int, int, int, const char * = 0)`
Creates a new `FL_Group` widget using the given position, size, and label string.
 - `void focus (FL_Widget *W)`
 - `void forms_end ()`
This is for forms compatibility only.
 - `void init_sizes ()`
Resets the internal array of widget sizes and positions.
 - `void insert (FL_Widget &, int i)`
The widget is removed from its current group (if any) and then inserted into this group.
 - `void insert (FL_Widget &o, FL_Widget *before)`
This does `insert(w, find(before))`.
 - `void remove (FL_Widget &)`
Removes a widget from the group but does not delete it.
 - `void remove (FL_Widget *o)`
Removes the widget `o` from the group.
 - `void remove (int index)`
Removes the widget at `index` from the group but does not delete it.
 - `FL_Widget * resizable () const`
Returns the group's resizable widget.
 - `void resizable (FL_Widget &o)`
Sets the group's resizable widget.
 - `void resizable (FL_Widget *o)`
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
 - `virtual ~FL_Group ()`
The destructor also deletes all the children.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (FI_Align alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window * as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window const * as_gl_window** () const
- virtual **FI_Window * as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window const * as_window** () const
- void **bind_deimage** (FI_Image *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (FI_Boxtype new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (FI_Callback *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const
Checks if the widget value changed since the last callback.
- void **clear_active** ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FL_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FL_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FL_Color bg`, `FL_Color sel`)
- Sets the background and selection color of the widget.*

 - `FL_Color color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FL_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FL_Image * deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FL_Image * deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image &img`)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image *img`)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FL_Widget *widget`, long arg, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h` () `const`
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- `int image_bound` () `const`
Returns whether the image is managed by the widget.
- `int inside` (`const FI_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- `int is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- `bool needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- `unsigned int output` () `const`

- Returns if a widget is used for output only.*

 - `FI_Group * parent ()` const

Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`

Internal use only - "for hacks only".
- `void position (int X, int Y)`

Repositions the window or widget.
- `void redraw ()`

Schedules the drawing of the widget.
- `void redraw_label ()`

Schedules the drawing of the label.
- `FI_Color selection_color ()` const

Gets the selection color.
- `void selection_color (FI_Color a)`

Sets the selection color.
- `void set_active ()`

Marks the widget as active without sending events or changing focus.
- `void set_changed ()`

Marks the value of the widget as changed.
- `void set_output ()`

Sets a widget to output only.
- `void set_visible ()`

Makes the widget visible.
- `void set_visible_focus ()`

Enables keyboard focus navigation with this widget.
- `int shortcut_label ()` const

Returns whether the widget's label uses '&' to indicate shortcuts.
- `void shortcut_label (int value)`

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual `void show ()`

Makes a widget visible.
- `void size (int W, int H)`

Changes the size of the widget.
- `int take_focus ()`

Gives the widget the keyboard focus.
- `unsigned int takeevents ()` const

Returns if the widget is able to take events.
- `int test_shortcut ()`

Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip ()` const

Gets the current tooltip text.
- `void tooltip (const char *text)`

Sets the current tooltip text.
- `FI_Window * top_window ()` const

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset (int &xoff, int &yoff)` const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type ()` const

Gets the widget type.
- `void type (uchar t)`

Sets the widget type.

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (FI_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- FI_When **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- FI_Window * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual **~FI_Widget** ()
Destroys the widget.

Protected Types

- enum **ResizeFlag** {
RESIZE_NONE = 0 , **RESIZE_COL_LEFT** = 1 , **RESIZE_COL_RIGHT** = 2 , **RESIZE_ROW_ABOVE** = 3 ,
RESIZE_ROW_BELOW = 4 }

Protected Types inherited from FI_Widget

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
,
OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
,
MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
,
GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

Protected Member Functions

- void **change_cursor** ([FL_Cursor](#) newcursor)
Change mouse cursor to different type.
- long **col_scroll_position** (int col)
Returns the scroll position (in pixels) of the specified column 'col'.
- [TableContext](#) **cursor2rowcol** (int &R, int &C, [ResizeFlag](#) &resizeflag)
Find row/col for the recent mouse event.
- void **damage_zone** (int r1, int c1, int r2, int c2, int r3=0, int c3=0)
Sets the damage zone to the specified row/col values.
- void **draw** () [FL_OVERRIDE](#)
Draws the entire [FL_Table](#).
- virtual void **draw_cell** ([TableContext](#) context, int R=0, int C=0, int X=0, int Y=0, int W=0, int H=0)
Subclass should override this method to handle drawing the cells.
- int **find_cell** ([TableContext](#) context, int R, int C, int &X, int &Y, int &W, int &H)
Find a cell's X/Y/W/H region for the specified cell in row 'R', column 'C'.
- void **get_bounds** ([TableContext](#) context, int &X, int &Y, int &W, int &H)
Returns the (X,Y,W,H) bounding region for the specified 'context'.
- int **handle** (int e) [FL_OVERRIDE](#)
Handle FLTK events.
- int **is_fltk_container** ()
Does the table contain any child fltk widgets?
- void **recalc_dimensions** ()
Recalculate the dimensions of the table, and affect any children.
- void **redraw_range** (int topRow, int botRow, int leftCol, int rightCol)
Define region of cells to be redrawn by specified range of rows/cols, and then sets damage(DAMAGE_CHILD).
- int **row_col_clamp** ([TableContext](#) context, int &R, int &C)
Return specified row/col values R and C to within the table's current row/col limits.
- long **row_scroll_position** (int row)
Returns the scroll position (in pixels) of the specified 'row'.
- void **table_resized** ()
Call this if table was resized, to recalculate internal data.
- void **table_scrolled** ()
Recalculate internals after a scroll.

Protected Member Functions inherited from [FL_Group](#)

- [FL_Rect](#) * **bounds** ()
Returns the internal array of widget sizes and positions.
- void **draw_child** ([FL_Widget](#) &widget) const
Forces a child to redraw.
- void **draw_children** ()
Draws all children of the group.
- void **draw_outside_label** (const [FL_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int **on_insert** ([FL_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int **on_move** (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void **on_remove** (int)
Allow derived groups to act when a child widget is removed from the group.
- int * **sizes** ()

Returns the internal array of widget sizes and positions.

- void **update_child** (FI_Widget &widget) const

Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Static Protected Member Functions

- static void **scroll_cb** (FI_Widget *, void *)
Callback for when someone moves a scrollbar.

Protected Attributes

- int **botrow**
bottom row# of currently visible table on screen
- int **current_col**
selection cursor's current column (-1 if none)
- int **current_row**
selection cursor's current row (-1 if none)
- [Fl_Scrollbar](#) * **hscrollbar**
child horizontal scrollbar widget
- int **leftcol**
left column# of currently visible table on screen
- int **leftcol_scrollpos**
precomputed scroll position for left column
- int **rightcol**
right column# of currently visible table on screen
- int **select_col**
extended selection column (-1 if none)
- int **select_row**
extended selection row (-1 if none)
- [Fl_Scroll](#) * **table**
child [Fl_Scroll](#) widget container for child fitk widgets (if any)
- int **table_h**
table's virtual height (in pixels)
- int **table_w**
table's virtual width (in pixels)
- int **tih**
Data table's inner h dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **tiw**
Data table's inner w dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **tix**
Data table's inner x dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **tiy**
Data table's inner y dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **toh**
Data table's outer h dimension, outside bounding box. See [Table Dimension Diagram](#).
- int **toprow**
top row# of currently visible table on screen
- int **toprow_scrollpos**
precomputed scroll position for top row
- int **tow**
Data table's outer w dimension, outside bounding box. See [Table Dimension Diagram](#).
- int **tox**
Data table's outer x dimension, outside bounding box. See [Table Dimension Diagram](#).
- int **toy**
Data table's outer y dimension, outside bounding box. See [Table Dimension Diagram](#).
- [Fl_Scrollbar](#) * **vscrollbar**
child vertical scrollbar widget
- int **wih**
Table widget's inner h dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **wiw**

Table widget's inner w dimension, inside bounding box. See [Table Dimension Diagram](#).

- int **wix**

Table widget's inner x dimension, inside bounding box. See [Table Dimension Diagram](#).

- int **wiy**

Table widget's inner y dimension, inside bounding box. See [Table Dimension Diagram](#).

Additional Inherited Members

Static Public Member Functions inherited from FI_Group

- static [FI_Group](#) * **current** ()
Returns the currently active group.
- static void **current** ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

12.138.1 Detailed Description

A table of widgets or other content.

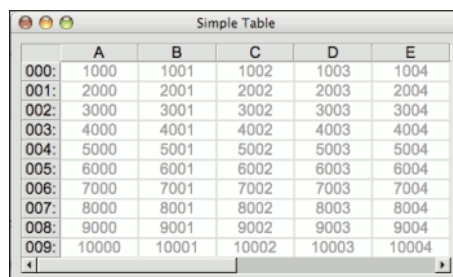
This is the base class for table widgets.

To be useful it must be subclassed and several virtual functions defined. Normally applications use widgets derived from this widget, and do not use this widget directly; this widget is usually too low level to be used directly by applications.

This widget does *not* handle the data in the table. The [draw_cell\(\)](#) method must be overridden by a subclass to manage drawing the contents of the cells.

This widget can be used in several ways:

- As a custom widget; see [examples/table-simple.cxx](#) and [test/table.cxx](#). Very optimal for even extremely large tables.
- As a table made up of a single FLTK widget instanced all over the table, simulating a numeric spreadsheet. See [examples/table-spreadsheet.cxx](#) and [examples/table-spreadsheet-with-keyboard-nav.cxx](#). Optimal for large tables.
- As a regular container of FLTK widgets, one widget per cell. See [examples/table-as-container.cxx](#). *Not* recommended for large tables.



	A	B	C	D	E
000:	1000	1001	1002	1003	1004
001:	2000	2001	2002	2003	2004
002:	3000	3001	3002	3003	3004
003:	4000	4001	4002	4003	4004
004:	5000	5001	5002	5003	5004
005:	6000	6001	6002	6003	6004
006:	7000	7001	7002	7003	7004
007:	8000	8001	8002	8003	8004
008:	9000	9001	9002	9003	9004
009:	10000	10001	10002	10003	10004

Figure 12.47 table-simple example

	Column 0	Column 1	Column 2	Column 3	Column 4	Column 5
Row 0	0/0	0.1	0/2	0.3	0/4	0.5
Row 1	1/0	1.1	1/2	1.3	1/4	1.5
Row 2	2/0	2.1	2/2	2.3	2/4	2.5
Row 3	3/0	3.1	3/2	3.3	3/4	3.5
Row 4	4/0	4.1	4/2	4.3	4/4	4.5
Row 5	5/0	5.1	5/2	5.3	5/4	5.5
Row 6	6/0	6.1	6/2	6.3	6/4	6.5
Row 7	7/0	7.1	7/2	7.3	7/4	7.5

Figure 12.48 table-as-container example

When acting as part of a custom widget, events on the cells and/or headings generate callbacks when they are clicked by the user. You control when events are generated based on the setting for `Fl_Table::when()`.

When acting as a container for FLTK widgets, the FLTK widgets maintain themselves. Although the `draw_cell()` method must be overridden, its contents can be very simple. See the `draw_cell()` code in `examples/table-simple.cxx`.

The following variables are available to classes deriving from `Fl_Table`:

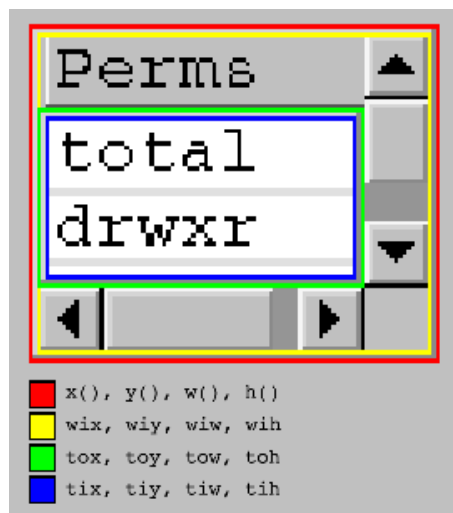


Figure 12.49 Fl_Table Dimensions

<code>x()/y()/w()/h()</code>	<code>Fl_Table</code> widget's outer dimension. The outer edge of the border of the <code>Fl_Table</code> . (Red in the diagram above)
<code>wix/wiy/wiw/wih</code>	<code>Fl_Table</code> widget's inner dimension. The inner edge of the border of the <code>Fl_Table</code> . eg. if the <code>Fl_Table</code> 's <code>box()</code> is <code>FL_NO_BOX</code> , these values are the same as <code>x()/y()/w()/h()</code> . (Yellow in the diagram above)
<code>tox/toy/tow/toh</code>	The table's outer dimension. The outer edge of the border around the cells, but inside the row/col headings and scrollbars. (Green in the diagram above)
<code>tix/tiy/tiw/tih</code>	The table's inner dimension. The inner edge of the border around the cells, but inside the row/col headings and scrollbars. AKA the table's clip region. eg. if the <code>table_box()</code> is <code>FL_NO_BOX</code> , these values are the same as <code>tox/toy/tow/toh</code> . (Blue in the diagram above)

CORE DEVELOPERS

- Greg Ercolano : 12/16/2002 - initial implementation 12/16/02. [Fl_Table](#), [Fl_Table_Row](#), docs.
- Jean-Marc Lienher : 02/22/2004 - added keyboard nav + mouse selection, and ported [Fl_Table](#) into fltk-utf8-1.1.4

OTHER CONTRIBUTORS

- Inspired by the Feb 2000 version of FLVW's `Flwv_Table` widget. Mucho thanks to those folks.

- Mister Satan : 04/07/2003 - MinGW porting mods, and singleinput.cxx; a cool [Fl_Input](#) oriented spreadsheet example
- Marek Paliwoda : 01/08/2003 - Porting mods for Borland
- Ori Berger : 03/16/2006 - Optimizations for >500k rows/cols

LICENSE

Greg kindly gave his permission to integrate [Fl_Table](#) and [Fl_Table_Row](#) into FLTK, allowing FLTK license to apply while his widgets are part of the library. [updated by Greg, 04/26/17]

12.138.2 Member Enumeration Documentation

12.138.2.1 TableContext

```
enum Fl_Table::TableContext
```

The context bit flags for [Fl_Table](#) related callbacks.

Should be used in [draw_cell\(\)](#) to determine what's being drawn, or in a [callback\(\)](#) to determine where a recent event occurred.

Enumerator

CONTEXT_NONE	no known context
CONTEXT_STARTPAGE	before the table is redrawn
CONTEXT_ENDPAGE	after the table is redrawn
CONTEXT_ROW_HEADER	drawing or event occurred in the row header
CONTEXT_COL_HEADER	drawing or event occurred in the col header
CONTEXT_CELL	drawing or event occurred in a cell
CONTEXT_TABLE	drawing or event occurred in a dead zone of table
CONTEXT_RC_RESIZE	column or row is being resized

12.138.3 Constructor & Destructor Documentation

12.138.3.1 Fl_Table()

```
Fl_Table::Fl_Table (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

The constructor for [Fl_Table](#).

This creates an empty table with no rows or columns, with headers and row/column resize behavior disabled.

12.138.3.2 ~Fl_Table()

```
Fl_Table::~Fl_Table ( )
```

The destructor for [Fl_Table](#).

Destroys the table and its associated widgets.

12.138.4 Member Function Documentation

12.138.4.1 array()

```
Fl_Widget *const * Fl_Table::array ( ) [inline]
```

Returns a pointer to the array of children.

This pointer is only valid until the next time a child is added or removed.

12.138.4.2 callback()

```
void Fl_Table::callback (
    Fl_Widget * ,
    void * )
```

Callbacks will be called depending on the setting of `Fl_Widget::when()`.

Callback functions should use the following functions to determine the context/row/column:

- `Fl_Table::callback_row()` returns current row
- `Fl_Table::callback_col()` returns current column
- `Fl_Table::callback_context()` returns current table context

`callback_row()` and `callback_col()` will be set to the row and column number the event occurred on. If someone clicked on a row header, `col` will be 0. If someone clicked on a column header, `row` will be 0.

`callback_context()` will return one of the following:

<code>Fl_Table::CONTEXT_ROW_HEADER</code>	Someone clicked on a row header. Excludes resizing.
<code>Fl_Table::CONTEXT_COL_HEADER</code>	Someone clicked on a column header. Excludes resizing.
<code>Fl_Table::CONTEXT_CELL</code>	Someone clicked on a cell. To receive callbacks for FL_RELEASE events, you must set <code>when(FL_WHEN_RELEASE)</code> .
<code>Fl_Table::CONTEXT_RC_RESIZE</code>	Someone is resizing rows/columns either interactively, or via the <code>col_width()</code> or <code>row_height()</code> API. Use <code>is_interactive_resize()</code> to determine interactive resizing. If resizing a column, <code>R=0</code> and <code>C=column</code> being resized. If resizing a row, <code>C=0</code> and <code>R=row</code> being resized. NOTE: To receive resize events, you must set <code>when(FL_WHEN_CHANGED)</code> .

```
class MyTable : public Fl_Table {
[.]
private:
    // Handle events that happen on the table
    void event_callback2() {
        int R = callback_row(),           // row where event occurred
            C = callback_col();           // column where event occurred
        TableContext context = callback_context(); // which part of table
        fprintf(stderr, "callback: Row=%d Col=%d Context=%d Event=%d\n",
            R, C, (int)context, (int)Fl::event());
    }

    // Actual static callback
    static void event_callback(Fl_Widget*, void* data) {
        MyTable *o = (MyTable*)data;
        o->event_callback2();
    }

public:
    // Constructor
    MyTable() {
        [.]
        table.callback(&event_callback, (void*)this); // setup callback
        table.when(FL_WHEN_CHANGED|FL_WHEN_RELEASE); // when to call it
    }
};
```

12.138.4.3 callback_col()

```
int Fl_Table::callback_col ( ) [inline]
```

Returns the current column the event occurred on.

This function should only be used from within the user's callback function.

12.138.4.4 callback_context()

```
TableContext Fl_Table::callback_context ( ) [inline]
```

Returns the current 'table context'.

This function should only be used from within the user's callback function.

12.138.4.5 `callback_row()`

```
int Fl_Table::callback_row ( ) [inline]
```

Returns the current row the event occurred on.

This function should only be used from within the user's callback function.

12.138.4.6 `child()`

```
Fl_Widget * Fl_Table::child (
    int n ) const [inline]
```

Returns the child widget by an index.

When using the `Fl_Table` as a container for FLTK widgets, this method returns the widget pointer from the internal array of widgets in the container.

Typically used in loops, eg:

```
for ( int i=0; i<children(); i++ ) {
    Fl_Widget *w = child(i);
    [...]
}
```

12.138.4.7 `children()`

```
int Fl_Table::children ( ) const [inline]
```

Returns the number of children in the table.

When using the `Fl_Table` as a container for FLTK widgets, this method returns how many child widgets the table has.

See also

`child(int)`

12.138.4.8 `clear()`

```
virtual void Fl_Table::clear ( ) [inline], [virtual]
```

Clears the table to zero rows (`rows(0)`), zero columns (`cols(0)`), and clears any widgets (`table->clear()`) that were added with `begin()/end()` or `add()/insert()/etc.`

See also

`rows(int), cols(int)`

Reimplemented in `Fl_Table_Row`.

12.138.4.9 `col_header()`

```
void Fl_Table::col_header (
    int flag ) [inline]
```

Enable or disable column headers.

If changed, the table is redrawn.

12.138.4.10 `col_resize()`

```
void Fl_Table::col_resize (
    int flag ) [inline]
```

Allows/disallows column resizing by the user.

1=allow interactive resizing, 0=disallow interactive resizing. Since interactive resizing is done via the column headers, `col_header ()` must also be enabled to allow resizing.

12.138.4.11 col_resize_min()

```
void Fl_Table::col_resize_min (
    int val ) [inline]
```

Sets the current column minimum resize value.

This is used to prevent the user from interactively resizing any column to be smaller than 'pixels'. Must be a value ≥ 1 .

12.138.4.12 col_width()

```
void Fl_Table::col_width (
    int col,
    int width )
```

Sets the width of the specified column in pixels, and the table is redrawn.

[callback\(\)](#) will be invoked with CONTEXT_RC_RESIZE if the column's width was actually changed, and [when\(\)](#) is FL_WHEN_CHANGED.

12.138.4.13 col_width_all()

```
void Fl_Table::col_width_all (
    int width ) [inline]
```

Convenience method to set the width of all columns to the same value, in pixels.

The screen is redrawn.

12.138.4.14 cursor2rowcol()

```
Fl_Table::TableContext Fl_Table::cursor2rowcol (
    int & R,
    int & C,
    ResizeFlag & resizeflag ) [protected]
```

Find row/col for the recent mouse event.

Returns the context, and the row/column values in R/C. Also returns 'resizeflag' if mouse is hovered over a resize boundary.

12.138.4.15 damage_zone()

```
void Fl_Table::damage_zone (
    int r1,
    int c1,
    int r2,
    int c2,
    int r3 = 0,
    int c3 = 0 ) [protected]
```

Sets the damage zone to the specified row/col values.

Calls [redraw_range\(\)](#).

12.138.4.16 do_callback()

```
void Fl_Table::do_callback (
    TableContext context,
    int row,
    int col ) [inline]
```

Calls the widget callback.

Saves the specified 'context', 'row', and 'col' values, so that the user's callback can then access them with the member functions [callback_context\(\)](#), [callback_row\(\)](#) and [callback_col\(\)](#).

12.138.4.17 draw()

```
void Fl_Table::draw (
    void ) [protected], [virtual]
```

Draws the entire [Fl_Table](#).

Lets fltk widgets draw themselves first, followed by the cells via calls to [draw_cell\(\)](#).

Reimplemented from [Fl_Group](#).

12.138.4.18 draw_cell()

```
virtual void Fl_Table::draw_cell (
    TableContext context,
    int R = 0,
    int C = 0,
    int X = 0,
    int Y = 0,
    int W = 0,
    int H = 0 ) [inline], [protected], [virtual]
```

Subclass should override this method to handle drawing the cells.

This method will be called whenever the table is redrawn, once per cell.

Only cells that are completely (or partially) visible will be told to draw.

context will be one of the following:

Fl_Table::CONTEXT_STARTPAGE	When table, or parts of the table, are about to be redrawn. Use to initialize static data, such as font selections. R/C will be zero, X/Y/W/H will be the dimensions of the table's entire data area. (Useful for locking a database before accessing; see also visible_cells())
Fl_Table::CONTEXT_ENDPAGE	When table has completed being redrawn. R/C will be zero, X/Y/W/H dimensions of table's data area. (Useful for unlocking a database after accessing)
Fl_Table::CONTEXT_ROW_HEADER	Whenever a row header cell needs to be drawn. R will be the row number of the header being redrawn, C will be zero, X/Y/W/H will be the fltk drawing area of the row header in the window
Fl_Table::CONTEXT_COL_HEADER	Whenever a column header cell needs to be drawn. R will be zero, C will be the column number of the header being redrawn, X/Y/W/H will be the fltk drawing area of the column header in the window
Fl_Table::CONTEXT_CELL	Whenever a data cell in the table needs to be drawn. R/C will be the row/column of the cell to be drawn, X/Y/W/H will be the fltk drawing area of the cell in the window
Fl_Table::CONTEXT_RC_RESIZE	Whenever table or row/column is resized or scrolled, either interactively or via col_width() or row_height() . R/C/X/Y/W/H will all be zero. Useful for fltk containers that need to resize or move the child fltk widgets.

R and C will be set to the row and column number of the cell being drawn. In the case of row headers, C will be 0. In the case of column headers, R will be 0.

X/Y/W/H will be the position and dimensions of where the cell should be drawn.

In the case of custom widgets, a minimal [draw_cell\(\)](#) override might look like the following. With custom widgets it is up to the caller to handle drawing everything within the dimensions of the cell, including handling the selection color. Note all clipping must be handled as well; this allows drawing outside the dimensions of the cell if so desired for 'custom effects'.

```
// This is called whenever Fl_Table wants you to draw a cell
void MyTable::draw_cell(TableContext context, int R=0, int C=0, int X=0, int Y=0, int W=0, int H=0) {
    static char s[40];
    sprintf(s, "%d/%d", R, C); // text for each cell
    switch ( context ) {
        case CONTEXT_STARTPAGE: // Fl_Table telling us it's starting to draw page
```

```

    fl_font(FL_HELVETICA, 16);
    return;

case CONTEXT_ROW_HEADER:           // Fl_Table telling us to draw row/col headers
case CONTEXT_COL_HEADER:
    fl_push_clip(X, Y, W, H);
    {
        fl_draw_box(FL_THIN_UP_BOX, X, Y, W, H, color());
        fl_color(FL_BLACK);
        fl_draw(s, X, Y, W, H, FL_ALIGN_CENTER);
    }
    fl_pop_clip();
    return;

case CONTEXT_CELL:                 // Fl_Table telling us to draw cells
    fl_push_clip(X, Y, W, H);
    {
        // BG COLOR
        fl_color( row_selected(R) ? selection_color() : FL_WHITE);
        fl_rectf(X, Y, W, H);

        // TEXT
        fl_color(FL_BLACK);
        fl_draw(s, X, Y, W, H, FL_ALIGN_CENTER);

        // BORDER
        fl_color(FL_LIGHT2);
        fl_rect(X, Y, W, H);
    }
    fl_pop_clip();
    return;

default:
    return;
}
//NOTREACHED
}

```

12.138.4.19 find_cell()

```

int Fl_Table::find_cell (
    TableContext context,
    int R,
    int C,
    int & X,
    int & Y,
    int & W,
    int & H ) [protected]

```

Find a cell's X/Y/W/H region for the specified cell in row 'R', column 'C'.

Returns

- 0 – on success, XYWH returns the region of the specified cell.
- -1 – if R or C are out of range, and X/Y/W/H will be set to zero.

12.138.4.20 get_selection()

```

void Fl_Table::get_selection (
    int & row_top,
    int & col_left,
    int & row_bot,
    int & col_right )

```

Gets the region of cells selected (highlighted).

Parameters

in	<i>row_top</i>	Returns the top row of selection area
in	<i>col_left</i>	Returns the left column of selection area
in	<i>row_bot</i>	Returns the bottom row of selection area
in	<i>col_right</i>	Returns the right column of selection area

12.138.4.21 handle()

```
int Fl_Table::handle (
    int e ) [protected], [virtual]
```

Handle FLTK events.

Reimplemented from [Fl_Group](#).

Reimplemented in [Fl_Table_Row](#).

12.138.4.22 init_sizes()

```
void Fl_Table::init_sizes ( ) [inline]
```

Resets the internal array of widget sizes and positions.

See also

[Fl_Group::init_sizes\(\)](#)

12.138.4.23 insert()

```
void Fl_Table::insert (
    Fl_Widget & wgt,
    Fl_Widget * w2 ) [inline]
```

The specified widget is removed from its current group (if any) and inserted into [Fl_Table](#)'s group before widget 'w2'. This will append if 'w2' is not in [Fl_Table](#)'s group.

12.138.4.24 is_interactive_resize()

```
int Fl_Table::is_interactive_resize ( ) [inline]
```

Returns 1 if someone is interactively resizing a row or column.

You can currently call this only from within your [callback\(\)](#).

12.138.4.25 is_selected()

```
int Fl_Table::is_selected (
    int r,
    int c )
```

See if the cell at row *r* and column *c* is selected.

Returns

1 if the cell is selected, 0 if not.

12.138.4.26 move_cursor()

```
int Fl_Table::move_cursor (
    int R,
    int C,
    int shiftselect )
```

Moves the selection cursor a relative number of rows/columns specified by R/C.

R/C can be positive or negative, depending on the direction to move. A value of 0 for R or C prevents cursor movement on that axis.

If shiftselect is set, the selection range is extended to the new cursor position. If clear, the cursor is simply moved, and any previous selection is cancelled.

Used mainly by keyboard events (e.g. [Fl_Right](#), [FL_Home](#), [FL_End](#)..) to let the user keyboard navigate the selection cursor around.

The scroll positions may be modified if the selection cursor traverses into cells off the screen's edge.

Internal variables `select_row/select_col` and `current_row/current_col` are modified, among others.

Examples:

```
R=1, C=0 -- moves the selection cursor one row downward.
R=5, C=0 -- moves the selection cursor 5 rows downward.
R=-5, C=0 -- moves the cursor 5 rows upward.
R=2, C=2 -- moves the cursor 2 rows down and 2 columns to the right.
```

12.138.4.27 recalc_dimensions()

```
void Fl_Table::recalc_dimensions ( ) [protected]
```

Recalculate the dimensions of the table, and affect any children. Internally, [Fl_Group::resize\(\)](#) and [init_sizes\(\)](#) are called.

12.138.4.28 redraw_range()

```
void Fl_Table::redraw_range (
    int topRow,
    int botRow,
    int leftCol,
    int rightCol ) [inline], [protected]
```

Define region of cells to be redrawn by specified range of rows/cols, and then sets `damage(DAMAGE_CHILD)`. Extends any previously defined range to redraw.

12.138.4.29 resize()

```
void Fl_Table::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Handle resize events if user resizes parent window. This changes the size of [Fl_Table](#), causing it to redraw. Reimplemented from [Fl_Group](#).

12.138.4.30 row_col_clamp()

```
int Fl_Table::row_col_clamp (
    TableContext context,
    int & R,
    int & C ) [protected]
```

Return specified row/col values R and C to within the table's current row/col limits.

Returns

0 if no changes were made, or 1 if they were.

12.138.4.31 row_header()

```
void Fl_Table::row_header (
    int flag ) [inline]
```

Enables/disables showing the row headers. 1=enabled, 0=disabled. If changed, the table is redrawn.

12.138.4.32 row_height()

```
void Fl_Table::row_height (
    int row,
    int height )
```

Sets the height of the specified row in pixels, and the table is redrawn. [callback\(\)](#) will be invoked with `CONTEXT_RC_RESIZE` if the row's height was actually changed, and [when\(\)](#) is `FL_WHEN_CHANGED`.

12.138.4.33 row_height_all()

```
void Fl_Table::row_height_all (
    int height ) [inline]
```

Convenience method to set the height of all rows to the same value, in pixels. The screen is redrawn.

12.138.4.34 row_resize()

```
void Fl_Table::row_resize (
    int flag ) [inline]
```

Allows/disallows row resizing by the user.

1=allow interactive resizing, 0=disallow interactive resizing. Since interactive resizing is done via the row headers, [row_header\(\)](#) must also be enabled to allow resizing.

12.138.4.35 row_resize_min()

```
void Fl_Table::row_resize_min (
    int val ) [inline]
```

Sets the current row minimum resize value.

This is used to prevent the user from interactively resizing any row to be smaller than 'pixels'. Must be a value ≥ 1 .

12.138.4.36 rows()

```
void Fl_Table::rows (
    int val ) [virtual]
```

Sets the number of rows in the table, and the table is redrawn.

Reimplemented in [Fl_Table_Row](#).

12.138.4.37 scrollbar_size() [1/2]

```
int Fl_Table::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

12.138.4.38 scrollbar_size() [2/2]

```
void Fl_Table::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting `newSize` to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

12.138.4.39 set_selection()

```
void Fl_Table::set_selection (
    int row_top,
    int col_left,
    int row_bot,
    int col_right )
```

Sets the region of cells to be selected (highlighted).

So for instance, `set_selection(0,0,0,0)` selects the top/left cell in the table. And `set_selection(0,0,1,1)` selects the four cells in rows 0 and 1, column 0 and 1.

To deselect all cells, use `set_selection(-1,-1,-1,-1)`;

Parameters

in	<i>row_top</i>	Top row of selection area
in	<i>col_left</i>	Left column of selection area
in	<i>row_bot</i>	Bottom row of selection area
in	<i>col_right</i>	Right column of selection area

12.138.4.40 tab_cell_nav() [1/2]

```
int Fl_Table::tab_cell_nav ( ) const [inline]
```

Get state of table's 'Tab' key cell navigation flag.

Returns

- 1 if Tab configured to navigate cells in table
- 0 to navigate widget focus (default)

See also

[tab_cell_nav\(int\)](#)

12.138.4.41 tab_cell_nav() [2/2]

```
void Fl_Table::tab_cell_nav (
    int val ) [inline]
```

Flag to control if Tab navigates table cells or not.

If on, Tab key navigates table cells. If off, Tab key navigates fltk widget focus. (default)

As of fltk 1.3, the default behavior of the Tab key is to navigate focus off of the current widget, and on to the next one. But in some applications, it's useful for Tab to be used to navigate cells in the [Fl_Table](#).

Parameters

in	<i>val</i>	If <i>val</i> is 1, Tab key navigates cells in table, not fltk widgets. If <i>val</i> is 0, Tab key will advance focus to the next fltk widget (default), and does not navigate cells in table.
----	------------	--

12.138.4.42 table_box()

```
void Fl_Table::table_box (
    Fl_Boxtype val ) [inline]
```

Sets the kind of box drawn around the data table, the default being FL_NO_BOX. Changing this value will cause the table to redraw.

12.138.4.43 table_resized()

```
void Fl_Table::table_resized ( ) [protected]
```

Call this if table was resized, to recalculate internal data.
Calls `recall_dimensions()`, and recalculates scrollbar sizes.

12.138.4.44 table_scrolled()

```
void Fl_Table::table_scrolled ( ) [protected]
```

Recalculate internals after a scroll.
Call this if table has been scrolled or resized. Does not handle `redraw()`. TODO: Assumes `ti[xywh]` has already been recalculated.

12.138.4.45 top_row() [1/2]

```
int Fl_Table::top_row ( ) [inline]
```

Returns the current top row shown in the table.
This row may be partially obscured.

12.138.4.46 top_row() [2/2]

```
void Fl_Table::top_row (
    int row ) [inline]
```

Sets which row should be at the top of the table, scrolling as necessary, and the table is redrawn.
If the table cannot be scrolled that far, it is scrolled as far as possible.

12.138.4.47 visible_cells()

```
void Fl_Table::visible_cells (
    int & r1,
    int & r2,
    int & c1,
    int & c2 ) [inline]
```

Returns the range of row and column numbers for all visible and partially visible cells in the table. These values can be used e.g. by your `draw_cell()` routine during `CONTEXT_STARTPAGE` to figure out what cells are about to be redrawn for the purposes of locking the data from a database before it's drawn.

```

leftcol      rightcol
:            :
toprow ..  :-----:
|          | V I S I B L E |
|          |   T A B L E   |
|          |-----|
botrow ..  :-----:
```

e.g. in a table where the visible rows are 5-20, and the visible columns are 100-120, then those variables would be:

- `toprow = 5`
- `botrow = 20`
- `leftcol = 100`
- `rightcol = 120`

12.138.4.48 when()

```
void Fl_Table::when (
    Fl_When flags )
```

The `Fl_Widget::when()` function is used to set a group of flags, determining when the widget callback is called:

FL_WHEN_CHANGED	<code>callback()</code> will be called when rows or columns are resized (interactively or via <code>col_width()</code> or <code>row_height()</code>), passing <code>CONTEXT_RC_RESIZE</code> via <code>callback_context()</code> .
FL_WHEN_RELEASE	<code>callback()</code> will be called during <code>FL_RELEASE</code> events, such as when someone releases a mouse button somewhere on the table.

The `callback()` routine is sent a `TableContext` that indicates the context the event occurred in, such as in a cell, in a header, or elsewhere on the table. When an event occurs in a cell or header, `callback_row()` and `callback_col()` can be used to determine the row and column. The callback can also look at the regular fltk event values (ie. `Fl::event()` and `Fl::event_button()`) to determine what kind of event is occurring.

The documentation for this class was generated from the following files:

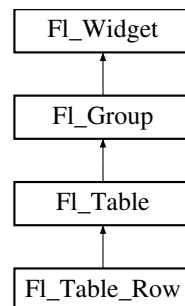
- `Fl_Table.H`
- `Fl_Table.cxx`

12.139 Fl_Table_Row Class Reference

A table with row selection capabilities.

```
#include <Fl_Table_Row.H>
```

Inheritance diagram for `Fl_Table_Row`:



Public Types

- enum `TableRowSelectMode` { `SELECT_NONE` , `SELECT_SINGLE` , `SELECT_MULTI` }

Public Types inherited from `Fl_Table`

- enum `TableContext` {
`CONTEXT_NONE` = 0 , `CONTEXT_STARTPAGE` = 0x01 , `CONTEXT_ENDPAGE` = 0x02 , `CONTEXT_ROW_HEADER`
= 0x04 ,
`CONTEXT_COL_HEADER` = 0x08 , `CONTEXT_CELL` = 0x10 , `CONTEXT_TABLE` = 0x20 , `CONTEXT_RC_RESIZE`
= 0x40 }

The context bit flags for `Fl_Table` related callbacks.

Public Member Functions

- void `clear` () `FL_OVERRIDE`
Clears the table to zero rows (`rows(0)`), zero columns (`cols(0)`), and clears any widgets (`table->clear()`) that were added with `begin()/end()` or `add()/insert()/etc`.
- `Fl_Table_Row` (int X, int Y, int W, int H, const char *l=0)
The constructor for the `Fl_Table_Row`.
- int `row_selected` (int row)
Checks to see if 'row' is selected.
- int `rows` ()
- void `rows` (int val) `FL_OVERRIDE`

- Sets the number of rows in the table, and the table is redrawn.*

 - void `select_all_rows` (int flag=1)
 - This convenience function changes the selection state for all rows based on 'flag'.*
 - int `select_row` (int row, int flag=1)
 - Changes the selection state for 'row', depending on the value of 'flag'.*
 - TableRowSelectionMode **type** () const
 - void `type` (TableRowSelectionMode val)
 - Sets the table selection mode.*
 - `~FI_Table_Row` ()
 - The destructor for the `FI_Table_Row`.*

Public Member Functions inherited from FI_Table

- void `add` (FI_Widget &wgt)
 - The specified widget is removed from its current group (if any) and added to the end of FI_Table's group.*
- void `add` (FI_Widget *wgt)
 - The specified widget is removed from its current group (if any) and added to the end of FI_Table's group.*
- FI_Widget *const * `array` ()
 - Returns a pointer to the array of children.*
- void `begin` ()
- void `callback` (FI_Widget *, void *)
 - Callbacks will be called depending on the setting of FI_Widget::when().*
- int `callback_col` ()
 - Returns the current column the event occurred on.*
- TableContext `callback_context` ()
 - Returns the current 'table context'.*
- int `callback_row` ()
 - Returns the current row the event occurred on.*
- FI_Widget * `child` (int n) const
 - Returns the child widget by an index.*
- int `children` () const
 - Returns the number of children in the table.*
- int `col_header` ()
 - Returns if column headers are enabled or not.*
- void `col_header` (int flag)
 - Enable or disable column headers.*
- FI_Color `col_header_color` ()
 - Gets the color for column headers.*
- void `col_header_color` (FI_Color val)
 - Sets the color for column headers and redraws the table.*
- int `col_header_height` ()
 - Gets the column header height.*
- void `col_header_height` (int height)
 - Sets the height in pixels for column headers and redraws the table.*
- int `col_position` ()
 - Returns the current column scroll position as a column number.*
- void `col_position` (int col)
 - Sets the horizontal scroll position so 'col' is at the left, and causes the screen to redraw.*
- int `col_resize` ()
 - Returns if column resizing by the user is allowed.*
- void `col_resize` (int flag)

- Allows/disallows column resizing by the user.*

 - int **col_resize_min** ()
 - Returns the current column minimum resize value.*
 - void **col_resize_min** (int val)
 - Sets the current column minimum resize value.*
 - int **col_width** (int col)
 - Returns the current width of the specified column in pixels.*
 - void **col_width** (int col, int width)
 - Sets the width of the specified column in pixels, and the table is redrawn.*
 - void **col_width_all** (int width)
 - Convenience method to set the width of all columns to the same value, in pixels.*
 - int **cols** ()
 - Get the number of columns in the table.*
 - virtual void **cols** (int val)
 - Set the number of columns in the table and redraw.*
 - void **do_callback** (TableContext context, int row, int col)
 - Calls the widget callback.*
 - void **end** ()
 - int **find** (const FL_Widget &wgt) const
 - int **find** (const FL_Widget *wgt) const
 - **FL_Table** (int X, int Y, int W, int H, const char *|=0)
 - The constructor for FL_Table.*
 - void **get_selection** (int &row_top, int &col_left, int &row_bot, int &col_right)
 - Gets the region of cells selected (highlighted).*
 - void **init_sizes** ()
 - Resets the internal array of widget sizes and positions.*
 - void **insert** (FL_Widget &wgt, FL_Widget *w2)
 - The specified widget is removed from its current group (if any) and inserted into FL_Table's group before widget 'w2'.*
 - void **insert** (FL_Widget &wgt, int n)
 - The specified widget is removed from its current group (if any) and inserted into the FL_Table's group at position 'n'.*
 - int **is_interactive_resize** ()
 - Returns 1 if someone is interactively resizing a row or column.*
 - int **is_selected** (int r, int c)
 - See if the cell at row r and column c is selected.*
 - int **move_cursor** (int R, int C)
 - Same as move_cursor(R,C,1):.*
 - int **move_cursor** (int R, int C, int shiftselect)
 - Moves the selection cursor a relative number of rows/columns specified by R/C.*
 - void **remove** (FL_Widget &wgt)
 - The specified widget is removed from FL_Table's group.*
 - void **resize** (int X, int Y, int W, int H) **FL_OVERRIDE**
 - Handle resize events if user resizes parent window.*
 - int **row_header** ()
 - Returns if row headers are enabled or not.*
 - void **row_header** (int flag)
 - Enables/disables showing the row headers.*
 - **FL_Color** **row_header_color** ()
 - Returns the current row header color.*
 - void **row_header_color** (FL_Color val)
 - Sets the row header color and causes the screen to redraw.*
 - int **row_header_width** ()

- Returns the current row header width (in pixels).*

 - void **row_header_width** (int width)

Sets the row header width to n and causes the screen to redraw.
- int **row_height** (int row)

Returns the current height of the specified row as a value in pixels.
- void **row_height** (int row, int height)

Sets the height of the specified row in pixels, and the table is redrawn.
- void **row_height_all** (int height)

Convenience method to set the height of all rows to the same value, in pixels.
- int **row_position** ()

Returns the current row scroll position as a row number.
- void **row_position** (int row)

Sets the vertical scroll position so 'row' is at the top, and causes the screen to redraw.
- int **row_resize** ()

Returns if row resizing by the user is allowed.
- void **row_resize** (int flag)

Allows/disallows row resizing by the user.
- int **row_resize_min** ()

Returns the current row minimum resize value.
- void **row_resize_min** (int val)

Sets the current row minimum resize value.
- int **rows** ()

Returns the number of rows in the table.
- int **scrollbar_size** () const

Gets the current size of the scrollbars' troughs, in pixels.
- void **scrollbar_size** (int newSize)

Sets the pixel size of the scrollbars' troughs to newSize, in pixels.
- void **set_selection** (int row_top, int col_left, int row_bot, int col_right)

Sets the region of cells to be selected (highlighted).
- int **tab_cell_nav** () const

Get state of table's 'Tab' key cell navigation flag.
- void **tab_cell_nav** (int val)

Flag to control if Tab navigates table cells or not.
- void **table_box** (FI_Boxtype val)

Sets the kind of box drawn around the data table, the default being FL_NO_BOX.
- FI_Boxtype **table_box** (void)

Returns the current box type used for the data table.
- int **top_row** ()

Returns the current top row shown in the table.
- void **top_row** (int row)

Sets which row should be at the top of the table, scrolling as necessary, and the table is redrawn.
- void **visible_cells** (int &r1, int &r2, int &c1, int &c2)

Returns the range of row and column numbers for all visible and partially visible cells in the table.
- void **when** (FI_When flags)

The FI_Widget::when() function is used to set a group of flags, determining when the widget callback is called:
- ~FI_Table ()

The destructor for FI_Table.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *[&_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
Removes the widget at `index` from the group and deletes it.
- void [end](#) ()
Exactly the same as `current(this->parent())`.
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\) const](#).*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does `insert(w, find(before))`.
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)
Removes the widget `o` from the group.
- void [remove](#) (int index)

- Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget * resizable () const`

Returns the group's resizable widget.
- `void resizable (FI_Widget &o)`

Sets the group's resizable widget.
- `void resizable (FI_Widget *o)`

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FI_Group ()`

The destructor also deletes all the children.

Public Member Functions inherited from FI_Widget

- `void _clear_fullscreen ()`
- `void _set_fullscreen ()`
- `void activate ()`

Activates the widget.
- `unsigned int active () const`

Returns whether the widget is active.
- `int active_r () const`

Returns whether the widget and all of its parents are active.
- `FI_Align align () const`

Gets the label alignment.
- `void align (FI_Align alignment)`

Sets the label alignment.
- `long argument () const`

Gets the current user data (long) argument that is passed to the callback function.
- `void argument (long v)`

Sets the current user data (long) argument that is passed to the callback function.
- `virtual class FI_Gl_Window * as_gl_window ()`

Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- `virtual class FI_Gl_Window const * as_gl_window () const`
- `virtual FI_Window * as_window ()`

Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- `virtual FI_Window const * as_window () const`
- `void bind_deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
- `void bind_deimage (int f)`

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- `void bind_image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.
- `void bind_image (int f)`

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`

Gets the box type of the widget.
- `void box (FI_Boxtype new_box)`

Sets the box type for the widget.
- `FI_Callback_p callback () const`

Gets the current callback function for the widget.
- `void callback (FI_Callback *cb)`

Sets the current callback function for the widget.
- `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback *cb`, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0 *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1 *cb`, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FI_Color bg`, `FI_Color sel`)
- Sets the background and selection color of the widget.*

 - `FI_Color color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image * deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image * deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

- void [deimage](#) ([FI_Image](#) &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [deimage](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- int [deimage_bound](#) () const
 - Returns whether the inactive image is managed by the widget.*
- void [do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with default arguments.*
- void [do_callback](#) ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
- void [do_callback](#) ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
- void [draw_label](#) (int, int, int, int, [FI_Align](#)) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int [h](#) () const
 - Gets the widget height.*
- virtual void [hide](#) ()
 - Makes a widget invisible.*
- [FI_Image](#) * [image](#) ()
 - Gets the image that is used as part of the widget label when in the active state.*
- const [FI_Image](#) * [image](#) () const
 - Gets the image that is used as part of the widget label when in the active state.*
- void [image](#) ([FI_Image](#) &img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [image](#) ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- int [image_bound](#) () const
 - Returns whether the image is managed by the widget.*
- int [inside](#) (const [FI_Widget](#) *wgt) const
 - Checks if this widget is a child of wgt.*
- int [is_label_copied](#) () const
 - Returns whether the current label was assigned with [copy_label\(\)](#).*
- const char * [label](#) () const
 - Gets the current label text.*
- void [label](#) (const char *text)
 - Sets the current label pointer.*
- void [label](#) ([FI_Labeltype](#) a, const char *b)
 - Shortcut to set the label text and type in one call.*
- [FI_Color](#) [labelcolor](#) () const
 - Gets the label color.*
- void [labelcolor](#) ([FI_Color](#) c)
 - Sets the label color.*
- [FI_Font](#) [labelfont](#) () const
 - Gets the font to use.*
- void [labelfont](#) ([FI_Font](#) f)
 - Sets the font to use.*
- [FI_Fontsize](#) [labelsize](#) () const
 - Gets the font size in pixels.*
- void [labelsize](#) ([FI_Fontsize](#) pix)
 - Sets the font size in pixels.*
- [FI_Labeltype](#) [labeltype](#) () const

- Gets the label type.*

 - void `labeltype` (`FI_Labeltype` a)
- Sets the label type.*

 - void `measure_label` (int &ww, int &hh) const
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard` (bool needs)
- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group` * `parent` () const
- Returns a pointer to the parent widget.*

 - void `parent` (`FI_Group` *p)
- Internal use only - "for hacks only".*

 - void `position` (int X, int Y)
- Repositions the window or widget.*

 - void `redraw` ()
- Schedules the drawing of the widget.*

 - void `redraw_label` ()
- Schedules the drawing of the label.*

 - `FI_Color` `selection_color` () const
- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)
- Sets the selection color.*

 - void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()
- Marks the value of the widget as changed.*

 - void `set_output` ()
- Sets a widget to output only.*

 - void `set_visible` ()
- Makes the widget visible.*

 - void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void `show` ()
- Makes a widget visible.*

 - void `size` (int W, int H)
- Changes the size of the widget.*

 - int `take_focus` ()
- Gives the widget the keyboard focus.*

 - unsigned int `takeevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (uchar t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data *v`, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- int `find_cell` (`TableContext` context, int R, int C, int &X, int &Y, int &W, int &H)
- int `handle` (int event) `FL_OVERRIDE`
Handle FLTK events.

Protected Member Functions inherited from [FI_Table](#)

- void **change_cursor** ([FI_Cursor](#) newcursor)
Change mouse cursor to different type.
- long **col_scroll_position** (int col)
Returns the scroll position (in pixels) of the specified column 'col'.
- [TableContext](#) **cursor2rowcol** (int &R, int &C, [ResizeFlag](#) &resizeflag)
Find row/col for the recent mouse event.
- void **damage_zone** (int r1, int c1, int r2, int c2, int r3=0, int c3=0)
Sets the damage zone to the specified row/col values.
- void **draw** () [FL_OVERRIDE](#)
Draws the entire [FI_Table](#).
- virtual void **draw_cell** ([TableContext](#) context, int R=0, int C=0, int X=0, int Y=0, int W=0, int H=0)
Subclass should override this method to handle drawing the cells.
- int **find_cell** ([TableContext](#) context, int R, int C, int &X, int &Y, int &W, int &H)
Find a cell's X/Y/W/H region for the specified cell in row 'R', column 'C'.
- void **get_bounds** ([TableContext](#) context, int &X, int &Y, int &W, int &H)
Returns the (X,Y,W,H) bounding region for the specified 'context'.
- int **is_fltk_container** ()
Does the table contain any child fltk widgets?
- void **recalc_dimensions** ()
Recalculate the dimensions of the table, and affect any children.
- void **redraw_range** (int topRow, int botRow, int leftCol, int rightCol)
Define region of cells to be redrawn by specified range of rows/cols, and then sets damage(DAMAGE_CHILD).
- int **row_col_clamp** ([TableContext](#) context, int &R, int &C)
Return specified row/col values R and C to within the table's current row/col limits.
- long **row_scroll_position** (int row)
Returns the scroll position (in pixels) of the specified 'row'.
- void **table_resized** ()
Call this if table was resized, to recalculate internal data.
- void **table_scrolled** ()
Recalculate internals after a scroll.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * **bounds** ()
Returns the internal array of widget sizes and positions.
- void **draw_child** ([FI_Widget](#) &widget) const
Forces a child to redraw.
- void **draw_children** ()
Draws all children of the group.
- void **draw_outside_label** (const [FI_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int **on_insert** ([FI_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int **on_move** (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void **on_remove** (int)
Allow derived groups to act when a child widget is removed from the group.
- int * **sizes** ()
Returns the internal array of widget sizes and positions.
- void **update_child** ([FI_Widget](#) &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from FI_Group

- static FI_Group * **current** ()
Returns the currently active group.
- static void **current** (FI_Group *g)
Sets the current group.

Static Public Member Functions inherited from FI_Widget

- static void **default_callback** (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Table](#)

- enum **ResizeFlag** {
RESIZE_NONE = 0 , **RESIZE_COL_LEFT** = 1 , **RESIZE_COL_RIGHT** = 2 , **RESIZE_ROW_ABOVE** = 3 ,
RESIZE_ROW_BELOW = 4 }

Protected Types inherited from [FI_Widget](#)

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
, **OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
, **MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
, **GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }

flags possible values enumeration.

Static Protected Member Functions inherited from [FI_Table](#)

- static void **scroll_cb** ([FI_Widget](#) *, void *)
Callback for when someone moves a scrollbar.

Protected Attributes inherited from [FI_Table](#)

- int **botrow**
bottom row# of currently visible table on screen
- int **current_col**
selection cursor's current column (-1 if none)
- int **current_row**
selection cursor's current row (-1 if none)
- [FI_Scrollbar](#) * **hscrollbar**
child horizontal scrollbar widget
- int **leftcol**
left column# of currently visible table on screen
- int **leftcol_scrollpos**
precomputed scroll position for left column
- int **rightcol**
right column# of currently visible table on screen
- int **select_col**
extended selection column (-1 if none)
- int **select_row**
extended selection row (-1 if none)
- [FI_Scroll](#) * **table**
child [FI_Scroll](#) widget container for child fltk widgets (if any)
- int **table_h**
table's virtual height (in pixels)
- int **table_w**
table's virtual width (in pixels)

- int **tih**
Data table's inner h dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **tiw**
Data table's inner w dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **tix**
Data table's inner x dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **tiy**
Data table's inner y dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **toh**
Data table's outer h dimension, outside bounding box. See [Table Dimension Diagram](#).
- int **toprow**
top row# of currently visible table on screen
- int **toprow_scrollpos**
precomputed scroll position for top row
- int **tow**
Data table's outer w dimension, outside bounding box. See [Table Dimension Diagram](#).
- int **tox**
Data table's outer x dimension, outside bounding box. See [Table Dimension Diagram](#).
- int **toy**
Data table's outer y dimension, outside bounding box. See [Table Dimension Diagram](#).
- [FI_Scrollbar](#) * **vscrollbar**
child vertical scrollbar widget
- int **wih**
Table widget's inner h dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **wiw**
Table widget's inner w dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **wix**
Table widget's inner x dimension, inside bounding box. See [Table Dimension Diagram](#).
- int **wiy**
Table widget's inner y dimension, inside bounding box. See [Table Dimension Diagram](#).

12.139.1 Detailed Description

A table with row selection capabilities.

This class implements a simple table with the ability to select rows. This widget is similar to an [FI_Browser](#) with columns. Most methods of importance will be found in the [FI_Table](#) widget, such as [FI_Table::rows\(\)](#) and [FI_Table::cols\(\)](#).

To be useful it must be subclassed and at minimum the [draw_cell\(\)](#) method must be overridden to provide the content of the cells. This widget does *not* manage the cell's data content; it is up to the parent class's [draw_cell\(\)](#) method override to provide this.

Events on the cells and/or headings generate callbacks when they are clicked by the user. You control when events are generated based on the values you supply for [FI_Table::when\(\)](#).

12.139.2 Constructor & Destructor Documentation

12.139.2.1 FI_Table_Row()

```
FI_Table_Row::FI_Table_Row (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 ) [inline]
```

The constructor for the [FI_Table_Row](#).

This creates an empty table with no rows or columns, with headers and row/column resize behavior disabled.

12.139.2.2 ~Fl_Table_Row()

```
Fl_Table_Row::~Fl_Table_Row ( ) [inline]
```

The destructor for the [Fl_Table_Row](#).

Destroys the table and its associated widgets.

12.139.3 Member Function Documentation

12.139.3.1 clear()

```
void Fl_Table_Row::clear ( ) [inline], [virtual]
```

Clears the table to zero rows (`rows(0)`), zero columns (`cols(0)`), and clears any widgets (`table->clear()`) that were added with `begin()/end()` or `add()/insert()/etc.`

See also

[rows\(int\), cols\(int\)](#)

Reimplemented from [Fl_Table](#).

12.139.3.2 handle()

```
int Fl_Table_Row::handle (
    int e ) [protected], [virtual]
```

Handle FLTK events.

Reimplemented from [Fl_Table](#).

12.139.3.3 row_selected()

```
int Fl_Table_Row::row_selected (
    int row )
```

Checks to see if 'row' is selected.

Returns 1 if selected, 0 if not. You can change the selection of a row by clicking on it, or by using [select_row\(row, flag\)](#)

12.139.3.4 rows()

```
void Fl_Table_Row::rows (
    int val ) [virtual]
```

Sets the number of rows in the table, and the table is redrawn.

Reimplemented from [Fl_Table](#).

12.139.3.5 select_all_rows()

```
void Fl_Table_Row::select_all_rows (
    int flag = 1 )
```

This convenience function changes the selection state for *all* rows based on 'flag'.

0=deselect, 1=select, 2=toggle existing state.

12.139.3.6 select_row()

```
int Fl_Table_Row::select_row (
    int row,
    int flag = 1 )
```

Changes the selection state for 'row', depending on the value of 'flag'.

0=deselected, 1=select, 2=toggle existing state.

12.139.3.7 type()

```
void Fl_Table_Row::type (
    TableRowSelectMode val )
```

Sets the table selection mode.

- `Fl_Table_Row::SELECT_NONE` - No selection allowed
- `Fl_Table_Row::SELECT_SINGLE` - Only single rows can be selected
- `Fl_Table_Row::SELECT_MULTI` - Multiple rows can be selected

The documentation for this class was generated from the following files:

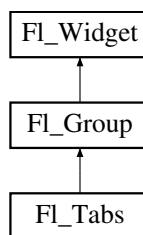
- `Fl_Table_Row.H`
- `Fl_Table_Row.cxx`

12.140 Fl_Tabs Class Reference

The `Fl_Tabs` widget is a container widget that displays a set of tabs, with each tab representing a different child widget.

```
#include <Fl_Tabs.H>
```

Inheritance diagram for `Fl_Tabs`:



Public Types

- enum { `OVERFLOW_COMPRESS` = 0, `OVERFLOW_CLIP`, `OVERFLOW_PULLDOWN`, `OVERFLOW_DRAG` }

Public Member Functions

- void `client_area` (int &rx, int &ry, int &rw, int &rh, int tabh=0)
Returns the position and size available to be used by its children.
- `Fl_Tabs` (int X, int Y, int W, int H, const char *L=0)
Creates a new `Fl_Tabs` widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handle all events in the tabs area and forward the rest to the selected child.
- void `handle_overflow` (int ov)
Set a method to handle an overflowing tab bar.
- `Fl_Widget *` `push` () const
Returns the tab group for the tab the user has currently down-clicked on and remains over until `FL_RELEASE`.
- int `push` (`Fl_Widget *`)
This is called by the tab widget's `handle()` method to set the tab group widget the user last `FL_PUSH`'ed on.
- `Fl_Align` `tab_align` () const
Gets the tab label alignment.
- void `tab_align` (`Fl_Align` a)
Sets the tab label alignment.
- `Fl_Widget *` `value` ()
Gets the currently visible widget/tab.
- int `value` (`Fl_Widget *`)
Sets the widget to become the current visible widget/tab.
- virtual `Fl_Widget *` `which` (int event_x, int event_y)
Return a pointer to the child widget with a tab at the given coordinates.
- virtual `~Fl_Tabs` ()
Delete allocated resources and destroy all children.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *[&_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void [add_resizable](#) ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FI_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FI_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FI_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
Removes the widget at `index` from the group and deletes it.
- void [end](#) ()
Exactly the same as `current(this->parent())`.
- int [find](#) (const [FI_Widget](#) &o) const
*See int [FI_Group::find\(const FI_Widget *w\) const](#).*
- int [find](#) (const [FI_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FI_Group](#) (int, int, int, int, const char *s=0)
Creates a new [FI_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FI_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FI_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FI_Widget](#) &o, [FI_Widget](#) *before)
This does `insert(w, find(before))`.
- void [remove](#) ([FI_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FI_Widget](#) *o)
Removes the widget `o` from the group.
- void [remove](#) (int index)

- Removes the widget at `index` from the group but does not delete it.*

 - `FI_Widget * resizable () const`
Returns the group's resizable widget.
 - `void resizable (FI_Widget &o)`
Sets the group's resizable widget.
 - `void resizable (FI_Widget *o)`
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
 - `virtual ~FI_Group ()`
The destructor also deletes all the children.

Public Member Functions inherited from `FI_Widget`

- `void _clear_fullscreen ()`
- `void _set_fullscreen ()`
- `void activate ()`
Activates the widget.
- `unsigned int active () const`
Returns whether the widget is active.
- `int active_r () const`
Returns whether the widget and all of its parents are active.
- `FI_Align align () const`
Gets the label alignment.
- `void align (FI_Align alignment)`
Sets the label alignment.
- `long argument () const`
Gets the current user data (long) argument that is passed to the callback function.
- `void argument (long v)`
Sets the current user data (long) argument that is passed to the callback function.
- `virtual class FI_Gl_Window * as_gl_window ()`
Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- `virtual class FI_Gl_Window const * as_gl_window () const`
- `virtual FI_Window * as_window ()`
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- `virtual FI_Window const * as_window () const`
- `void bind_deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void bind_deimage (int f)`
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- `void bind_image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `void bind_image (int f)`
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`
Gets the box type of the widget.
- `void box (FI_Boxtype new_box)`
Sets the box type for the widget.
- `FI_Callback_p callback () const`
Gets the current callback function for the widget.
- `void callback (FI_Callback *cb)`
Sets the current callback function for the widget.
- `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback *cb`, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0 *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1 *cb`, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FI_Color bg`, `FI_Color sel`)
- Sets the background and selection color of the widget.*

 - `FI_Color color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image * deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image * deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

- void [deimage](#) ([Fl_Image](#) &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [deimage](#) ([Fl_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- int [deimage_bound](#) () const
 - Returns whether the inactive image is managed by the widget.*
- void [do_callback](#) ([Fl_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with default arguments.*
- void [do_callback](#) ([Fl_Widget](#) *widget, long arg, [Fl_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
- void [do_callback](#) ([Fl_Widget](#) *widget, void *arg=0, [Fl_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
- void [draw_label](#) (int, int, int, int, [Fl_Align](#)) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int [h](#) () const
 - Gets the widget height.*
- virtual void [hide](#) ()
 - Makes a widget invisible.*
- [Fl_Image](#) * [image](#) ()
 - Gets the image that is used as part of the widget label when in the active state.*
- const [Fl_Image](#) * [image](#) () const
 - Gets the image that is used as part of the widget label when in the active state.*
- void [image](#) ([Fl_Image](#) &img)
 - Sets the image to use as part of the widget label when in the active state.*
- void [image](#) ([Fl_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*
- int [image_bound](#) () const
 - Returns whether the image is managed by the widget.*
- int [inside](#) (const [Fl_Widget](#) *wgt) const
 - Checks if this widget is a child of wgt.*
- int [is_label_copied](#) () const
 - Returns whether the current label was assigned with [copy_label\(\)](#).*
- const char * [label](#) () const
 - Gets the current label text.*
- void [label](#) (const char *text)
 - Sets the current label pointer.*
- void [label](#) ([Fl_Labeltype](#) a, const char *b)
 - Shortcut to set the label text and type in one call.*
- [Fl_Color](#) [labelcolor](#) () const
 - Gets the label color.*
- void [labelcolor](#) ([Fl_Color](#) c)
 - Sets the label color.*
- [Fl_Font](#) [labelfont](#) () const
 - Gets the font to use.*
- void [labelfont](#) ([Fl_Font](#) f)
 - Sets the font to use.*
- [Fl_Fontsize](#) [labelsize](#) () const
 - Gets the font size in pixels.*
- void [labelsize](#) ([Fl_Fontsize](#) pix)
 - Sets the font size in pixels.*
- [Fl_Labeltype](#) [labeltype](#) () const

- Gets the label type.*

 - void `labeltype` (`FI_Labeltype` a)
- Sets the label type.*

 - void `measure_label` (int &ww, int &hh) const
- Sets width ww and height hh accordingly with the label size.*

 - bool `needs_keyboard` () const
- Returns whether this widget needs a keyboard.*

 - void `needs_keyboard` (bool needs)
- Sets whether this widget needs a keyboard.*

 - unsigned int `output` () const
- Returns if a widget is used for output only.*

 - `FI_Group` * `parent` () const
- Returns a pointer to the parent widget.*

 - void `parent` (`FI_Group` *p)
- Internal use only - "for hacks only".*

 - void `position` (int X, int Y)
- Repositions the window or widget.*

 - void `redraw` ()
- Schedules the drawing of the widget.*

 - void `redraw_label` ()
- Schedules the drawing of the label.*

 - `FI_Color` `selection_color` () const
- Gets the selection color.*

 - void `selection_color` (`FI_Color` a)
- Sets the selection color.*

 - void `set_active` ()
- Marks the widget as active without sending events or changing focus.*

 - void `set_changed` ()
- Marks the value of the widget as changed.*

 - void `set_output` ()
- Sets a widget to output only.*

 - void `set_visible` ()
- Makes the widget visible.*

 - void `set_visible_focus` ()
- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void `shortcut_label` (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void `show` ()
- Makes a widget visible.*

 - void `size` (int W, int H)
- Changes the size of the widget.*

 - int `take_focus` ()
- Gives the widget the keyboard focus.*

 - unsigned int `takeevents` () const
- Returns if the widget is able to take events.*

 - int `test_shortcut` ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * `tooltip` () const
- Gets the current tooltip text.*

- void **tooltip** (const char *text)
Sets the current tooltip text.
- **Fl_Window** * **top_window** () const
Returns a pointer to the top-level window for the widget.
- **Fl_Window** * **top_window_offset** (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- **uchar** **type** () const
Gets the widget type.
- void **type** (uchar t)
Sets the widget type.
- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (**Fl_Callback_User_Data** *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- **Fl_When** **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- **Fl_Window** * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual **~Fl_Widget** ()
Destroys the widget.

Protected Member Functions

- void **check_overflow_menu** ()
Check if the tabs overflow and sets the has_overflow_menu flag accordingly.
- virtual void **clear_tab_positions** ()
Clear internal array of tab positions and widths.
- void **draw** () **FL_OVERRIDE**
Draw the tabs area, the optional pulldown button, and all children.
- void **draw_overflow_menu_button** ()
Draw square button-like graphics with a down arrow in the top or bottom right corner.

- virtual void `draw_tab` (int x1, int x2, int W, int H, `FI_Widget` *o, int flags, int sel)
 - Draw a tab in the top or bottom tabs area.*
- void `handle_overflow_menu` ()
 - This is called when the user clicks the overflow pulldown menu button.*
- virtual int `hit_close` (`FI_Widget` *o, int event_x, int event_y)
 - Check whether the coordinates fall within the "close" button area of the tab.*
- virtual int `hit_overflow_menu` (int event_x, int event_y)
 - Determine if the coordinates are in the area of the overflow menu button.*
- virtual int `hit_tabs_area` (int event_x, int event_y)
 - Determine if the coordinates are within the tabs area.*
- int `on_insert` (`FI_Widget` *, int) `FL_OVERRIDE`
 - Make sure that we redraw all tabs when new children are added.*
- int `on_move` (int, int) `FL_OVERRIDE`
 - Make sure that we redraw all tabs when children are moved.*
- void `on_remove` (int) `FL_OVERRIDE`
 - Make sure that we redraw all tabs when new children are removed.*
- virtual void `redraw_tabs` ()
 - Redraw all tabs (and only the tabs).*
- void `resize` (int, int, int, int) `FL_OVERRIDE`
 - Make sure that we redraw all tabs when the widget size changes.*
- virtual int `tab_height` ()
 - Return space (height) in pixels usable for tabs.*
- virtual int `tab_positions` ()
 - Calculate tab positions and widths.*

Protected Member Functions inherited from `FI_Group`

- `FI_Rect` * `bounds` ()
 - Returns the internal array of widget sizes and positions.*
- void `draw_child` (`FI_Widget` &widget) const
 - Forces a child to redraw.*
- void `draw_children` ()
 - Draws all children of the group.*
- void `draw_outside_label` (const `FI_Widget` &widget) const
 - Parents normally call this to draw outside labels of child widgets.*
- int * `sizes` ()
 - Returns the internal array of widget sizes and positions.*
- void `update_child` (`FI_Widget` &widget) const
 - Draws a child only if it needs it.*

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
 - Clears a flag in the flags mask.*
- void `draw_backdrop` () const
 - If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.*
- void `draw_box` () const
 - Draws the widget box according its box style.*
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
 - Draws a box of type t, of color c at the widget's position and size.*
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const

- Draws a box of type t, of color c at the position X,Y and size W,H.*

 - void `draw_focus` () const
- Draws a focus rectangle around the widget.*

 - void `draw_focus` (FI_Boxtype t, int X, int Y, int W, int H) const
- Draws a focus rectangle around the widget.*

 - void `draw_focus` (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
- Draws a focus box for the widget at the given position and size.*

 - void `draw_label` () const
- Draws the widget's label at the defined label position.*

 - void `draw_label` (int, int, int, int) const
- Draws the label in an arbitrary bounding box.*

 - `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
- Creates a widget at the given position and size.*

 - unsigned int `flags` () const
- Gets the widget flags mask.*

 - void `h` (int v)
- Internal use only.*

 - void `set_flag` (unsigned int c)
- Sets a flag in the flags mask.*

 - void `w` (int v)
- Internal use only.*

 - void `x` (int v)
- Internal use only.*

 - void `y` (int v)
- Internal use only.*

Protected Attributes

- int `has_overflow_menu`
 - set in OVERFLOW_PULLDOWN mode if tabs overflow. The actual menu array is created only on demand*
- int `overflow_type`
- `FI_Align` `tab_align_`
 - tab label alignment*
- int `tab_count`
 - Array size of tab positions etc.*
- int * `tab_flags`
 - Array of tab flag of tabs per child.*
- int `tab_offset`
 - for pulldown and drag overflow, this is the horizontal offset when the tabs bar is dragged by the user*
- int * `tab_pos`
 - Array of x-offsets of tabs per child + 1.*
- int * `tab_width`
 - Array of widths of tabs per child.*

Additional Inherited Members

Static Public Member Functions inherited from FI_Group

- static `FI_Group` * `current` ()
 - Returns the currently active group.*
- static void `current` (`FI_Group` *g)
 - Sets the current group.*

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.140.1 Detailed Description

The [FI_Tabs](#) widget is a container widget that displays a set of tabs, with each tab representing a different child widget.

The user can select a tab by clicking on it, and the corresponding child widget will be displayed. The [FI_Tabs](#) widget is useful for organizing a large number of controls or other widgets into a compact space, allowing the user to switch between different sets of controls as needed.

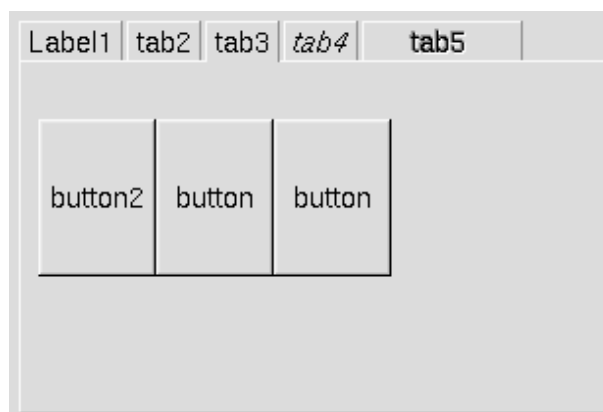


Figure 12.50 [FI_Tabs](#)

Clicking the tab makes a child [visible\(\)](#) by calling [show\(\)](#) on it, and all other children are made invisible by calling [hide\(\)](#) on them. Usually the children are [FI_Group](#) widgets containing several widgets themselves.

Each child makes a card, and its [label\(\)](#) is printed on the card tab, including the label font and style. The selection color of that child is used to color the tab, while the color of the child determines the background color of the pane. '&' in labels are used to prefix a shortcut that is drawn underlined and that activates the corresponding tab; repeated '&&' avoids that.

The size of the tabs is controlled by the bounding box of the children (there should be some space between the children and the edge of the `Fl_Tabs`), and the tabs may be placed "inverted" on the bottom - this is determined by which gap is larger. It is easiest to lay this out in FLUID, using the FLUID browser to select each child group and resize them until the tabs look the way you want them to.

The background area behind and to the right of the tabs is "transparent", exposing the background detail of the parent. The value of `Fl_Tabs::box()` does not affect this area. So if `Fl_Tabs` is resized by itself without the parent, force the appropriate parent (visible behind the tabs) to `redraw()` to prevent artifacts.

See "Resizing Caveats" below on how to keep tab heights constant. See "Callback's Use Of `when()`" on how to control the details of how clicks invoke the `callback()`.

A typical use of the `Fl_Tabs` widget:

```
// Typical use of Fl_Tabs
Fl_Tabs *tabs = new Fl_Tabs(10,10,300,200);
{
  Fl_Group *grp1 = new Fl_Group(20,30,280,170,"Tab1");
  {
    ..widgets that go in tab#1..
  }
  grp1->end();
  Fl_Group *grp2 = new Fl_Group(20,30,280,170,"Tab2");
  {
    ..widgets that go in tab#2..
  }
  grp2->end();
}
tabs->end();
```

Default Appearance

The appearance of each "tab" is taken from the `label()` and `color()` of the child group corresponding to that "tab" and panel. Where the "tabs" appear depends on the position and size of the child groups that make up the panels within the `Fl_Tabs` widget, i.e. whether there is more space above or below them. The height of the "tabs" depends on how much free space is available.

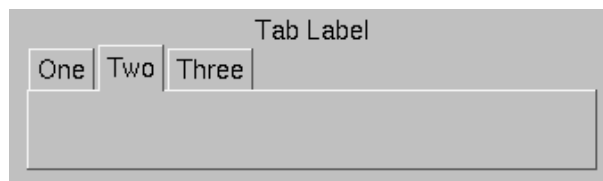


Figure 12.51 `Fl_Tabs` Default Appearance

Highlighting The Selected Tab

The selected "tab" can be highlighted further by setting the `selection_color()` of the `Fl_Tab` itself, e.g.

```
..
tabs = new Fl_Tabs(..);
tabs->selection_color(FL_DARK3);
..
```

The result of the above looks like:

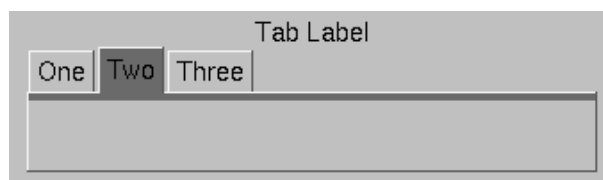


Figure 12.52 Highlighting the selected tab

Uniform Tab and Panel Appearance

In order to have uniform tab and panel appearance, not only must the `color()` and `selection_color()` for each child group be set, but also the `selection_color()` of the `Fl_Tab` itself any time a new "tab" is selected. This can be achieved within the `Fl_Tab` callback, e.g.

```

void MyTabCallback(Fl_Widget *w, void*) {
    Fl_Tabs *tabs = (Fl_Tabs*)w;
    // When tab changed, make sure it has same color as its group
    tabs->selection_color( (tabs->value()->color() );
}
..
int main(..) {
    // Define tabs widget
    tabs = new Fl_Tabs(..);
    tabs->callback(MyTabCallback);

    // Create three tabs each colored differently
    grp1 = new Fl_Group(.. "One");
    grp1->color(9);
    grp1->selection_color(9);
    grp1->end();

    grp2 = new Fl_Group(.. "Two");
    grp2->color(10);
    grp2->selection_color(10);
    grp2->end();

    grp3 = new Fl_Group(.. "Three");
    grp3->color(14);
    grp3->selection_color(14);
    grp3->end();
    ..
    // Make sure default tab has same color as its group
    tabs->selection_color( (tab->value()->color() );
    ..
    return Fl::run();
}

```

The result of the above looks like:

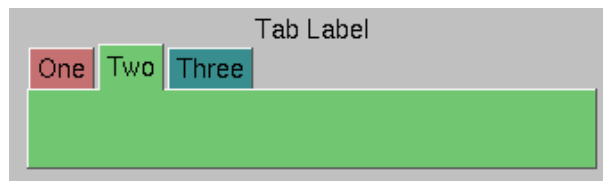


Figure 12.53 `Fl_Tabs` with uniform colors

If `Fl_Tabs` has no children, the widget will be drawn as a flat rectangle in the background color set by `color()`.

Close Button on Tabs

The `Fl_Tabs` widget allows you to specify that a child widget should display a close button in its tab. If the `FL_WHEN_CLOSED` flag is set for the child widget, an "X" symbol will be displayed to the left of the label text in the tab. When the close button is clicked, the child widget's callback function will be called with the `FL_REASON_CLOSED` reason. It is then the responsibility of the child widget to remove itself from the `Fl_Tabs` container.

Tabs that are in a compressed state will not display a close button until they are fully expanded.

Overflowing Tabs

When the combined width of the tabs exceeds that of the `Fl_Tabs` widget, the tabs will overflow. `Fl_Tabs` provides four options for managing tabs overflow:

- `Fl_Tabs::OVERFLOW_COMPRESS`: proportionally compress the tabs to the left and right of the selected tab until they all fit within the widget.
- `Fl_Tabs::OVERFLOW_CLIP`: clips any tabs that extend beyond the right edge of the `Fl_Tabs` widget, making some tabs unreachable.
- `Fl_Tabs::OVERFLOW_PULLDOWN`: doesn't compress the tabs but instead generates a pulldown menu at the right end of the tabs area, displaying all available tabs.
- `Fl_Tabs::OVERFLOW_DRAG`: maintains the tabs' original sizes, allowing horizontal dragging of the tabs area using the mouse, a horizontal mouse wheel, or the horizontal scrolling gesture on touchpads.

Resizing Caveats

When `Fl_Tabs` is resized vertically, the default behavior scales the tab's height as well as its children. To keep the tab height constant during resizing, set the tab widget's `resizable()` to one of the tab's child groups, i.e.

```

tabs = new Fl_Tabs(..);
grp1 = new Fl_Group(..);
..
grp2 = new Fl_Group(..);
..
tabs->end();
tabs->resizable(grp1);      // keeps tab height constant

```

Callback's Use Of when()

As of FLTK 1.3.3, `Fl_Tabs()` supports the following flags for `when()`:

- `FL_WHEN_NEVER` – callback never invoked (all flags off)
- `FL_WHEN_CHANGED` – if flag set, invokes callback when a tab has been changed (on click or keyboard navigation)
- `FL_WHEN_NOT_CHANGED` – if flag set, invokes callback when the tabs remain unchanged (on click or keyboard navigation)
- `FL_WHEN_RELEASE` – if flag set, invokes callback on RELEASE of mouse button or keyboard navigation

Notes:

1. The above flags can be logically OR-ed (`|`) or added (`+`) to combine behaviors.
2. The default value for `when()` is `FL_WHEN_RELEASE` (inherited from `Fl_Widget`).
3. If `FL_WHEN_RELEASE` is the *only* flag specified, the behavior will be as if (`FL_WHEN_RELEASE|FL_WHEN_CHANGED`) was specified.
4. The value of `changed()` will be valid during the callback.
5. If both `FL_WHEN_CHANGED` and `FL_WHEN_NOT_CHANGED` are specified, the callback is invoked whether the tab has been changed or not. The `changed()` method can be used to determine the cause.
6. `FL_WHEN_NOT_CHANGED` can happen if someone clicks on an already selected tab, or if a keyboard navigation attempt results in no change to the tabs, such as using the arrow keys while at the left or right end of the tabs.
7. `Fl::callback_reason()` returns `FL_REASON_SELECTED` or `FL_REASON_RESELECTED`

12.140.2 Member Enumeration Documentation

12.140.2.1 anonymous enum

anonymous enum

Enumerator

<code>OVERFLOW_COMPRESS</code>	Tabs will be compressed and overlaid on top of each other.
<code>OVERFLOW_CLIP</code>	Only the first tabs that fit will be displayed.
<code>OVERFLOW_PULLDOWN</code>	Tabs that do not fit will be placed in a pull-down menu.
<code>OVERFLOW_DRAG</code>	The tab bar can be dragged horizontally to reveal additional tabs.

12.140.3 Constructor & Destructor Documentation

12.140.3.1 Fl_Tabs()

`Fl_Tabs::Fl_Tabs (`

```

int X,
int Y,
int W,
int H,
const char * L = 0 )

```

Creates a new [Fl_Tabs](#) widget using the given position, size, and label string.

The default boxtype is `FL_THIN_UP_BOX`.

Use [add\(Fl_Widget*\)](#) to add each child, which are usually [Fl_Group](#) widgets. The children should be sized to stay away from the top or bottom edge of the [Fl_Tabs](#) widget, which is where the tabs will be drawn.

All children of [Fl_Tabs](#) should have the same size and exactly fit on top of each other. They should only leave space above or below where the tabs will go, but not on the sides. If the first child of [Fl_Tabs](#) is set to "resizable()", the riders will not resize when the tabs are resized.

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [Fl_Tabs](#) and all of its children can be automatic (local) variables, but you must declare the [Fl_Tabs](#) widget *first* so that it is destroyed last.

12.140.4 Member Function Documentation

12.140.4.1 clear_tab_positions()

```
void Fl_Tabs::clear_tab_positions ( ) [protected], [virtual]
```

Clear internal array of tab positions and widths.

See also

[tab_positions\(\)](#).

12.140.4.2 client_area()

```
void Fl_Tabs::client_area (
    int & rx,
    int & ry,
    int & rw,
    int & rh,
    int tabh = 0 )

```

Returns the position and size available to be used by its children.

If there isn't any child yet the `tabh` parameter will be used to calculate the return values. This assumes that the children's labelsize is the same as the [Fl_Tabs](#)' labelsize and adds a small border.

If there are already children, the values of `child(0)` are returned, and `tabh` is ignored.

Note

Children should always use the same positions and sizes.

`tabh` can be one of

- 0: calculate label size, tabs on top
- -1: calculate label size, tabs on bottom
- > 0: use given `tabh` value, tabs on top (height = `tabh`)
- < -1: use given `tabh` value, tabs on bottom (height = `-tabh`)

Parameters

in	<i>tabh</i>	position and optional height of tabs (see above)
out	<i>rx,ry,rw,rh</i>	(x,y,w,h) of client area for children

Since

FLTK 1.3.0

12.140.4.3 draw()

```
void Fl_Tabs::draw (
    void ) [protected], [virtual]
```

Draw the tabs area, the optional pulldown button, and all children.
Reimplemented from [Fl_Group](#).

12.140.4.4 draw_tab()

```
void Fl_Tabs::draw_tab (
    int x1,
    int x2,
    int W,
    int H,
    Fl_Widget * o,
    int flags,
    int what ) [protected], [virtual]
```

Draw a tab in the top or bottom tabs area.

Tabs can be selected, or on the left or right side of the selected tab. If overlapping, left tabs are drawn bottom to top using clipping. The selected tab is then the topmost, followed by the right side tabs drawn top to bottom.

Tabs with the FL_WHEN_CLOSE bit set will draw a cross on their left side only if they are not compressed/overlapping.

Parameters

in	<i>x1</i>	horizontal position of the left visible edge of the tab
in	<i>x2</i>	horizontal position of the following tab
in	<i>W,H</i>	width and height of the tab
in	<i>o</i>	the child widget that corresponds to this tab
in	<i>flags</i>	if bit 1 is set, this tab is overlapped by another tab
in	<i>what</i>	can be LEFT, SELECTED, or RIGHT to indicate if the tab is to the left side or the right side of the selected tab, or the selected tab itself

12.140.4.5 handle()

```
int Fl_Tabs::handle (
    int event ) [virtual]
```

Handle all events in the tabs area and forward the rest to the selected child.

Parameters

in	<i>event</i>	handle this event
----	--------------	-------------------

Returns

1 if the event was handled

Reimplemented from [Fl_Group](#).

12.140.4.6 handle_overflow()

```
void Fl_Tabs::handle_overflow (
    int ov )
```

Set a method to handle an overflowing tab bar.

The [Fl_Tabs](#) widget allows you to specify how to handle the situation where there are more tabs than can be displayed at once. The available options are:

- `OVERFLOW_COMPRESS`: Tabs will be compressed and overlaid on top of each other.
- `OVERFLOW_CLIP`: Only the first tabs that fit will be displayed.
- `OVERFLOW_PULLDOWN`: Tabs that do not fit will be placed in a pull-down menu.
- `OVERFLOW_DRAG`: The tab bar can be dragged horizontally to reveal additional tabs.

You can set the desired behavior using the `overflow()` method.

Parameters

<i>ov</i>	overflow type
-----------	---------------

See also

[OVERFLOW_COMPRESS](#), [OVERFLOW_CLIP](#), [OVERFLOW_PULLDOWN](#), [OVERFLOW_DRAG](#)

12.140.4.7 `handle_overflow_menu()`

```
void Fl_Tabs::handle_overflow_menu ( ) [protected]
```

This is called when the user clicks the overflow pulldown menu button.

This method creates a menu item array that contains the titles of all tabs in the [Fl_Tabs](#) group. Visible and invisible tabs are separated by dividers to indicate their state.

The menu is then presented until the user selects an item or cancels. The chosen tab is then selected and made visible.

The menu item array is then deleted.

12.140.4.8 `hit_close()`

```
int Fl_Tabs::hit_close (
    Fl_Widget * o,
    int event_x,
    int event_y ) [protected], [virtual]
```

Check whether the coordinates fall within the "close" button area of the tab.

The `Fl_Tabs::hit_close()` method checks whether the given event coordinates fall within the area of the "close" button on the tab of the specified child widget. This method should be called after the `Fl_Tabs::which()` method, which updates a lookup table used to determine the width of each tab.

Parameters

<i>o</i>	check the tab of this widget
<i>event_x, event_y</i>	event coordinates

Returns

1 if we hit the close button, and 0 otherwise

12.140.4.9 `hit_overflow_menu()`

```
int Fl_Tabs::hit_overflow_menu (
    int event_x,
    int event_y ) [protected], [virtual]
```

Determine if the coordinates are in the area of the overflow menu button.

Parameters

<i>event_x, event_y</i>	event coordinates
-------------------------	-------------------

Returns

1 if we hit the overflow menu button, and 0 otherwise

12.140.4.10 hit_tabs_area()

```
int Fl_Tabs::hit_tabs_area (
    int event_x,
    int event_y ) [protected], [virtual]
```

Determine if the coordinates are within the tabs area.

Parameters

<i>event_x, event_y</i>	event coordinates
-------------------------	-------------------

Returns

1 if we hit the tabs area, and 0 otherwise

12.140.4.11 on_insert()

```
int Fl_Tabs::on_insert (
    Fl_Widget * candidate,
    int index ) [protected], [virtual]
```

Make sure that we redraw all tabs when new children are added.
Reimplemented from [Fl_Group](#).

12.140.4.12 on_move()

```
int Fl_Tabs::on_move (
    int a,
    int b ) [protected], [virtual]
```

Make sure that we redraw all tabs when children are moved.
Reimplemented from [Fl_Group](#).

12.140.4.13 on_remove()

```
void Fl_Tabs::on_remove (
    int index ) [protected], [virtual]
```

Make sure that we redraw all tabs when new children are removed.
Reimplemented from [Fl_Group](#).

12.140.4.14 push() [1/2]

```
Fl_Widget * Fl_Tabs::push ( ) const [inline]
```

Returns the tab group for the tab the user has currently down-clicked on and remains over until FL_RELEASE.
Otherwise, returns NULL.

While the user is down-clicked on a tab, the return value is the tab group for that tab. But as soon as the user releases, or drags off the tab with the button still down, the return value will be NULL.

See also

[push\(Fl_Widget*\)](#).

12.140.4.15 push() [2/2]

```
int Fl_Tabs::push (
    Fl_Widget * o )
```

This is called by the tab widget's [handle\(\)](#) method to set the tab group widget the user last FL_PUSH'ed on. Set back to zero on FL_RELEASE.

As of this writing, the value is mainly used by [draw_tab\(\)](#) to determine whether or not to draw a 'down' box for the tab when it's clicked, and to turn it off if the user drags off it.

See also

[push\(\)](#).

12.140.4.16 redraw_tabs()

```
void Fl_Tabs::redraw_tabs ( ) [protected], [virtual]
```

Redraw all tabs (and only the tabs).

This method sets the Fl_Tab's damage flags so the tab area is redrawn.

12.140.4.17 resize()

```
void Fl_Tabs::resize (
    int X,
    int Y,
    int W,
    int H ) [protected], [virtual]
```

Make sure that we redraw all tabs when the widget size changes.

Reimplemented from [Fl_Group](#).

12.140.4.18 tab_align() [1/2]

```
Fl_Align Fl_Tabs::tab_align ( ) const [inline]
```

Gets the tab label alignment.

See also

[tab_align\(Fl_Align\)](#)

12.140.4.19 tab_align() [2/2]

```
void Fl_Tabs::tab_align (
    Fl_Align a ) [inline]
```

Sets the tab label alignment.

The default is FL_ALIGN_CENTER so tab labels are centered, but since the label space is measured (per label) to fit the labels, there wouldn't be any difference if labels were aligned left or right.

If you want to show an image (icon) next to the group's label you can set a different label alignment. FL_ALIGN_↔ IMAGE_NEXT_TO_TEXT is the recommended alignment to show the icon left of the text.

12.140.4.20 tab_height()

```
int Fl_Tabs::tab_height ( ) [protected], [virtual]
```

Return space (height) in pixels usable for tabs.

The calculated height is the largest space between all children and the upper and lower widget boundaries, respectively. If the space at the bottom is larger than at the top, the value will be negative and the tabs should be placed at the bottom.

Returns

Vertical space that can be used for the tabs.

Return values

>	0 To put the tabs at the top of the widget.
<	0 To put the tabs on the bottom.
<i>Full</i>	height, if <code>children() == 0</code> .

12.140.4.21 tab_positions()

```
int Fl_Tabs::tab_positions ( ) [protected], [virtual]
```

Calculate tab positions and widths.

This protected method calculates the horizontal display positions and widths of all tabs. If the number of children 'nc' (see below) is > 0 three internal arrays are allocated, otherwise the arrays are free'd and the pointers are set to NULL. Note that the first array is larger (nc+1).

- `tab_pos[nc+1]` : The left edges of each tab plus a fake left edge for a tab past the right-hand one.
- `tab_width[nc]` : The width of each tab
- `tab_flags[nc]` : Flags, bit 0 is set if the tab is compressed

If needed, these arrays are (re)allocated.

These positions are actually of the left edge of the slope. They are either separated by the correct distance or by EXTRASPACE or by zero.

In OVERFLOW_COMPRESS mode, tab positions and widths are compressed to make the entire tabs bar fit into the width of `Fl_Tabs` while keeping the selected tab fully visible.

In other overflow modes, the tabs area may be dragged horizontally using `tab_offset`. The `tab_pos` array is not adjusted to the horizontal offset, but starts at `this->x()` plus the box's left margin.

The protected variable `tab_count` is set to the currently allocated size, i.e. the number of children (nc).

Returns

Index of the selected item

Return values

-1	If the number of children is 0 (zero).
----	--

Note

Return values in 1.3 were not documented. Return values before Sep 2023 were documented as 1 based index and 0 if there were no children. This was actually never the case. It always returned a 0 based index and the (useless) value of also 0 if there were no children. The current version return -1 if there are no children.

For this method to work, only on single child should be selected. Calling the method `value()` before calling `tab_positions()` will ensure that exactly one child is selected and return a pointer to that child.

See also

[clear_tab_positions\(\)](#)

12.140.4.22 value() [1/2]

```
Fl_Widget * Fl_Tabs::value ( )
```

Gets the currently visible widget/tab.

The `Fl_Tabs::value()` method returns a pointer to the currently visible child widget of the `Fl_Tabs` container. The visible child is the first child that is currently being displayed, or the last child if none of the children are being displayed.

If child widgets have been added, moved, or deleted, this method ensures that only one tab is visible at a time.

Returns

a pointer to the currently visible child

12.140.4.23 value() [2/2]

```
int Fl_Tabs::value (
    Fl_Widget * newvalue )
```

Sets the widget to become the current visible widget/tab.

The `Fl_Tabs::value()` method allows you to set a particular child widget of the `Fl_Tabs` container to be the currently visible widget. If the specified widget is a child of the `Fl_Tabs` container, it will be made visible and all other children will be hidden. The method returns 1 if the value was changed, and 0 if the specified value was already set.

Parameters

in	<i>newvalue</i>	a pointer to a child widget
----	-----------------	-----------------------------

Returns

1 if a different tab was chosen

0 if there was no change (new value already set)

12.140.4.24 which()

```
Fl_Widget * Fl_Tabs::which (
    int event_x,
    int event_y ) [virtual]
```

Return a pointer to the child widget with a tab at the given coordinates.

The `Fl_Tabs::which()` method returns a pointer to the child widget of the `Fl_Tabs` container that corresponds to the tab at the given event coordinates. If the event coordinates are outside the area of the tabs or if the `Fl_Tabs` container has no children, the method returns NULL.

Parameters

<i>event_x, event_y</i>	event coordinates
-------------------------	-------------------

Returns

pointer to the selected child widget, or NULL

12.140.5 Member Data Documentation

12.140.5.1 overflow_type

```
int Fl_Tabs::overflow_type [protected]
```

See also

[OVERFLOW_COMPRESS](#), [OVERFLOW_CLIP](#), etc.

12.140.5.2 tab_count

```
int Fl_Tabs::tab_count [protected]
```

Array size of tab positions etc.

See also

[tab_positions\(\)](#)

12.140.5.3 tab_flags

```
int* Fl_Tabs::tab_flags [protected]
```

Array of tab flag of tabs per child.

See also

[tab_positions\(\)](#)

12.140.5.4 tab_pos

```
int* Fl_Tabs::tab_pos [protected]
```

Array of x-offsets of tabs per child + 1.

See also

[tab_positions\(\)](#)

12.140.5.5 tab_width

```
int* Fl_Tabs::tab_width [protected]
```

Array of widths of tabs per child.

See also

[tab_positions\(\)](#)

The documentation for this class was generated from the following files:

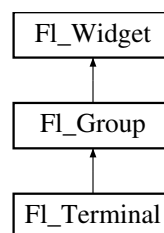
- Fl_Tabs.H
- Fl_Tabs.cxx

12.141 FI_Terminal Class Reference

Terminal widget supporting Unicode/utf-8, ANSI/xterm escape codes with full RGB color control.

```
#include <Fl_Terminal.H>
```

Inheritance diagram for Fl_Terminal:



Classes

- class [CharStyle](#)
- class [Cursor](#)
- class [EscapeSeq](#)
- class [Margin](#)
- class [PartialUtf8Buf](#)
- class [RingBuffer](#)
- class [Selection](#)
- class [Utf8Char](#)

Public Types

- enum `Attrib` {
`NORMAL` = 0x00 , `BOLD` = 0x01 , `DIM` = 0x02 , `ITALIC` = 0x04 ,
`UNDERLINE` = 0x08 , `_RESERVED_1` = 0x10 , `INVERSE` = 0x20 , `_RESERVED_2` = 0x40 ,
`STRIKEOUT` = 0x80 }
- Bits for the per-character attributes, which control text features such as italic, bold, underlined text, etc.*
- enum `CharFlags` {
`FG_XTERM` = 0x01 , `BG_XTERM` = 0x02 , `EOL` = 0x04 , `RESV_A` = 0x08 ,
`RESV_B` = 0x10 , `RESV_C` = 0x20 , `RESV_D` = 0x40 , `RESV_E` = 0x80 ,
`COLORMASK` = (FG_XTERM | BG_XTERM) }
- Per-character 8 bit flags (uchar) used to manage special states for characters.*
- enum `OutFlags` { `OFF` = 0x00 , `CR_TO_LF` = 0x01 , `LF_TO_CR` = 0x02 , `LF_TO_CRLF` = 0x04 }
- Output translation flags for special control character translations.*
- enum `RedrawStyle` { `NO_REDRAW` = 0 , `RATE_LIMITED` , `PER_WRITE` }
- Determines when `FI_Terminal` calls `redraw()` if new text is added.*

Public Member Functions

- void `ansi` (bool val)
Enable/disable the ANSI mode flag.
- bool `ansi` (void) const
Return the state of the ANSI flag.
- void `append` (const char *s, int len=-1)
Appends string s to the terminal at the current cursor position using the current text color/attributes.
- void `append_ascii` (const char *s)
Append NULL terminated ASCII string to terminal, slightly more efficient than `append_utf8()`.
- void `append_utf8` (const char *buf, int len=-1)
Append NULL terminated UTF-8 string to terminal.
- void `box` (`FI_Boxtype` val)
Sets the box type, updates terminal margins et al.
- `FI_Boxtype` `box` (void) const
Returns the current box type.
- void `clear` (`FI_Color` val)
Clears the screen to a specific color val and homes the cursor.
- void `clear` (void)
Clears the screen to the current `textbgcolor()`, and homes the cursor.
- void `clear_history` (void)
Clears the scroll history buffer and adjusts scrollbar, forcing it to `redraw()`.
- void `clear_screen` (bool scroll_to_hist=true)
Clear the terminal screen only; does not affect the cursor position.
- void `clear_screen_home` (bool scroll_to_hist=true)
Clear the terminal screen and home the cursor.
- void `color` (`FI_Color` val)
Sets the background color for the terminal's `FI_Group::box()`.
- `FI_Color` `color` (void) const
Return base widget `FI_Group`'s `box()` color()
- int `cursor_col` (void) const
Return the cursor's current column position on the screen.
- void `cursor_home` (void)
Move cursor to the home position (top/left).
- int `cursor_row` (void) const
Return the cursor's current row position on the screen.

- void **cursorbgcolor** ([FL_Color](#) val)
 - Set the cursor's background color used for the cursor itself.*
- [FL_Color](#) **cursorbgcolor** (void) const
 - Get the cursor's background color used for the cursor itself.*
- void **cursorfgcolor** ([FL_Color](#) val)
 - Set the cursor's foreground color used for text under the cursor.*
- [FL_Color](#) **cursorfgcolor** (void) const
 - Get the cursor's foreground color used for text under the cursor.*
- void **display_columns** (int val)
 - Set terminal's display width in columns of text characters.*
- int **display_columns** (void) const
 - Return terminal's display width in columns of text characters.*
- void **display_rows** (int val)
 - Set terminal's display height in lines of text (rows).*
- int **display_rows** (void) const
 - Return terminal's display height in lines of text (rows).*
- void **draw** (void) [FL_OVERRIDE](#)
 - Draws the entire [FL_Terminal](#).*
- [FL_Terminal](#) (int X, int Y, int W, int H, const char *L, int rows, int cols, int hist)
 - Same as the default FLTK constructor, but lets the user force the rows, columns and history to specific sizes on creation.*
- [FL_Terminal](#) (int X, int Y, int W, int H, const char *L=0)
 - The constructor for [FL_Terminal](#).*
- int **handle** (int e) [FL_OVERRIDE](#)
 - Handle FLTK events.*
- void **history_lines** (int val)
 - Set the number of lines of screen history.*
- int **history_lines** (void) const
 - Return the number of lines of screen history.*
- void **history_rows** (int val)
 - Set terminal's scrollbar history buffer size in lines of text (rows).*
- int **history_rows** (void) const
 - Return terminal's scrollbar history buffer size in lines of text (rows).*
- int **history_use** (void) const
 - Returns how many lines are "in use" by the screen history buffer.*
- void **margin_bottom** (int val)
 - Set the bottom margin; see [Margins](#).*
- int **margin_bottom** (void) const
 - Return the bottom margin; see [Margins](#).*
- void **margin_left** (int val)
 - Set the left margin; see [Margins](#).*
- int **margin_left** (void) const
 - Return the left margin; see [Margins](#).*
- void **margin_right** (int val)
 - Set the right margin; see [Margins](#).*
- int **margin_right** (void) const
 - Return the right margin; see [Margins](#).*
- void **margin_top** (int val)
 - Set the top margin; see [Margins](#).*
- int **margin_top** (void) const
 - Return the top margin; see [Margins](#).*

- void `output_translate` (`Fl_Terminal::OutFlags` val)
 - Sets the combined output translation flags to val.*
- `Fl_Terminal::OutFlags` `output_translate` (void) const
 - Return the current combined output translation flags.*
- void `print_char` (char c)
 - Prints single ASCII char c at current cursor position, and advances the cursor.*
- void `print_char` (const char *text, int len=-1)
 - Prints single UTF-8 char text of optional byte length len at current cursor position, and advances the cursor if the character is printable.*
- void `printf` (const char *fmt,...)
 - Appends printf formatted messages to the terminal.*
- void `putchar` (char c, int drow, int dcol)
 - Print the ASCII character c at the terminal's display position (drow,dcol).*
- void `putchar` (const char *text, int len, int drow, int dcol)
 - Print UTF-8 character text of length len at display position (drow,dcol).*
- void `redraw_rate` (float val)
 - Set the maximum rate redraw speed in floating point seconds if `redraw_style()` is set to `RATE_LIMITED`.*
- float `redraw_rate` (void) const
 - Get max rate redraw speed in floating point seconds.*
- void `redraw_style` (`RedrawStyle` val)
 - Set how `Fl_Terminal` manages screen redrawing.*
- `RedrawStyle` `redraw_style` (void) const
 - Get the redraw style.*
- void `reset_terminal` (void)
 - Resets terminal to default colors, clears screen, history and mouse selection, homes cursor, resets tabstops.*
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`
 - Handle widget resizing, such as if user resizes parent window.*
- int `scrollbar_actual_size` (void) const
 - Returns the scrollbar's actual size; actual width for vertical scrollbars, actual height for horizontal scrollbars.*
- void `scrollbar_size` (int val)
 - Set the width of the scrollbar's trough to val, in pixels.*
- int `scrollbar_size` (void) const
 - Get the current size of the scrollbar's trough, in pixels.*
- void `selectionbgcolor` (`Fl_Color` val)
 - Set mouse selection background color.*
- `Fl_Color` `selectionbgcolor` (void) const
 - Get mouse selection background color.*
- void `selectionfgcolor` (`Fl_Color` val)
 - Set mouse selection foreground color.*
- `Fl_Color` `selectionfgcolor` (void) const
 - Get mouse selection foreground color.*
- void `show_unknown` (bool val)
 - Set the "show unknown" flag.*
- bool `show_unknown` (void) const
 - Return the "show unknown" flag.*
- `uchar` `textattrib` () const
 - Get text attribute bits (underline, inverse, etc).*
- void `textattrib` (`uchar` val)
 - Set text attribute bits (underline, inverse, etc).*
- void `textbgcolor` (`Fl_Color` val)
 - Set text background color to fltk color val used by any new text added.*

- [FI_Color](#) **textbgcolor** (void) const
Return text's current background color.
- void [textbgcolor_default](#) ([FI_Color](#) val)
Set the default text background color used by any new text added after a reset (<ESC>c, <ESC>[0m, or [reset_terminal\(\)](#)).
- [FI_Color](#) **textbgcolor_default** (void) const
Return text's default background color.
- void [textbgcolor_xterm](#) (uchar val)
Sets the background text color as one of the 8 'xterm color' values.
- void [textcolor](#) ([FI_Color](#) val)
Set the text color for the terminal.
- [FI_Color](#) **textcolor** (void) const
Return [textcolor\(\)](#). This is a convenience method that returns [textfgcolor_default\(\)](#)
- void [textfgcolor](#) ([FI_Color](#) val)
*Set text foreground drawing color to fltk color *val* used by any new text added.*
- [FI_Color](#) **textfgcolor** (void) const
Return text's current foreground color.
- void [textfgcolor_default](#) ([FI_Color](#) val)
Set the default text foreground color used by <ESC>c, <ESC>[0m, and [reset_terminal\(\)](#).
- [FI_Color](#) **textfgcolor_default** (void) const
Return text's default foreground color.
- void [textfgcolor_xterm](#) (uchar val)
Sets the foreground text color as one of the 8 'xterm color' values.
- void [textfont](#) ([FI_Font](#) val)
Sets the font used for all text displayed in the terminal.
- [FI_Font](#) **textfont** (void) const
Return text font used to draw all text in the terminal.
- void [textsize](#) ([FI_Fontsize](#) val)
Sets the font size used for all text displayed in the terminal.
- [FI_Fontsize](#) **textsize** (void) const
Return text font size used to draw all text in the terminal.
- void [vprintf](#) (const char *fmt, va_list ap)
Appends printf formatted messages to the terminal.
- [~FI_Terminal](#) (void)
The destructor for [FI_Terminal](#).

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *& **_ddfdesign_kludge** ()
This is for forms compatibility only.
- void **add** ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void **add** ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)
- void **add_resizable** ([FI_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FI_Widget](#) *const * **array** () const
Returns a pointer to the array of children.
- [FI_Group](#) const * **as_group** () const **FL_OVERRIDE**
- [FI_Group](#) * **as_group** () **FL_OVERRIDE**
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).

- void **begin** ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- **Fl_Widget * child** (int n) const
Returns `array()[n]`.
- int **children** () const
Returns how many child widgets the group has.
- void **clear** ()
Deletes all child widgets from memory recursively.
- unsigned int **clip_children** ()
Returns the current clipping mode.
- void **clip_children** (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int **delete_child** (int n)
Removes the widget at `index` from the group and deletes it.
- void **end** ()
Exactly the same as `current(this->parent())`.
- int **find** (const **Fl_Widget** &o) const
*See `int Fl_Group::find(const Fl_Widget *w) const`.*
- int **find** (const **Fl_Widget** *) const
Searches the child array for the widget and returns the index.
- **Fl_Group** (int, int, int, int, const char *s=0)
Creates a new `Fl_Group` widget using the given position, size, and label string.
- void **focus** (**Fl_Widget** *W)
- void **forms_end** ()
This is for forms compatibility only.
- void **init_sizes** ()
Resets the internal array of widget sizes and positions.
- void **insert** (**Fl_Widget** &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void **insert** (**Fl_Widget** &o, **Fl_Widget** *before)
This does `insert(w, find(before))`.
- void **remove** (**Fl_Widget** &)
Removes a widget from the group but does not delete it.
- void **remove** (**Fl_Widget** *o)
Removes the widget `o` from the group.
- void **remove** (int index)
Removes the widget at `index` from the group but does not delete it.
- **Fl_Widget * resizable** () const
Returns the group's resizable widget.
- void **resizable** (**Fl_Widget** &o)
Sets the group's resizable widget.
- void **resizable** (**Fl_Widget** *o)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- virtual **~Fl_Group** ()
The destructor also deletes all the children.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align alignment](#))
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image *img](#))
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype new_box](#))
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback *cb](#), [FI_Callback_User_Data *p](#), bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback *cb](#), void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0 *cb](#))
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1 *cb](#), long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed ()`
- Marks the value of the widget as unchanged.*

 - void `clear_damage (uchar c=0)`
- Clears or sets the damage flags.*

 - void `clear_output ()`
- Sets a widget to accept input.*

 - void `clear_visible ()`
- Hides the widget.*

 - void `clear_visible_focus ()`
- Disables keyboard focus navigation with this widget.*

 - `Fl_Color color () const`
- Gets the background color of the widget.*

 - void `color (Fl_Color bg)`
- Sets the background color of the widget.*

 - void `color (Fl_Color bg, Fl_Color sel)`
- Sets the background and selection color of the widget.*

 - `Fl_Color color2 () const`
- For back compatibility only.*

 - void `color2 (unsigned a)`
- For back compatibility only.*

 - int `contains (const Fl_Widget *w) const`
- Checks if w is a child of this widget.*

 - void `copy_label (const char *new_label)`
- Sets the current label.*

 - void `copy_tooltip (const char *text)`
- Sets the current tooltip text.*

 - `uchar damage () const`
- Returns non-zero if `draw()` needs to be called.*

 - void `damage (uchar c)`
- Sets the damage bits for the widget.*

 - void `damage (uchar c, int x, int y, int w, int h)`
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize (int, int, int, int)`
- Internal use only.*

 - void `deactivate ()`
- Deactivates the widget.*

 - `Fl_Image * deimage ()`
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `Fl_Image * deimage () const`
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage (Fl_Image &img)`
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage (Fl_Image *img)`
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound () const`
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback (Fl_Callback_Reason reason=FL_REASON_UNKNOWN)`
- Calls the widget callback function with default arguments.*

 - void `do_callback (Fl_Widget *widget, long arg, Fl_Callback_Reason reason=FL_REASON_UNKNOWN)`
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () `const`
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () `const`
Returns whether the image is managed by the widget.
- int `inside` (`const FI_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- int `is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- bool `needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- unsigned int `output` () `const`

- Returns if a widget is used for output only.*
- `Fl_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (Fl_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`
Schedules the drawing of the widget.
- `void redraw_label ()`
Schedules the drawing of the label.
- `Fl_Color selection_color () const`
Gets the selection color.
- `void selection_color (Fl_Color a)`
Sets the selection color.
- `void set_active ()`
Marks the widget as active without sending events or changing focus.
- `void set_changed ()`
Marks the value of the widget as changed.
- `void set_output ()`
Sets a widget to output only.
- `void set_visible ()`
Makes the widget visible.
- `void set_visible_focus ()`
Enables keyboard focus navigation with this widget.
- `int shortcut_label () const`
Returns whether the widget's label uses '&' to indicate shortcuts.
- `void shortcut_label (int value)`
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual `void show ()`
Makes a widget visible.
- `void size (int W, int H)`
Changes the size of the widget.
- `int take_focus ()`
Gives the widget the keyboard focus.
- `unsigned int takeevents () const`
Returns if the widget is able to take events.
- `int test_shortcut ()`
Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip () const`
Gets the current tooltip text.
- `void tooltip (const char *text)`
Sets the current tooltip text.
- `Fl_Window * top_window () const`
Returns a pointer to the top-level window for the widget.
- `Fl_Window * top_window_offset (int &xoff, int &yoff) const`
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (FI_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- FI_When **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- FI_Window * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual ~FI_Widget ()
Destroys the widget.

Public Attributes

- FI_Scrollbar * **scrollbar**
Vertical scrollbar.

Protected Member Functions

- void **clear_eod** (void)
Clear from cursor to End Of Display (EOD), like "<ESC> [J<ESC> [0J".
- void **clear_eol** (void)
Clear from cursor to End Of Line (EOL), like "<ESC> [K".
- void **clear_line** (int row)
Clear entire line for specified row.
- void **clear_line** (void)
Clear entire line cursor is currently on.
- void **clear_mouse_selection** (void)
Clear any current mouse selection.
- void **clear_sod** (void)
Clear from cursor to Start Of Display (EOD), like "<ESC> [1J".
- void **clear_sol** (void)
Clear from cursor to Start Of Line (SOL), like "<ESC> [1K".

- void **current_style** (const [CharStyle](#) &sty)
 - Set current style for rendering text.*
- const [CharStyle](#) & **current_style** (void) const
 - Return current style for rendering text.*
- void **cursor_col** (int col)
 - Move cursor to the specified column `col`.*
- void **cursor_cr** (void)
 - Move cursor as if a CR (`\r`) was received.*
- void **cursor_crlf** (int count=1)
 - Move cursor as if a CR/LF pair (`\r\n`) was received.*
- void **cursor_down** (int count=1, bool do_scroll=false)
 - Moves cursor down `count` lines.*
- void **cursor_eol** (void)
 - Move cursor to the last column (at the far right) on the current line.*
- void **cursor_left** (int count=1)
 - Moves cursor left `count` columns, and cursor stops (does not wrap) if it hits screen edge.*
- void **cursor_right** (int count=1, bool do_scroll=false)
 - Moves cursor right `count` columns.*
- void **cursor_row** (int row)
 - Move cursor to the specified row `row`.*
- void **cursor_sol** (void)
 - Move cursor to the first column (at the far left) on the current line.*
- void **cursor_tab_left** (int count=1)
 - Tab left, do not wrap beyond left edge.*
- void **cursor_tab_right** (int count=1)
 - Tab right, do not wrap beyond right edge.*
- void **cursor_up** (int count=1, bool do_scroll=false)
 - Moves cursor up `count` lines.*
- void **delete_chars** (int drow, int dcol, int rep)
 - Delete char(s) at (`drow,dcol`) for '`rep`' times.*
- void **delete_chars** (int rep)
 - Delete char(s) at cursor position for '`rep`' times.*
- void **delete_rows** (int count)
 - Delete (`count`) rows at cursor position.*
- int **disp_cols** (void) const
 - Return the number of columns in the display area.*
- int **disp_erow** (void) const
 - Return the ending row# in the display area.*
- int **disp_rows** (void) const
 - Return the number of rows in the display area.*
- int **disp_srow** (void) const
 - Return the starting row# in the display area.*
- void **draw_buff** (int Y) const
 - Draws the buffer position we are scrolled to onto the FLTK screen starting at pixel position `Y`.*
- void **draw_row** (int grow, int Y) const
 - Draw the specified global row, which is the row in `ring_chars[]`.*
- void **draw_row_bg** (int grow, int X, int Y) const
 - Draw the background for the specified `ring_chars[]` global row `grow` starting at FLTK coords `X` and `Y`.*
- bool **get_selection** (int &srow, int &scol, int &erow, int &ecol) const
 - Return mouse selection's start/end position in the ring buffer, if any.*
- int **h_to_row** (int H) const

- Given a height in pixels, return number of rows that "fits" into that area.*

 - int `handle_unknown_char` (void)
 - Handle an unknown char by either emitting an error symbol to the tty, or do nothing, depending on the user configurable value of `show_unknown()`.*
 - int `hist_cols` (void) const
 - Return the number of columns in the scrollbar history.*
 - int `hist_erow` (void) const
 - Return the ending row# of the scrollbar history.*
 - int `hist_rows` (void) const
 - Return the number of rows in the scrollbar history.*
 - int `hist_srow` (void) const
 - Return the starting row# of the scrollbar history.*
 - int `hist_use` (void) const
 - Return number of rows in use by the scrollbar history.*
 - int `hist_use_srow` (void) const
 - Return the starting row of the "in use" scrollbar history.*
 - void `insert_char` (char c, int rep)
 - Insert char 'c' at the current cursor position for 'rep' times.*
 - void `insert_char_eol` (char c, int drow, int dcol, int rep)
 - Insert char 'c' for 'rep' times at display row 'drow' and column 'dcol'.*
 - void `insert_rows` (int count)
 - Insert (count) rows at current cursor position.*
 - bool `is_inside_selection` (int row, int col) const
 - Is global row/column inside the current mouse selection?*
 - bool `is_selection` (void) const
 - Returns true if there's a mouse selection.*
 - int `offset` (void) const
 - Returns the current offset into the ring buffer.*
 - void `restore_cursor` (void)
 - Restore previously saved cursor position, if any. Used by ESC [u.*
 - int `ring_cols` (void) const
 - Return the number of columns in the ring buffer.*
 - int `ring_erow` (void) const
 - Return the ending row# in the ring buffer (Always `ring_rows()-1`)*
 - int `ring_rows` (void) const
 - Return the number of rows in the ring buffer.*
 - int `ring_srow` (void) const
 - Return the starting row# in the ring buffer. (Always 0)*
 - void `save_cursor` (void)
 - Save current cursor position. Used by ESC [s.*
 - void `scroll` (int rows)
 - Scroll the display up(+) or down(-) the specified rows.*
 - int `scrollbar_width` (void) const
 - Return scrollbar width if visible, or 0 if not visible.*
 - bool `selection_extend` (int X, int Y)
 - Extend selection to FLTK coords X, Y.*
 - const char * `selection_text` (void) const
 - Return text selection (for copy()/paste() operations)*
 - int `selection_text_len` (void) const
 - Return byte length of all UTF-8 chars in selection, or 0 if no selection.*
 - `Utf8Char` * `u8c_cursor` (void)

- Return the Utf8Char* for character under cursor.*

 - [Utf8Char](#) * [u8c_disp_row](#) (int drow)

Return pointer to the first u8c character in row drow of the display.
- const [Utf8Char](#) * [u8c_disp_row](#) (int drow) const

See docs for non-const version of [u8c_disp_row\(int\)](#)
- [Utf8Char](#) * [u8c_hist_row](#) (int hrow)

Return u8c for beginning of a row inside the scrollbar history.
- const [Utf8Char](#) * [u8c_hist_row](#) (int hrow) const

See docs for non-const version of [u8c_hist_row\(int\)](#)
- const [Utf8Char](#) * [u8c_hist_use_row](#) (int hrow) const

See docs for non-const version of [u8c_hist_use_row\(int\)](#)
- [Utf8Char](#) * [u8c_hist_use_row](#) (int hurow)

Return u8c for beginning of row hurow inside the 'in use' part of the scrollbar history.
- [Utf8Char](#) * [u8c_ring_row](#) (int grow)

Return UTF-8 char for row grow in the ring buffer.
- const [Utf8Char](#) * [u8c_ring_row](#) (int grow) const

See docs for non-const version of [u8c_ring_row\(int\)](#)
- int [w_to_col](#) (int W) const

Given a width in pixels, return number of columns that "fits" into that area.
- const [Utf8Char](#) * [walk_selection](#) (const [Utf8Char](#) *u8c, int &row, int &col) const

Walk the mouse selection one character at a time from beginning to end, returning a Utf8Char to the next character in the selection, or NULL if the end was reached, or if there's no selection.*

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * [bounds](#) ()

Returns the internal array of widget sizes and positions.
- void [draw_child](#) ([FI_Widget](#) &widget) const

Forces a child to redraw.
- void [draw_children](#) ()

Draws all children of the group.
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const

Parents normally call this to draw outside labels of child widgets.
- virtual int [on_insert](#) ([FI_Widget](#) *, int)

Allow derived groups to act when a widget is added as a child.
- virtual int [on_move](#) (int, int)

Allow derived groups to act when a widget is moved within the group.
- virtual void [on_remove](#) (int)

Allow derived groups to act when a child widget is removed from the group.
- int * [sizes](#) ()

Returns the internal array of widget sizes and positions.
- void [update_child](#) ([FI_Widget](#) &widget) const

Draws a child only if it needs it.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)

Clears a flag in the flags mask.
- void [draw_backdrop](#) () const

If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const

Draws the widget box according its box style.

- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Group](#)

- static [FI_Group](#) * **current** ()
Returns the currently active group.
- static void **current** ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
 - INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,
 - FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7
 - ,
 - OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11
 - ,
 - MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15
 - ,
 - GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU = 1<<19 ,
 - NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
 - AUTO_DELETE_USER_DATA = 1<<23 ,
 - MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
 - USERFLAG1 = 1<<31 }

flags possible values enumeration.

12.141.1 Detailed Description

Terminal widget supporting Unicode/utf-8, ANSI/xterm escape codes with full RGB color control.

12.141.2 FI_Terminal

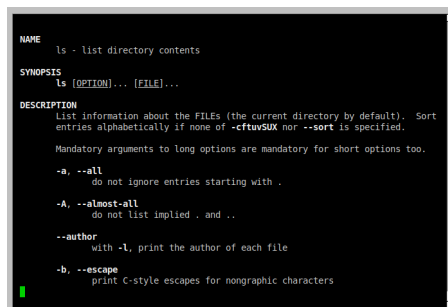


Figure 12.54 FI_Terminal widget showing a linux manual page

[FI_Terminal](#) is an output-only text widget supporting ASCII and UTF-8/Unicode. It supports most terminal text features, such as most VT100/xterm style escape sequences (see [The Escape Codes FI_Terminal Supports](#)), text colors/attributes, scrollback history, mouse selection, etc.

It is recommended that accessing features such as setting text colors and cursor positioning is best done with ANSI/XTERM escape sequences. But if one sets `ansi(false)` then this is not possible, so the public API can be used for common operations, e.g.

Public API	ESC code equivalent	Description
clear_screen_home()	ESC [H ESC [2 J	Clear screen, home cursor
cursor_home()	ESC [H	Home the cursor
clear_history()	ESC [3 J	Clear scrollback history
reset_terminal()	ESC [c	Reset terminal

To access more advanced API calls, one can derive a class from [FI_Terminal](#) to access protected methods manipulate the terminal more directly, e.g.

Protected API	ESC code equiv.	Description
current_style()	ESC [# m	Set text attributes
clear_eod()	ESC [0 J	Clear from cursor to end of display
clear_sod()	ESC [1 J	Clear from cursor to start of display
clear_eol()	ESC [0 K	Clear from cursor to end of line
clear_sol()	ESC [1 K	Clear from cursor to start of line
clear_line()	ESC [2 K	Clear line cursor is on
scroll(int) // >0 for up	ESC [1 S	Scroll up one line
scroll(int) // <0 for down	ESC [1 T	Scroll down one line
cursor_left()	ESC [1 D	Move cursor left (no wrap)
cursor_right()	ESC [1 C	Move cursor right (no wrap)
cursor_up()	ESC [1 B	Move cursor up (no scroll or wrap)
cursor_down()	ESC [1 A	Move cursor down (no scroll or wrap)
cursor_row() cursor_col()	ESC [# ; # H	Move cursor to row# / column#
insert_char()	ESC [# @	Insert a char at cursor position
delete_chars()	ESC [# P	Delete chars at cursor position
insert_rows()	ESC [# L	Insert rows at cursor position
delete_rows()	ESC [# M	Delete rows at cursor position
etc...	etc...	etc...

Many commonly used API functions are public, such as [textfgcolor\(\)](#) for setting text colors. Others, such as [cursor_up\(\)](#) are protected to prevent common misuse, and are available only to subclasses.

For applications that need input support, the widget can be subclassed to provide keyboard input, and advanced features like pseudo ttys, termio, serial port I/O, etc., as such features are beyond the scope of FLTK.

12.141.2.1 Examples

```
//
// Fl_Terminal: Simple Use
//
Fl_Terminal *tty = new Fl_Terminal(...);
:
tty->append("Hello world.\n"); // simple strings
tty->append("\033[31mThis text is red.\033[0m\n"); // colored text
tty->append("\033[32mThis text is green.\033[0m\n");
tty->printf("The value of x is %.02f\n", x); // printf() formatting
```

There are also public methods for doing what most "\033[" escape codes do, so that if [ansi\(bool\)](#) is set to "false", one can still change text colors or clear the screen via application control, e.g.

```
tty->home(); // home the cursor
tty->clear_screen(); // clear the screen
tty->textfgcolor(0xff000000); // change the text color to RED
tty->textbgcolor(0x0000ff00); // change the background color to BLUE
//
// R G B
```

When creating the widget, the width/height determine the default column and row count for the terminal's display based on the current font size. The column width determines where text will wrap.

You can specify wider column sizes than the screen using [display_columns\(colwidth\)](#). When this value is larger than the widget's width, text will wrap off-screen, and can be revealed by resizing the widget wider.

Example of 3 bit colors:

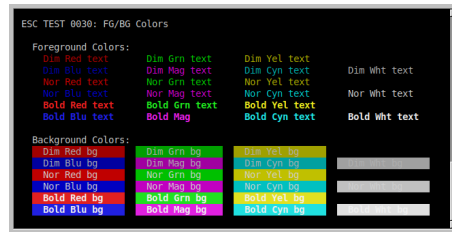


Figure 12.56 FI_Terminal 3 bit colors

Example application source code using 3 bit colors:

```
//
// Text colors
//
tty->append("\033[31m Red text.\033[0m\n"); // Print red text..
tty->append("\033[32m Green text.\033[0m\n");
:
tty->append("\033[36m Cyan text.\033[0m\n");
tty->append("\033[37m White text.\033[0m\n");
//
// Background colors
//
tty->append("\033[41m Red Background.\033[0m\n"); // background will be red
tty->append("\033[42m Green Background.\033[0m\n");
:
tty->append("\033[46m Cyan Background.\033[0m\n");
tty->append("\033[47m White Background.\033[0m\n");
```

Example of 24 bit colors:

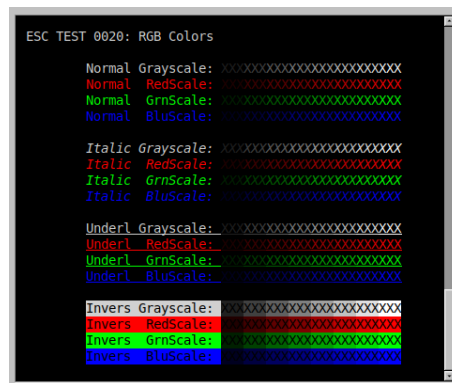


Figure 12.57 FI_Terminal 24 bit colors

Example application source code using 24 bit colors:

```
//
// 24 bit Text Color
//
tty->append("\033[38;2;0;0;255m Text is BLUE.\033[0m\n"); // RGB: R=0, G=0, B=255
tty->append("\033[38;2;255;0;0m Text is RED.\033[0m\n"); // RGB: R=255, G=0, B=0
tty->append("\033[38;2;127;64;0m Text is DARK ORANGE.\033[0m\n"); // RGB: R=127, G=64, B=0
//
// 24 bit Background Color
//
tty->append("\033[48;2;0;0;255m Background is BLUE.\033[0m\n"); // RGB: R=0, G=0, B=255
tty->append("\033[48;2;255;0;0m Background is RED.\033[0m\n"); // RGB: R=255, G=0, B=0
tty->append("\033[48;2;127;64;0m Background is DARK ORANGE.\033[0m\n"); // RGB: R=127, G=64, B=0
```

For more on the ANSI escape codes, see [The Escape Codes FI_Terminal Supports](#).

12.141.2.5 Features

Most standard terminal behaviors are supported, e.g.

- ASCII + UTF-8/Unicode
- scrollback history management
- mouse selection + copy/paste (^C, ^A)
- autoscroll during selection

Most popular ANSI/DEC VT100/Xterm escape sequences are supported (see [The Escape Codes FI_Terminal Supports](#)), including:

- per-character colors for text and background
- per-character text attributes: bold/dim, underline, strikeout
- scrolling up/down
- character insert/delete for characters/rows/screen
- clearing characters/rows/screen

Does not (yet) support:

- programmable regions (scroll regions and attribute blocks)
- dynamic line wrap (where resizing display dynamically re-wraps long lines)

Will likely never implement as part of this widget:

- pty/termio management (such features should be *subclassed*)
- Different per-character font family + sizes (font family/size is global only)
- variable width fonts

Regarding the font family+size; the way the terminal is currently designed, the font family and size must not vary within text; rows have to be consistent height. Varying widths are tricky too, esp. when it comes to moving the cursor up/down within a column; varying *widths* are supported (due to Unicode characters sometimes being "wide", but not heights).

12.141.2.6 Margins

The margins define the amount of space (in pixels) around the outside of the text display area, the space between the widget's inner edge (inside the `box()`) and the text display area's outer edge. The margins can be inspected and changed with the `margin_left()`, `margin_right()`, `margin_top()` and `margin_bottom()` methods.

Enumerator

UNDERLINE	underlined text
_RESERVED↔ _1	<i>(reserved for internal future use)</i>
INVERSE	inverse text; fg/bg color are swapped
_RESERVED↔ _2	<i>(reserved for internal future use)</i>
STRIKEOUT	strikeout text

12.141.3.2 CharFlags

enum `Fl_Terminal::CharFlags`

Per-character 8 bit flags (uchar) used to manage special states for characters.

Enumerator

FG_XTERM	this char's fg color is an XTERM color; can be affected by Dim+Bold
BG_XTERM	this char's bg color is an XTERM color; can be affected by Dim+Bold
EOL	TODO: char at EOL, used for line re-wrap during screen resizing.

12.141.3.3 OutFlags

enum `Fl_Terminal::OutFlags`

Output translation flags for special control character translations.

Enumerator

OFF	no output translation
CR_TO_LF	carriage return generates a vertical line-feed (<code>\r -> \n</code>)
LF_TO_CR	line-feed generates a carriage return (<code>\n -> \r</code>)
LF_TO_CRLF	line-feed generates a carriage return line-feed (<code>\n -> \r\n</code>)

12.141.3.4 RedrawStyle

enum `Fl_Terminal::RedrawStyle`

Determines when `Fl_Terminal` calls `redraw()` if new text is added.

RATE_LIMITED is the recommended setting, using `redraw_rate(float)` to determine the maximum rate of redraws.

See also

[redraw_style\(\)](#), [redraw_rate\(\)](#)

Enumerator

NO_REDRAW	app must call redraw() as needed to update text to screen
RATE_LIMITED	timer controlled redraws. (DEFAULT)
PER_WRITE	redraw triggered after every append() / printf() / etc. operation

12.141.4 Constructor & Destructor Documentation

12.141.4.1 `Fl_Terminal()` [1/2]

```
Fl_Terminal::Fl_Terminal (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor for `Fl_Terminal`.

This creates an empty terminal with defaults:

- white on black text; see `textfgcolor(Fl_Color)`, `textbgcolor(Fl_Color)`
- rows/cols based on the `W` and `H` values, see `display_rows()`, `display_columns()`
- scrollbar history of 100 lines, see `history_rows()`
- `redraw_style()` set to `RATE_LIMITED`, `redraw_rate()` set to 0.10 seconds

Note: While `Fl_Terminal` derives from `Fl_Group`, it's not intended for user code to use it as a parent for other widgets, so `end()` is called.

Parameters

in	<code>X,Y,W,H</code>	position and size.
in	<code>L</code>	label string (optional), may be NULL.

12.141.4.2 `Fl_Terminal()` [2/2]

```
Fl_Terminal::Fl_Terminal (
    int X,
    int Y,
    int W,
    int H,
    const char * L,
    int rows,
    int cols,
    int hist )
```

Same as the default FLTK constructor, but lets the user force the rows, columns and history to specific sizes on creation.

Since the row/cols/hist are specified directly, this prevents the widget from auto-calculating the initial text buffer size based on the widget's pixel width/height, bypassing calls to the font system before the widget is displayed.

Note

fluid uses this constructor internally to avoid font calculations that opens the display, useful for when running in a headless context. (issue 837)

12.141.4.3 `~Fl_Terminal()`

```
Fl_Terminal::~~Fl_Terminal (
    void )
```

The destructor for `Fl_Terminal`.

Destroys the terminal display, scroll history, and associated widgets.

12.141.5 Member Function Documentation

12.141.5.1 ansi() [1/2]

```
void Fl_Terminal::ansi (
    bool val )
```

Enable/disable the ANSI mode flag.

If true, ANSI and VT100/xterm codes will be processed. If false, these codes won't be processed and will either be ignored or print the error character "¿", depending on the value of [show_unknown\(\)](#).

See also

[show_unknown\(\)](#), [The Escape Codes Fl_Terminal Supports](#)

12.141.5.2 ansi() [2/2]

```
bool Fl_Terminal::ansi (
    void ) const
```

Return the state of the ANSI flag.

See also

[ansi\(bool\)](#)

12.141.5.3 append()

```
void Fl_Terminal::append (
    const char * s,
    int len = -1 )
```

Appends string *s* to the terminal at the current cursor position using the current text color/attributes.

If *s* is NULL, the UTF-8 character cache is cleared, which is recommended before starting a block reading loop, and again after the block loop has completed.

If *len* is not specified, it's assumed *s* is a NULL terminated string. If *len* IS specified, it can be used for writing strings that aren't NULL terminated, such as block reads on a pipe, network, or other block oriented data source.

Redraws of the terminal widget are by default handled automatically, but can be changed with [redraw_rate\(\)](#) and [redraw_style\(\)](#).

Block I/O

When reading block oriented sources (such as pipes), [append\(\)](#) will handle partial UTF-8 chars straddling the block boundaries. It does this using an internal byte cache, which should be cleared before and after block I/O loops by calling [append\(NULL\)](#) as shown in the example below, to prevent the possibilities of partial UTF-8 characters left behind by an interrupted or incomplete block loop.

```
// Example block reading a command pipe in Unix

// Run command and read as a pipe
FILE *fp = popen("ls -la", "r");
if (!fp) { ..error_handling.. }

// Enable non-blocking I/O
int fd = fileno(fp);
fcntl(fd, F_SETFL, O_NONBLOCK);

// Clear UTF-8 character cache before starting block loop
G_tty->append(NULL); // prevents leftover partial UTF-8 bytes

// Block read loop
while (1) {
    Fl::wait(0.05); // give fltk .05 secs of cpu to manage UI
    ssize_t bytes = read(fd, s, sizeof(s)); // read block from pipe
    if (bytes == -1 && errno == EAGAIN) continue; // no data yet? continue
    if (bytes > 0) G_tty->append(s); // append output to terminal
    else break; // end of pipe?
}

// Flush cache again after block loop completes
G_tty->append(NULL);

// Close pipe, done
pclose(fp);
```

Note

- String can contain ASCII or UTF-8 chars
- `len` is optional; if unspecified, expects `s` to be a NULL terminated string
- Handles partial UTF-8 chars split between calls (e.g. block oriented writes)
- If `s` is NULL, this clears the "partial UTF-8" character cache
- Redraws are managed automatically by default; see [redraw_style\(\)](#)

12.141.5.4 append_ascii()

```
void Fl_Terminal::append_ascii (
    const char * s )
```

Append NULL terminated ASCII string to terminal, slightly more efficient than [append_utf8\(\)](#).

- If `s` is NULL, behavior is to do nothing
- Redraws are triggered automatically, depending on [redraw_style\(\)](#)

12.141.5.5 append_utf8()

```
void Fl_Terminal::append_utf8 (
    const char * buf,
    int len = -1 )
```

Append NULL terminated UTF-8 string to terminal.

- If `buf` is NULL, UTF-8 cache buffer is cleared
- If optional `len` isn't specified or is -1, `strlen(text)` is used.
- If `len` is 0 or <-1, no changes are made
- Handles UTF-8 chars split across calls (e.g. block writes from pipes, etc)
- Redraws are triggered automatically, depending on [redraw_style\(\)](#)

12.141.5.6 box()

```
void Fl_Terminal::box (
    Fl_Boxtype val ) [inline]
```

Sets the box type, updates terminal margins et al.

Default is `FL_DOWN_FRAME`.

`FL_XXX_FRAME` types are handled in a special way by this widget, and guarantee the background is a flat field.

`FL_XXX_BOX` may draw gradients as inherited by [Fl::scheme\(\)](#).

12.141.5.7 clear() [1/2]

```
void Fl_Terminal::clear (
    Fl_Color val )
```

Clears the screen to a specific color `val` and homes the cursor.

See also

[clear_screen\(\)](#), [clear_screen_home\(\)](#), [cursor_home\(\)](#)

12.141.5.8 clear() [2/2]

```
void Fl_Terminal::clear (
    void )
```

Clears the screen to the current [textbgcolor\(\)](#), and homes the cursor.

See also

[clear_screen\(\)](#), [clear_screen_home\(\)](#), [cursor_home\(\)](#)

12.141.5.9 clear_screen()

```
void Fl_Terminal::clear_screen (
    bool scroll_to_hist = true )
```

Clear the terminal screen only; does not affect the cursor position.

Also clears the current mouse selection.

If 'scroll_to_hist' is true, the screen is cleared by scrolling the contents into the scrollbar history, where it can be retrieved with the scrollbar. This is the default behavior. If false, the screen is cleared and the scrollbar history is unchanged.

Similar to the escape sequence "<ESC>[2J".

See also

[clear_screen_home\(\)](#)

12.141.5.10 clear_screen_home()

```
void Fl_Terminal::clear_screen_home (
    bool scroll_to_hist = true )
```

Clear the terminal screen and home the cursor.

Also clears the current mouse selection.

If 'scroll_to_hist' is true, the screen is cleared by scrolling the contents into the scrollbar history, where it can be retrieved with the scrollbar. This is the default behavior. If false, the screen is cleared and the scrollbar history is unchanged.

Similar to the escape sequence "<ESC>[2J<ESC>[H".

See also

[clear_screen\(\)](#)

12.141.5.11 color()

```
void Fl_Terminal::color (
    Fl_Color val )
```

Sets the background color for the terminal's [Fl_Group::box\(\)](#).

If the [textbgcolor\(\)](#) and [textbgcolor_default\(\)](#) are set to the special "see through" color 0xffffffff when any text was added, changing [color\(\)](#) affects the color that shows through behind that existing text.

Otherwise, whatever specific background color was set for existing text will persist after changing [color\(\)](#).

To see the effects of a change to [color\(\)](#), follow up with a call to [redraw\(\)](#).

The default value is 0x0.

12.141.5.12 cursor_col()

```
void Fl_Terminal::cursor_col (
    int col ) [protected]
```

Move cursor to the specified column `col`.

This value is clamped to the range (0..[display_columns\(\)](#)-1).

12.141.5.13 cursor_cr()

```
void Fl_Terminal::cursor_cr (
    void ) [protected]
```

Move cursor as if a CR (\r) was received.

Same as [cursor_sol\(\)](#)

12.141.5.14 cursor_down()

```
void Fl_Terminal::cursor_down (
    int count = 1,
    bool do_scroll = false ) [protected]
```

Moves cursor down `count` lines.

If cursor hits screen bottom, it either stops (does not wrap) if `do_scroll` is false, or wraps and scrolls up if `do_scroll` is true.

Parameters

<code>count</code>	Number of lines to move cursor down
<code>do_scroll</code>	Enable scrolling if set to true

12.141.5.15 `cursor_right()`

```
void Fl_Terminal::cursor_right (
    int count = 1,
    bool do_scroll = false ) [protected]
```

Moves cursor right `count` columns.

If cursor hits right edge of screen, it either stops (does not wrap) if `do_scroll` is false, or wraps and scrolls up one line if `do_scroll` is true.

12.141.5.16 `cursor_row()`

```
void Fl_Terminal::cursor_row (
    int row ) [protected]
```

Move cursor to the specified row `row`.

This value is clamped to the range (0..`display_rows()`-1).

12.141.5.17 `cursor_up()`

```
void Fl_Terminal::cursor_up (
    int count = 1,
    bool do_scroll = false ) [protected]
```

Moves cursor up `count` lines.

If cursor hits screen top, it either stops (does not wrap) if `do_scroll` is false, or scrolls down if `do_scroll` is true.

12.141.5.18 `delete_rows()`

```
void Fl_Terminal::delete_rows (
    int count ) [protected]
```

Delete (count) rows at cursor position.

Causes rows to scroll up, and empty lines created at bottom of screen. Lines deleted by scroll up are NOT moved into the scroll history.

12.141.5.19 `display_columns()` [1/2]

```
void Fl_Terminal::display_columns (
    int dcols )
```

Set terminal's display width in columns of text characters.

This value is normally managed automatically by `resize()` based on the current font size, and should not be changed. You CAN make the `display_columns()` larger than the width of the widget; text in the terminal will simply run off the screen edge and be clipped; the only way to reveal that text is if the user enlarges the widget, or the font size made smaller.

To change the display width, it is best to use `resize()` instead.

12.141.5.20 `display_columns()` [2/2]

```
int Fl_Terminal::display_columns (
    void ) const
```

Return terminal's display width in columns of text characters.

This value is normally managed automatically by [resize\(\)](#) based on the current font size.

12.141.5.21 `display_rows()` [1/2]

```
void Fl_Terminal::display_rows (
    int drows )
```

Set terminal's display height in lines of text (rows).

This value is normally managed automatically by [resize\(\)](#) based on the current font size, and should not be changed.

To change the display height, use [resize\(\)](#) instead.

12.141.5.22 `display_rows()` [2/2]

```
int Fl_Terminal::display_rows (
    void ) const
```

Return terminal's display height in lines of text (rows).

This value is normally managed automatically by [resize\(\)](#) based on the current font size.

12.141.5.23 `draw()`

```
void Fl_Terminal::draw (
    void ) [virtual]
```

Draws the entire [Fl_Terminal](#).

Lets the group draw itself first (scrollbar should be only member), followed by the terminal's screen contents.

Reimplemented from [Fl_Group](#).

12.141.5.24 `draw_buff()`

```
void Fl_Terminal::draw_buff (
    int Y ) const [protected]
```

Draws the buffer position we are scrolled to onto the FLTK screen starting at pixel position Y.

This can be anywhere in the ring buffer, not just the 'active display'; depends on what position the scrollbar is set to.

Handles attributes, colors, text selections, cursor.

12.141.5.25 `draw_row()`

```
void Fl_Terminal::draw_row (
    int grow,
    int Y ) const [protected]
```

Draw the specified global row, which is the row in `ring_chars[]`.

The global row includes history + display buffers.

12.141.5.26 `draw_row_bg()`

```
void Fl_Terminal::draw_row_bg (
    int grow,
    int X,
    int Y ) const [protected]
```

Draw the background for the specified `ring_chars[]` global row `grow` starting at FLTK coords X and Y.

Note we may be called to draw display, or even history if we're scrolled back. If there's any change in bg color, we draw the filled rects here.

If the bg color for a character is the special "see through" color 0xfffffff, no pixels are drawn.

12.141.5.27 `get_selection()`

```
bool Fl_Terminal::get_selection (
    int & srow,
    int & scol,
    int & erow,
    int & ecol ) const [protected]
```

Return mouse selection's start/end position in the ring buffer, if any.

Ensures (start < end) to allow walking 'forward' thru selection, left-to-right, top-to-bottom. The row/col values are indexes into the entire ring buffer.

Example: walk the characters of the mouse selection:

```
// Get selection
int srow,scol,erow,ecol;
if (get_selection(srow,scol,erow,ecol)) { // mouse selection exists?
    // Walk entire selection from start to end
    for (int row=srow; row<=erow; row++) { // walk rows of selection
        const Utf8Char *u8c = u8c_ring_row(row); // ptr to first character in row
        int col_start = (row==srow) ? scol : 0; // start row? start at scol
        int col_end = (row==erow) ? ecol : ring_cols(); // end row? end at ecol
        u8c += col_start; // include col offset (if any)
        for (int col=col_start; col<=col_end; col++,u8c++) { // walk columns
            ..do something with each char at *u8c..
        }
    }
}
```

Returns:

- true – valid selection values returned
- false – no selection was made, returned values undefined

See also

[walk_selection\(\)](#), [is_selection\(\)](#)

Parameters

<i>srow</i>	starting row for selection
<i>scol</i>	starting column for selection
<i>erow</i>	ending row for selection
<i>ecol</i>	ending column for selection

12.141.5.28 h_to_row()

```
int Fl_Terminal::h_to_row (
    int H ) const [protected]
```

Given a height in pixels, return number of rows that "fits" into that area.

This is used by the constructor to size the row/cols to fit the widget size.

12.141.5.29 handle()

```
int Fl_Terminal::handle (
    int e ) [virtual]
```

Handle FLTK events.

Reimplemented from [Fl_Group](#).

12.141.5.30 handle_unknown_char()

```
int Fl_Terminal::handle_unknown_char (
    void ) [protected]
```

Handle an unknown char by either emitting an error symbol to the tty, or do nothing, depending on the user configurable value of [show_unknown\(\)](#).

Returns 1 if tty modified, 0 if not.

See also

[show_unknown\(\)](#)

12.141.5.31 history_lines()

```
void Fl_Terminal::history_lines (
    int val )
```

Set the number of lines of screen history.

Large values can be briefly heavy on cpu and memory usage.

12.141.5.32 history_use()

```
int Fl_Terminal::history_use (
    void ) const
```

Returns how many lines are "in use" by the screen history buffer.

This value will be 0 if history was recently cleared with e.g. [clear_history\(\)](#) or "<ESC>c".

Return value will be in the range 0 .. ([history_lines\(\)](#)-1).

12.141.5.33 insert_char()

```
void Fl_Terminal::insert_char (
    char c,
    int rep ) [protected]
```

Insert char 'c' at the current cursor position for 'rep' times.

Does not wrap; characters at end of line are lost.

12.141.5.34 insert_rows()

```
void Fl_Terminal::insert_rows (
    int count ) [protected]
```

Insert (count) rows at current cursor position.

Causes rows below to scroll down, and empty lines created. Lines deleted by scroll down are NOT moved into the scroll history.

12.141.5.35 is_inside_selection()

```
bool Fl_Terminal::is_inside_selection (
    int grow,
    int gcol ) const [protected]
```

Is global row/column inside the current mouse selection?

Returns

- true – (grow, gcol) is inside a valid selection.
- false – (grow, gcol) is outside, or no valid selection.

12.141.5.36 output_translate()

```
void Fl_Terminal::output_translate (
    Fl_Terminal::OutFlags val )
```

Sets the combined output translation flags to val.

val can be sensible combinations of the OutFlags bit flags.

The default is LF_TO_CRLF, so that \n will generate both carriage-return (CR) and line-feed (LF).

For \r and \n to be handled literally, use `output_translate(Fl_Terminal::OutFlags::OFF)`;

To disable all output translations, use 0 or `Fl_Terminal::OutFlags::OFF`.

12.141.5.37 print_char() [1/2]

```
void Fl_Terminal::print_char (
    char c )
```

Prints single ASCII char `c` at current cursor position, and advances the cursor.

The character is displayed at the current cursor position using the current text color/attributes.

- `c` must be ASCII, not utf-8
- Does not trigger redraws

12.141.5.38 print_char() [2/2]

```
void Fl_Terminal::print_char (
    const char * text,
    int len = -1 )
```

Prints single UTF-8 char `text` of optional byte length `len` at current cursor position, and advances the cursor if the character is printable.

Handles ASCII and control codes (CR, LF, etc).

The character is displayed at the current cursor position using the current text color/attributes.

Handles control codes and can be used to construct ANSI/XTERM escape sequences.

- If optional `len` isn't specified or <0 , `strlen(text)` is used.
- `text` must not be NULL.
- `len` must not be 0.
- `text` must be a single char only (whether UTF-8 or ASCII)
- `text` can be an ASCII character, though not as efficient as [print_char\(\)](#)
- Invalid UTF-8 chars show the error character (`¿`) depending on [show_unknown\(bool\)](#).
- Does not trigger redraws

See also

[show_unknown\(bool\)](#), [handle_unknown_char\(\)](#)

12.141.5.39 printf()

```
void Fl_Terminal::printf (
    const char * fmt,
    ... )
```

Appends printf formatted messages to the terminal.

The string can contain UTF-8, crlf's, and ANSI sequences are also supported. Example:

```
#include <FL/Fl_Terminal.H>
int main(..) {
    :
    // Create a terminal, and append some messages to it
    Fl_Terminal *tty = new Fl_Terminal(..);
    :
    // Append three lines of formatted text to the buffer
    tty->printf("The current date is: %s.\nThe time is: %s\n", date_str, time_str);
    tty->printf("The current PID is %ld.\n", (long) getpid());
    :
}
```

Note

The expanded string is currently limited to 1024 characters (including NULL). For longer strings use [append\(\)](#) which has no string limits.

12.141.5.40 putchar() [1/2]

```
void Fl_Terminal::putchar (
    char c,
    int drow,
    int dcol )
```

Print the ASCII character *c* at the terminal's display position (drow,dcol).

The character MUST be printable (in range 0x20 - 0x7e), and is displayed using the current text color/attributes. Characters outside that range are either ignored or print the error character (¿), depending on [show_unknown\(bool\)](#). This is a very low level method.

No range checking is done on drow,dcol:

- drow must be in range 0..[\(display_rows\(\)-1\)](#)
- dcol must be in range 0..[\(display_columns\(\)-1\)](#)
- Does not trigger redraws
- Does NOT handle control codes, ANSI or XTERM escape sequences.

See also

[show_unknown\(bool\)](#), [handle_unknown_char\(\)](#), [is_printable\(\)](#)

12.141.5.41 putchar() [2/2]

```
void Fl_Terminal::putchar (
    const char * text,
    int len,
    int drow,
    int dcol )
```

Print UTF-8 character *text* of length *len* at display position (drow,dcol).

The character is displayed using the current text color/attributes.

This is a very low level method.

No range checking is done on drow,dcol:

- drow must be in range 0..[\(display_rows\(\)-1\)](#)
- dcol must be in range 0..[\(display_columns\(\)-1\)](#)
- Does not trigger redraws
- Does not handle ANSI or XTERM escape sequences
- Invalid UTF-8 chars show the error character (¿) depending on [show_unknown\(bool\)](#).

See also

[handle_unknown_char\(\)](#)

12.141.5.42 redraw_rate()

```
void Fl_Terminal::redraw_rate (
    float val )
```

Set the maximum rate redraw speed in floating point seconds if [redraw_style\(\)](#) is set to RATE_LIMITED.

When output is sent to the terminal, rather than calling [redraw\(\)](#) right away, a timer is started with this value indicating how long to wait before calling [redraw\(\)](#), causing the output to be shown. 0.10 is recommended (1/10th of a second), to limit redraws to no more than 10 redraws per second.

The value that works best depends on how fast data arrives, and how fast the font system can draw text at runtime. Values too small cause too many redraws to occur, causing the terminal to get backlogged if large bursts of data arrive quickly. Values too large cause realtime output to be too "choppy".

12.141.5.43 redraw_style() [1/2]

```
void Fl_Terminal::redraw_style (
    RedrawStyle val )
```

Set how [Fl_Terminal](#) manages screen redrawing.

This setting is relevant when [Fl_Terminal](#) is used for high bandwidth data; too many redraws will slow things down, too few cause redraws to be 'choppy' when realtime data comes in.

Redrawing can be cpu intensive, depending on how many rows/cols are being displayed; worst case: large display + small font. Speed largely depends on the end user's graphics hardware and font drawing system.

RedrawStyle enum	Description
NO_REDRAW	App must call redraw() as needed to update text to screen
RATE_LIMITED	Rate limited, timer controlled redraws. (DEFAULT) See redraw_rate()
PER_WRITE	Redraw triggered <i>every</i> call to append() / printf() / etc.

The default style is [RATE_LIMITED](#), which is the easiest to use, and automates redrawing to be capped at 10 redraws per second max. See [redraw_rate\(float\)](#) to control this automated redraw speed.

See also

[redraw_rate\(\)](#), [RedrawStyle](#)

12.141.5.44 redraw_style() [2/2]

```
Fl_Terminal::RedrawStyle Fl_Terminal::redraw_style (
    void ) const
```

Get the redraw style.

This determines when the terminal redraws itself while text is being added to it.

Value will be one of the [Fl_Terminal::RedrawStyle](#) enum values.

See also

[redraw_style\(Fl_Terminal::RedrawStyle\)](#)

12.141.5.45 reset_terminal()

```
void Fl_Terminal::reset_terminal (
    void )
```

Resets terminal to default colors, clears screen, history and mouse selection, homes cursor, resets tabstops.

Same as "`<ESC>c`"

12.141.5.46 resize()

```
void Fl_Terminal::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Handle widget resizing, such as if user resizes parent window.

This may increase the column width of the widget if the width of the widget is made larger than it was.

Note

Resizing currently does not rewrap existing text. Currently enlarging makes room for longer lines, and shrinking the size lets long lines run off the right edge of the display, hidden from view. This behavior may change in the future to rewrap.

Reimplemented from [Fl_Group](#).

12.141.5.47 scroll()

```
void Fl_Terminal::scroll (
    int rows ) [protected]
```

Scroll the display up(+) or down(-) the specified rows.

- Negative value scrolls "down", clearing top line, and history unaffected.
- Postive value scrolls "up", clearing bottom line, rotating top line into history.

12.141.5.48 scrollbar_size() [1/2]

```
void Fl_Terminal::scrollbar_size (
    int val )
```

Set the width of the scrollbar's trough to val, in pixels.

Only use this method if you need to override the global scrollbar size.

Setting val to the special value 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#).

See also

[Fl::scrollbar_size\(\)](#)

12.141.5.49 scrollbar_size() [2/2]

```
int Fl_Terminal::scrollbar_size (
    void ) const
```

Get the current size of the scrollbar's trough, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

12.141.5.50 selection_extend()

```
bool Fl_Terminal::selection_extend (
    int X,
    int Y ) [protected]
```

Extend selection to FLTK coords X,Y.

Returns true if extended, false if nothing done (X,Y offscreen)

12.141.5.51 selection_text()

```
const char * Fl_Terminal::selection_text (
    void ) const [protected]
```

Return text selection (for copy()/paste() operations)

- Returns allocated NULL terminated string for entire selection.
- Caller must free() this memory when done.
- Unicode safe.

12.141.5.52 selection_text_len()

```
int Fl_Terminal::selection_text_len (
    void ) const [protected]
```

Return byte length of all UTF-8 chars in selection, or 0 if no selection.

NOTE: Length includes trailing white on each line.

12.141.5.53 show_unknown() [1/2]

```
void Fl_Terminal::show_unknown (
    bool val )
```

Set the "show unknown" flag.

If true, unknown escape sequences and unprintable control characters will be shown with the error character "?".

If false, those sequences and characters will be ignored.

See also

[handle_unknown_char\(\)](#)

12.141.5.54 show_unknown() [2/2]

```
bool Fl_Terminal::show_unknown (
    void ) const
```

Return the "show unknown" flag.

See [show_unknown\(bool\)](#) for more info.

12.141.5.55 textattrib() [1/2]

```
uchar Fl_Terminal::textattrib ( ) const
```

Get text attribute bits (underline, inverse, etc).

This is the default attribute used for all newly printed text.

See also

[textattrib\(uchar\)](#), [Fl_Terminal::Attrib](#)

12.141.5.56 textattrib() [2/2]

```
void Fl_Terminal::textattrib (
    uchar val )
```

Set text attribute bits (underline, inverse, etc).

This will be the default attribute used for all newly printed text.

See also

[Fl_Terminal::Attrib](#)

12.141.5.57 textbgcolor()

```
void Fl_Terminal::textbgcolor (
    Fl_Color val )
```

Set text background color to fltk color `val` used by any new text added.

Use this for temporary color changes, similar to `<ESC>[48;2;<R>;<G>;m`

This setting does *not* affect the 'default' text colors used by `<ESC>[0m`, `<ESC>c`, [reset_terminal\(\)](#), etc. To set that too, also set [textbgcolor_default\(Fl_Color\)](#), e.g.

```
// Set both 'current' and 'default' colors
Fl_Color darkamber = 0x20100000;
tty->textbgcolor(darkamber); // set 'current' bg color
tty->textbgcolor_default(darkamber); // set 'default' bg color used by ESC[0m reset
```

The special color value 0xffffffff (all ff's) is the "see through" color, which lets the widget's own [Fl_Group::color\(\)](#) show through behind the text. This special text background color is the *default*, and is what most situations need.

See also

[textbgcolor_default\(Fl_Color\)](#)

12.141.5.58 textbgcolor_default() [1/2]

```
void Fl_Terminal::textbgcolor_default (
    Fl_Color val )
```

Set the default text background color used by any new text added after a reset (<ESC>c, <ESC>[0m, or [reset_terminal\(\)](#)).

Does not affect the 'current' text background color; use [textbgcolor\(Fl_Color\)](#) to set that.

The special color value 0xffffffff (all ff's) is the "see through" color, which lets the widget's own [Fl_Group::color\(\)](#) show through behind the text. This special text background color is the *default*, and is what most situations need.

See also

[textbgcolor\(Fl_Color\)](#)

12.141.5.59 textbgcolor_default() [2/2]

```
Fl_Color Fl_Terminal::textbgcolor_default (
    void ) const [inline]
```

Return text's default background color.

See also

[textbgcolor\(\)](#)

12.141.5.60 textbgcolor_xterm()

```
void Fl_Terminal::textbgcolor_xterm (
    uchar val )
```

Sets the background text color as one of the 8 'xterm color' values.

This will be the foreground color used for all newly printed text, similar to the <ESC>[#m escape sequence, where # is between 40 and 47.

This color will be reset to the default bg color if [reset_terminal\(\)](#) is called, or by <ESC>c, <ESC>[0m, etc.

The xterm color intensity values can be influenced by the Dim/Bold/Normal modes (which can be set with e.g. <ESC>[1m, [textattrib\(\)](#), etc), so the actual RGB values of these colors allow room for Dim/Bold to influence their brightness. For instance, "Normal Red" is not full brightness to allow "Bold Red" to be brighter. This goes for all colors except 'Black', which is not influenced by Dim or Bold; Black is always Black.

The 8 color xterm values are:

- 0 = Black
- 1 = Red
- 2 = Green
- 3 = Yellow
- 4 = Blue
- 5 = Magenta
- 6 = Cyan
- 7 = White

See also

[textbgcolor_default\(Fl_Color\)](#)

12.141.5.61 textcolor()

```
void Fl_Terminal::textcolor (
    Fl_Color val )
```

Set the text color for the terminal.

This is a convenience method that sets *both* [textfgcolor\(\)](#) and [textfgcolor_default\(\)](#), ensuring both are set to the same value.

12.141.5.62 textfgcolor()

```
void Fl_Terminal::textfgcolor (
    Fl_Color val )
```

Set text foreground drawing color to fltk color `val` used by any new text added.

Use this for temporary color changes, similar to `<ESC>[38;2;<R>;<G>;m`

This setting does *not* affect the 'default' text colors used by `<ESC>[0m`, `<ESC>c`, [reset_terminal\(\)](#), etc. To change both the current *and* default fg color, also use [textfgcolor_default\(Fl_Color\)](#). Example:

```
// Set both 'current' and 'default' colors
Fl_Color amber = 0xd0704000;
tty->textfgcolor(amber);           // set 'current' fg color
tty->textfgcolor_default(amber); // set 'default' fg color used by ESC[0m reset
```

See also

[textfgcolor_default\(Fl_Color\)](#)

12.141.5.63 textfgcolor_default() [1/2]

```
void Fl_Terminal::textfgcolor_default (
    Fl_Color val )
```

Set the default text foreground color used by `<ESC>c`, `<ESC>[0m`, and [reset_terminal\(\)](#).

Does not affect the 'current' text foreground color; use [textfgcolor\(Fl_Color\)](#) to set that.

See also

[textfgcolor\(Fl_Color\)](#)

12.141.5.64 textfgcolor_default() [2/2]

```
Fl_Color Fl_Terminal::textfgcolor_default (
    void ) const [inline]
```

Return text's default foreground color.

See also

[textfgcolor\(\)](#)

12.141.5.65 textfgcolor_xterm()

```
void Fl_Terminal::textfgcolor_xterm (
    uchar val )
```

Sets the foreground text color as one of the 8 'xterm color' values.

This will be the foreground color used for all newly printed text, similar to the `<ESC>[#m` escape sequence, where `#` is between 30 and 37.

This color will be reset to the default fg color if [reset_terminal\(\)](#) is called, or by `<ESC>c`, `<ESC>[0m`, etc.

The xterm color intensity values can be influenced by the Dim/Bold/Normal modes (which can be set with e.g. `<ESC>[1m, textattrib\(\)`, etc), so the actual RGB values of these colors allow room for Dim/Bold to influence their brightness. For instance, "Normal Red" is not full brightness to allow "Bold Red" to be brighter. This goes for all colors except 'Black', which is not influenced by Dim or Bold; Black is always Black.

The 8 color xterm values are:

- 0 = Black
- 1 = Red
- 2 = Green
- 3 = Yellow
- 4 = Blue
- 5 = Magenta
- 6 = Cyan
- 7 = White

See also

[textfgcolor_default\(Fl_Color\)](#)

12.141.5.66 `textfont()`

```
void Fl_Terminal::textfont (
    Fl_Font val )
```

Sets the font used for all text displayed in the terminal.

This affects all existing text (in display and history) as well as any newly printed text.

Only monospace fonts are recommended, such as `FL_COURIER` or `FL_SCREEN`. Custom fonts configured with [Fl::set_font\(\)](#) will also work, as long as they are monospace.

12.141.5.67 `textsize()`

```
void Fl_Terminal::textsize (
    Fl_Fontsize val )
```

Sets the font size used for all text displayed in the terminal.

This affects all existing text (in display and history) as well as any newly printed text.

Changing this will affect the [display_rows\(\)](#) and [display_columns\(\)](#).

12.141.5.68 `u8c_disp_row()`

```
Fl_Terminal::Utf8Char * Fl_Terminal::u8c_disp_row (
    int drow ) [protected]
```

Return pointer to the first u8c character in row `drow` of the display.

- 'drow' is indexed relative to the beginning of the display buffer.

- This can be used to walk all columns in the specified row, e.g.

```
// Print all chars in first row of display (ASCII and UTF-8)
Utf8Char *u8c = u8c_disp_row(0);           // first char of first display row
int scol = 0, ecol = disp_cols();         // start/end for column loop
for (int col=scol; col<ecol; col++,u8c++) { // loop from first char to last
    char *text = u8c->text_utf8();         // text string for char
    int len = u8c->length();              // text string length for char
    ::printf("<%.*s>", len, text);        // print potentially multibyte char
}
```

12.141.5.69 u8c_hist_row()

```
Fl_Terminal::Utf8Char * Fl_Terminal::u8c_hist_row (
    int hrow ) [protected]
```

Return u8c for beginning of a row inside the scrollbar history.

'hrow' is indexed relative to the beginning of the scrollbar history buffer.

See also

[u8c_disp_row\(int\)](#) for example use.

12.141.5.70 u8c_hist_use_row()

```
Fl_Terminal::Utf8Char * Fl_Terminal::u8c_hist_use_row (
    int hurow ) [protected]
```

Return u8c for beginning of row `hurow` inside the 'in use' part of the scrollbar history.

'hurow' is indexed relative to the beginning of the 'in use' part of the scrollbar history buffer. This may be a different from [u8c_hist_row\(int\)](#) if the history was recently cleared, and there aren't many (or any) rows in the history buffer that have been populated with scrollbar text yet.

See also

[u8c_disp_row\(int\)](#) for example use.

12.141.5.71 u8c_ring_row()

```
Fl_Terminal::Utf8Char * Fl_Terminal::u8c_ring_row (
    int grow ) [protected]
```

Return UTF-8 char for row `grow` in the ring buffer.

`grow` is globally indexed relative to the beginning of the ring buffer, so this method can access ANY character in the entire ring buffer (hist or disp) by the global index.

Scrolling offset is NOT applied; this is raw access to the ring's rows.

Should really ONLY be used for making a complete copy of the ring.

Example:

```
// Walk ALL rows and cols in the ring buffer..
for (int row=0; row<ring.rows(); row++) {
    Utf8Char *u8c = ring.u8c_ring_row(row);
    for (int col=0; col<ring.cols(); col++,u8c++) {
        ..make use of u8c->xxx() methods..
    }
}
```

12.141.5.72 vprintf()

```
void Fl_Terminal::vprintf (
    const char * fmt,
    va_list ap )
```

Appends printf formatted messages to the terminal.

Subclasses can use this to implement their own [printf\(\)](#) functionality.

The string can contain UTF-8, crlf's, and ANSI sequences are also supported when [ansi\(bool\)](#) is set to 'true'.

Note

The expanded string is currently limited to 1024 characters (including NULL). For longer strings use [append\(\)](#) which has no string limits.

Parameters

<i>fmt</i>	is a printf format string for the message text.
<i>ap</i>	is a <code>va_list</code> created by <code>va_start()</code> and closed with <code>va_end()</code> , which the caller is responsible for handling.

12.141.5.73 w_to_col()

```
int Fl_Terminal::w_to_col (
    int W ) const [protected]
```

Given a width in pixels, return number of columns that "fits" into that area. This is used by the constructor to size the row/cols to fit the widget size.

12.141.5.74 walk_selection()

```
const Fl_Terminal::Utf8Char * Fl_Terminal::walk_selection (
    const Utf8Char * u8c,
    int & row,
    int & col ) const [protected]
```

Walk the mouse selection one character at a time from beginning to end, returning a Utf8Char* to the next character in the selection, or NULL if the end was reached, or if there's no selection.

This is easier to use for walking the selection than [get_selection\(\)](#).

u8c should start out as NULL, rewinding to the beginning of the selection. If the returned Utf8Char* is not NULL, row and col return the character's row/column position in the ring buffer.

```
// EXAMPLE: Walk the entire mouse selection, if any
int row,col; // the returned row/col for each char
Utf8Char *u8c = NULL; // start with NULL to begin walk
while ((u8c = walk_selection(u8c, row, col))) { // loop until end char reached
    ..do something with *u8c..
}
```

See also

[get_selection\(\)](#), [is_selection\(\)](#)

Parameters

<i>u8c</i>	NULL on first iter
<i>row</i>	returned row#
<i>col</i>	returned col#

12.141.6 Member Data Documentation

12.141.6.1 scrollbar

```
Fl_Scrollbar* Fl_Terminal::scrollbar
```

Vertical scrollbar.

Public, so that it can be accessed directly.

Todo Support scrollbar_left/right() - See [Fl_Browser_::scrollbar](#) docs

The documentation for this class was generated from the following files:

- [Fl_Terminal.H](#)
- [Fl_Terminal.cxx](#)

12.142 Fl_Text_Buffer Class Reference

This class manages Unicode text displayed in one or more [Fl_Text_Display](#) widgets.

```
#include <Fl_Text_Buffer.H>
```

Public Member Functions

- void [add_modify_callback](#) (Fl_Text_Modify_Cb bufModifiedCB, void *cbArg)

- Adds a callback function that is called whenever the text buffer is modified.*

 - void **add_predelete_callback** (FI_Text_Predelete_Cb bufPredeleCB, void *cbArg)
- Adds a callback routine to be called before text is deleted from the buffer.*

 - char * **address** (int pos)
- Convert a byte offset in buffer into a memory address.*

 - const char * **address** (int pos) const
- Convert a byte offset in buffer into a memory address.*

 - void **append** (const char *t, int addedLength=-1)
- Appends the text string to the end of the buffer.*

 - int **appendfile** (const char *file, int buflen=128 *1024)
- Appends the named file to the end of the buffer.*

 - char **byte_at** (int pos) const
- Returns the raw byte at the specified position pos in the buffer.*

 - void **call_modify_callbacks** ()
- Calls all modify callbacks that have been registered using the [add_modify_callback\(\)](#) method.*

 - void **call_predelete_callbacks** ()
- Calls the stored pre-delete callback procedure(s) for this buffer to update the changed area(s) on the screen and any other listeners.*

 - bool **can_redo** () const
- Check if undo is enabled and if the last undo action can be redone.*

 - bool **can_undo** () const
- Check if undo is enabled and if the last action can be undone.*

 - void **canUndo** (char flag=1)
- Enable or disable undo actions for this text buffer.*

 - unsigned int **char_at** (int pos) const
- Returns the character at the specified position pos in the buffer.*

 - void **copy** (FI_Text_Buffer *fromBuf, int fromStart, int fromEnd, int toPos)
- Copies text from another FI_Text_Buffer to this one.*

 - int **count_displayed_characters** (int lineStartPos, int targetPos) const
- Count the number of displayed characters between buffer position lineStartPos and targetPos.*

 - int **count_lines** (int startPos, int endPos) const
- Counts the number of newlines between startPos and endPos in buffer.*

 - int **findchar_backward** (int startPos, unsigned int searchChar, int *foundPos) const
- Search backwards in buffer buf for character searchChar, starting with the character before startPos, returning the result in foundPos.*

 - int **findchar_forward** (int startPos, unsigned searchChar, int *foundPos) const
- Finds the next occurrence of the specified character.*

 - FI_Text_Buffer (int requestedSize=0, int preferredGapSize=1024)
- Create an empty text buffer of a pre-determined size.*

 - int **highlight** ()
- Returns a non-zero value if text has been highlighted, 0 otherwise.*

 - void **highlight** (int start, int end)
- Highlights the specified text within the buffer.*

 - int **highlight_position** (int *start, int *end)
- Highlights the specified text between start and end within the buffer.*

 - const FI_Text_Selection * **highlight_selection** () const
- Returns the current highlight selection.*

 - char * **highlight_text** ()
- Returns the highlighted text.*

 - void **insert** (int pos, const char *text, int insertedLength=-1)
- Inserts null-terminated string text at position pos.*

- int **insertfile** (const char *file, int pos, int buflen=128 *1024)
Inserts a file at the specified position.
- bool **is_word_separator** (int pos) const
Returns whether character at position `pos` is a word separator.
- int **length** () const
Returns the number of bytes in the buffer.
- int **line_end** (int pos) const
Finds and returns the position of the end of the line containing position `pos` (which is either a pointer to the newline character ending the line or a pointer to one character beyond the end of the buffer).
- int **line_start** (int pos) const
Returns the position of the start of the line containing position `pos`.
- char * **line_text** (int pos) const
Returns the text from the entire line containing the specified character position.
- int **loadfile** (const char *file, int buflen=128 *1024)
Lloads a text file into the buffer.
- int **next_char** (int ix) const
Returns the index of the next character.
- int **next_char_clipped** (int ix) const
- int **outputfile** (const char *file, int start, int end, int buflen=128 *1024)
Writes the specified portions of the text buffer to a file.
- int **prev_char** (int ix) const
Returns the index of the previous character.
- int **prev_char_clipped** (int ix) const
- **FI_Text_Selection * primary_selection** ()
Returns the primary selection.
- const **FI_Text_Selection * primary_selection** () const
Returns the primary selection.
- void **printf** (const char *fmt,...)
Appends printf formatted messages to the end of the buffer.
- int **redo** (int *cp=0)
Redo previous undo action.
- void **remove** (int start, int end)
Deletes a range of characters in the buffer.
- void **remove_modify_callback** (FI_Text_Modify_Cb bufModifiedCB, void *cbArg)
Removes a modify callback.
- void **remove_predelete_callback** (FI_Text_Predelete_Cb predelCB, void *cbArg)
Removes a callback routine `bufPreDeleteCB` associated with argument `cbArg` to be called before text is deleted from the buffer.
- void **remove_secondary_selection** ()
Removes the text from the buffer corresponding to the secondary text selection object.
- void **remove_selection** ()
Removes the text in the primary selection.
- void **replace** (int start, int end, const char *text, int insertedLength=-1)
Deletes the characters between `start` and `end`, and inserts the null-terminated string `text` in their place in the buffer.
- void **replace_secondary_selection** (const char *text)
Replaces the text from the buffer corresponding to the secondary text selection object with the new string `text`.
- void **replace_selection** (const char *text)
Replaces the text in the primary selection.
- int **rewind_lines** (int startPos, int nLines)
Finds and returns the position of the first character of the line `nLines` backwards from `startPos` (not counting the character pointed to by `startpos` if that is a newline) in the buffer.

- int **savefile** (const char *file, int buflen=128 *1024)
Saves a text file from the current buffer.
- int **search_backward** (int startPos, const char *searchString, int *foundPos, int matchCase=0) const
Search backwards in buffer for string searchString, starting with the character at startPos, returning the result in foundPos.
- int **search_forward** (int startPos, const char *searchString, int *foundPos, int matchCase=0) const
Search forwards in buffer for string searchString, starting with the character startPos, and returning the result in foundPos.
- void **secondary_select** (int start, int end)
Selects a range of characters in the secondary selection.
- int **secondary_selected** ()
Returns a non-zero value if text has been selected in the secondary text selection, 0 otherwise.
- const **FI_Text_Selection** * **secondary_selection** () const
Returns the secondary selection.
- int **secondary_selection_position** (int *start, int *end)
Returns the current selection in the secondary text selection object.
- char * **secondary_selection_text** ()
Returns the text in the secondary selection.
- void **secondary_unselect** ()
Clears any selection in the secondary text selection object.
- void **select** (int start, int end)
Selects a range of characters in the buffer.
- int **selected** () const
Returns a non-zero value if text has been selected, 0 otherwise.
- int **selection_position** (int *start, int *end)
Gets the selection position.
- char * **selection_text** ()
Returns the currently selected text.
- int **skip_displayed_characters** (int lineStartPos, int nChars)
Count forward from buffer position startPos in displayed characters.
- int **skip_lines** (int startPos, int nLines)
Finds the first character of the line nLines forward from startPos in the buffer and returns its position.
- int **tab_distance** () const
Gets the tab width.
- void **tab_distance** (int tabDist)
Set the hardware tab distance (width) used by all displays for this buffer, and used in computing offsets for rectangular selection operations.
- char * **text** () const
Get a copy of the entire contents of the text buffer.
- void **text** (const char *text)
Replaces the entire contents of the text buffer.
- char * **text_range** (int start, int end) const
Get a copy of a part of the text buffer.
- int **undo** (int *cp=0)
Undo text modification according to the undo variables or insert text from the undo buffer.
- void **unhighlight** ()
Unhighlights text in the buffer.
- void **unselect** ()
Cancel any previous selection on the primary text selection object.
- int **utf8_align** (int) const
Align an index into the buffer to the current or previous UTF-8 boundary.

- void **vprintf** (const char *fmt, va_list ap)
Can be used by subclasses that need their own `printf()` style functionality.
- int **word_end** (int pos) const
Returns the position corresponding to the end of the word.
- int **word_start** (int pos) const
Returns the position corresponding to the start of the word.
- **~FI_Text_Buffer** ()
Frees a text buffer.

Public Attributes

- int **input_file_was_transcoded**
true if the loaded file has been transcoded to UTF-8.
- void(* **transcoding_warning_action**)(FI_Text_Buffer *)
Pointer to a function called after reading a non UTF-8 encoded file.

Static Public Attributes

- static const char * **file_encoding_warning_message**
This message may be displayed using the `fl_alert()` function when a file which was not UTF-8 encoded is input.

Protected Member Functions

- int **apply_undo** (FI_Text_Undo_Action *action, int *cursorPos)
Apply the current undo/redo operation, called from `undo()` or `redo()`.
- void **call_modify_callbacks** (int pos, int nDeleted, int nInserted, int nRestyled, const char *deletedText) const
Calls the stored modify callback procedure(s) for this buffer to update the changed area(s) on the screen and any other listeners.
- void **call_predelete_callbacks** (int pos, int nDeleted) const
Calls the stored pre-delete callback procedure(s) for this buffer to update the changed area(s) on the screen and any other listeners.
- int **insert_** (int pos, const char *text, int insertedLength=-1)
Internal (non-redisplaying) version of `insert()`.
- void **move_gap** (int pos)
Move the gap to start at a new position.
- void **reallocate_with_gap** (int newGapStart, int newGapLen)
Reallocates the text storage in the buffer to have a gap starting at `newGapStart` and a gap size of `newGapLen`, preserving the buffer's current contents.
- void **redisplay_selection** (FI_Text_Selection *oldSelection, FI_Text_Selection *newSelection) const
Calls the stored redisplay procedure(s) for this buffer to update the screen for a change in a selection.
- void **remove_** (int start, int end)
Internal (non-redisplaying) version of `remove()`.
- void **remove_selection_** (FI_Text_Selection *sel)
Removes the text from the buffer corresponding to `sel`.
- void **replace_selection_** (FI_Text_Selection *sel, const char *text)
Replaces the `text` in selection `sel`.
- char * **selection_text** (FI_Text_Selection *sel) const
- void **update_selections** (int pos, int nDeleted, int nInserted)
Updates all of the selections in the buffer for changes in the buffer's text.

Protected Attributes

- char * **mBuf**
allocated memory where the text is stored
- char **mCanUndo**
if this buffer is used for attributes, it must not do any undo calls
- void ** **mCbArgs**
caller arguments for modifyProcs above
- int **mCursorPosHint**
hint for reasonable cursor position after a buffer modification operation
- int **mGapEnd**
points to the first character after the gap
- int **mGapStart**
points to the first character of the gap
- [FI_Text_Selection](#) **mHighlight**
highlighted areas
- int **mLength**
length of the text in the buffer (the length of the buffer itself must be calculated: gapEnd - gapStart + length)
- [FI_Text_Modify_Cb](#) * **mModifyProcs**
procedures to call when buffer is modified to redisplay contents
- int **mNModifyProcs**
number of modify-redisplay procs attached
- int **mNPredeleteProcs**
number of pre-delete procs attached
- void ** **mPredeleteCbArgs**
caller argument for pre-delete proc above
- [FI_Text_Predelete_Cb](#) * **mPredeleteProcs**
procedure to call before text is deleted from the buffer; at most one is supported.
- int **mPreferredGapSize**
the default allocation for the text gap is 1024 bytes and should only be increased if frequent and large changes in buffer size are expected
- [FI_Text_Selection](#) **mPrimary**
highlighted areas
- [FI_Text_Undo_Action_List](#) * **mRedoList**
List of redo event.
- [FI_Text_Selection](#) **mSecondary**
highlighted areas
- int **mTabDist**
equiv.
- [FI_Text_Undo_Action](#) * **mUndo**
local undo event
- [FI_Text_Undo_Action_List](#) * **mUndoList**
List of undo event.

12.142.1 Detailed Description

This class manages Unicode text displayed in one or more [FI_Text_Display](#) widgets.

All text in [FI_Text_Buffer](#) must be encoded in UTF-8. All indices used in the function calls must be aligned to the start of a UTF-8 sequence. All indices and pointers returned will be aligned. All functions that return a single character will return that in an unsigned int in UCS-4 encoding.

The [FI_Text_Buffer](#) class is used by the [FI_Text_Display](#) and [FI_Text_Editor](#) to manage complex text data and is based upon the excellent NEdit text editor engine - see <https://sourceforge.net/projects/nedit/>.

12.142.2 Constructor & Destructor Documentation

12.142.2.1 Fl_Text_Buffer()

```
Fl_Text_Buffer::Fl_Text_Buffer (
    int requestedSize = 0,
    int preferredGapSize = 1024 )
```

Create an empty text buffer of a pre-determined size.

Parameters

<i>requestedSize</i>	use this to avoid unnecessary re-allocation if you know exactly how much the buffer will need to hold
<i>preferredGapSize</i>	Initial size for the buffer gap (empty space in the buffer where text might be inserted if the user is typing sequential characters)

12.142.3 Member Function Documentation

12.142.3.1 add_modify_callback()

```
void Fl_Text_Buffer::add_modify_callback (
    Fl_Text_Modify_Cb bufModifiedCB,
    void * cbArg )
```

Adds a callback function that is called whenever the text buffer is modified.

The callback function is declared as follows:

```
typedef void (*Fl_Text_Modify_Cb)(int pos, int nInserted, int nDeleted,
    int nRestyled, const char* deletedText,
    void* cbArg);
```

12.142.3.2 address() [1/2]

```
char * Fl_Text_Buffer::address (
    int pos ) [inline]
```

Convert a byte offset in buffer into a memory address.

Parameters

<i>pos</i>	byte offset into buffer
------------	-------------------------

Returns

byte offset converted to a memory address

12.142.3.3 address() [2/2]

```
const char * Fl_Text_Buffer::address (
    int pos ) const [inline]
```

Convert a byte offset in buffer into a memory address.

Parameters

<i>pos</i>	byte offset into buffer
------------	-------------------------

Returns

byte offset converted to a memory address

12.142.3.4 append()

```
void Fl_Text_Buffer::append (
    const char * t,
    int addedLength = -1 ) [inline]
```

Appends the text string to the end of the buffer.

Parameters

<i>t</i>	UTF-8 encoded text
<i>addedLength</i>	number of bytes to append, or -1 to indicate <i>t</i> is null-terminated

12.142.3.5 appendfile()

```
int Fl_Text_Buffer::appendfile (
    const char * file,
    int buflen = 128*1024 ) [inline]
```

Appends the named file to the end of the buffer.

See also [insertfile\(\)](#).

12.142.3.6 byte_at()

```
char Fl_Text_Buffer::byte_at (
    int pos ) const
```

Returns the raw byte at the specified position *pos* in the buffer.

Positions start at 0.

Parameters

<i>pos</i>	byte offset into buffer
------------	-------------------------

Returns

unencoded raw byte

12.142.3.7 can_redo()

```
bool Fl_Text_Buffer::can_redo ( ) const
```

Check if undo is enabled and if the last undo action can be redone.

Check if undo is enabled and if the last undo action can be redone.

See also

[canUndo\(\)](#)

12.142.3.8 can_undo()

```
bool Fl_Text_Buffer::can_undo ( ) const
```

Check if undo is enabled and if the last action can be undone.

See also

[canUndo\(\)](#)

12.142.3.9 canUndo()

```
void Fl_Text_Buffer::canUndo (
    char flag = 1 )
```

Enable or disable undo actions for this text buffer.

Undo actions are enable for text buffer by default. If used as a style buffer in [Fl_Text_Display](#), undo actions are disabled as they are handled by the text buffer.

See also

[can_undo\(\)](#)

12.142.3.10 char_at()

```
unsigned int Fl_Text_Buffer::char_at (
    int pos ) const
```

Returns the character at the specified position `pos` in the buffer. Positions start at 0.

Parameters

<code>pos</code>	byte offset into buffer, <code>pos</code> must be at a UTF-8 character boundary
------------------	---

Returns

Unicode UCS-4 encoded character

12.142.3.11 copy()

```
void Fl_Text_Buffer::copy (
    Fl_Text_Buffer * fromBuf,
    int fromStart,
    int fromEnd,
    int toPos )
```

Copies text from another [Fl_Text_Buffer](#) to this one.

Parameters

<code>fromBuf</code>	source text buffer, may be the same as this
<code>fromStart</code>	byte offset into buffer
<code>fromEnd</code>	byte offset into buffer
<code>toPos</code>	destination byte offset into buffer

12.142.3.12 count_displayed_characters()

```
int Fl_Text_Buffer::count_displayed_characters (
    int lineStartPos,
    int targetPos ) const
```

Count the number of displayed characters between buffer position `lineStartPos` and `targetPos`. Displayed characters are the characters shown on the screen to represent characters in the buffer, where tabs and control characters are expanded.

12.142.3.13 count_lines()

```
int Fl_Text_Buffer::count_lines (
    int startPos,
    int endPos ) const
```

Counts the number of newlines between `startPos` and `endPos` in buffer. The character at position `endPos` is not counted.

12.142.3.14 findchar_backward()

```
int Fl_Text_Buffer::findchar_backward (
    int startPos,
    unsigned int searchChar,
    int * foundPos ) const
```

Search backwards in buffer `buf` for character `searchChar`, starting with the character *before* `startPos`, returning the result in `foundPos`.

Returns 1 if found, 0 if not. The difference between this and [search_backward\(\)](#) is that it's optimized for single characters. The overall performance of the text widget is dependent on its ability to count lines quickly, hence searching for a single character: `newline`.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchChar</i>	UCS-4 character that we want to find
<i>foundPos</i>	byte offset where the character was found

Returns

1 if found, 0 if not

12.142.3.15 findchar_forward()

```
int Fl_Text_Buffer::findchar_forward (
    int startPos,
    unsigned searchChar,
    int * foundPos ) const
```

Finds the next occurrence of the specified character.

Search forwards in buffer for character `searchChar`, starting with the character `startPos`, and returning the result in `foundPos`. Returns 1 if found, 0 if not. The difference between this and [search_forward\(\)](#) is that it's optimized for single characters. The overall performance of the text widget is dependent on its ability to count lines quickly, hence searching for a single character: `newline`.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchChar</i>	UCS-4 character that we want to find
<i>foundPos</i>	byte offset where the character was found

Returns

1 if found, 0 if not

12.142.3.16 highlight_text()

```
char * Fl_Text_Buffer::highlight_text ( )
```

Returns the highlighted text.

When you are done with the text, free it using the `free()` function.

12.142.3.17 insert()

```
void Fl_Text_Buffer::insert (
    int pos,
    const char * text,
    int insertedLength = -1 )
```

Inserts null-terminated string `text` at position `pos`.

Parameters

<i>pos</i>	insertion position as byte offset (must be UTF-8 character aligned)
<i>text</i>	UTF-8 encoded text
<i>insertedLength</i>	number of bytes to insert, or -1 to indicate <i>text</i> is null-terminated

12.142.3.18 insert_()

```
int Fl_Text_Buffer::insert_ (
    int pos,
    const char * text,
    int insertedLength = -1 ) [protected]
```

Internal (non-redisplaying) version of [insert\(\)](#).

Returns the length of text inserted (this is just `strlen(text)` if `insertedLength == -1`, however this calculation can be expensive and the length will be required by any caller who will continue on to call `redisplay`). `pos` must be contiguous with the existing text in the buffer (i.e. not past the end).

Returns

the number of bytes inserted

12.142.3.19 insertfile()

```
int Fl_Text_Buffer::insertfile (
    const char * file,
    int pos,
    int buflen = 128*1024 )
```

Inserts a file at the specified position.

Returns

- 0 on success
- non-zero on error (`strerror()` contains reason)
- 1 indicates open for read failed (no data loaded)
- 2 indicates error occurred while reading data (data was partially loaded)

File can be UTF-8 or CP1252 encoded. If the input file is not UTF-8 encoded, the [Fl_Text_Buffer](#) widget will contain data transcoded to UTF-8. By default, the message [Fl_Text_Buffer::file_encoding_warning_message](#) will warn the user about this.

See also

[input_file_was_transcoded](#) and [transcoding_warning_action](#).

12.142.3.20 is_word_separator()

```
bool Fl_Text_Buffer::is_word_separator (
    int pos ) const
```

Returns whether character at position `pos` is a word separator.

Pos must be at a character boundary.

12.142.3.21 length()

```
int Fl_Text_Buffer::length ( ) const [inline]
```

Returns the number of bytes in the buffer.

Returns

size of text in bytes

12.142.3.22 line_end()

```
int Fl_Text_Buffer::line_end (
    int pos ) const
```

Finds and returns the position of the end of the line containing position `pos` (which is either a pointer to the newline character ending the line or a pointer to one character beyond the end of the buffer).

Parameters

<code>pos</code>	byte index into buffer
------------------	------------------------

Returns

byte offset to line end

12.142.3.23 line_start()

```
int Fl_Text_Buffer::line_start (
    int pos ) const
```

Returns the position of the start of the line containing position `pos`.

Parameters

<code>pos</code>	byte index into buffer
------------------	------------------------

Returns

byte offset to line start

12.142.3.24 line_text()

```
char * Fl_Text_Buffer::line_text (
    int pos ) const
```

Returns the text from the entire line containing the specified character position. When you are done with the text, free it using the `free()` function.

Parameters

<code>pos</code>	byte index into buffer
------------------	------------------------

Returns

copy of UTF-8 text, must be free'd

12.142.3.25 loadfile()

```
int Fl_Text_Buffer::loadfile (
    const char * file,
    int buflen = 128*1024 ) [inline]
```

Loads a text file into the buffer.

See also [insertfile\(\)](#).

12.142.3.26 next_char()

```
int Fl_Text_Buffer::next_char (
    int ix ) const
```

Returns the index of the next character.

Parameters

<i>ix</i>	index to the current character
-----------	--------------------------------

12.142.3.27 outputfile()

```
int Fl_Text_Buffer::outputfile (
    const char * file,
    int start,
    int end,
    int buflen = 128*1024 )
```

Writes the specified portions of the text buffer to a file.

Returns

- 0 on success
- non-zero on error (strerror() contains reason)
- 1 indicates open for write failed (no data saved)
- 2 indicates error occurred while writing data (data was partially saved)

See also

[savefile\(const char *file, int buflen\)](#)

12.142.3.28 prev_char()

```
int Fl_Text_Buffer::prev_char (
    int ix ) const
```

Returns the index of the previous character.

Parameters

<i>ix</i>	index to the current character
-----------	--------------------------------

12.142.3.29 printf()

```
void Fl_Text_Buffer::printf (
    const char * fmt,
    ... )
```

Appends printf formatted messages to the end of the buffer.

Example:

```
#include <FL/Fl_Text_Display.H>
int main(..) {
    :
    // Create a text display widget and assign it a text buffer
    Fl_Text_Display *tdsp = new Fl_Text_Display(..);
    Fl_Text_Buffer *tbuf = new Fl_Text_Buffer();
    tdsp->buffer(tbuf);
    :
    // Append three lines of formatted text to the buffer
    tbuf->printf("The current date is: %s.\nThe time is: %s\n", date_str, time_str);
    tbuf->printf("The current PID is %ld.\n", (long)getpid());
    :
}
```

Note

The expanded string is currently limited to 1024 characters.

Parameters

<i>in</i>	<i>fmt</i>	is a printf format string for the message text.
-----------	------------	---

12.142.3.30 remove()

```
void Fl_Text_Buffer::remove (
    int start,
    int end )
```

Deletes a range of characters in the buffer.

Parameters

<i>start</i>	byte offset to first character to be removed
<i>end</i>	byte offset to character after last character to be removed

12.142.3.31 remove_()

```
void Fl_Text_Buffer::remove_ (
    int start,
    int end ) [protected]
```

Internal (non-redisplaying) version of [remove\(\)](#).

Removes the contents of the buffer between *start* and *end* (and moves the gap to the site of the delete).

12.142.3.32 replace()

```
void Fl_Text_Buffer::replace (
    int start,
    int end,
    const char * text,
    int insertedLength = -1 )
```

Deletes the characters between *start* and *end*, and inserts the null-terminated string *text* in their place in the buffer.

Parameters

<i>start</i>	byte offset to first character to be removed and new insert position
<i>end</i>	byte offset to character after last character to be removed
<i>text</i>	UTF-8 encoded text
<i>insertedLength</i>	number of bytes to insert, or -1 to indicate <i>text</i> is null-terminated

12.142.3.33 rewind_lines()

```
int Fl_Text_Buffer::rewind_lines (
    int startPos,
    int nLines )
```

Finds and returns the position of the first character of the line *nLines* backwards from *startPos* (not counting the character pointed to by *startpos* if that is a newline) in the buffer.

nLines == 0 means find the beginning of the line.

12.142.3.34 savefile()

```
int Fl_Text_Buffer::savefile (
    const char * file,
    int buflen = 128*1024 ) [inline]
```

Saves a text file from the current buffer.

Returns

- 0 on success
- non-zero on error (strerror() contains reason)
- 1 indicates open for write failed (no data saved)
- 2 indicates error occurred while writing data (data was partially saved)

See also

[outfile\(const char *file, int start, int end, int buflen\)](#)

12.142.3.35 search_backward()

```
int Fl_Text_Buffer::search_backward (
    int startPos,
    const char * searchString,
    int * foundPos,
    int matchCase = 0 ) const
```

Search backwards in buffer for string `searchString`, starting with the character at `startPos`, returning the result in `foundPos`.

Returns 1 if found, 0 if not.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchString</i>	UTF-8 string that we want to find
<i>foundPos</i>	byte offset where the string was found
<i>matchCase</i>	if set, match character case

Returns

1 if found, 0 if not

12.142.3.36 search_forward()

```
int Fl_Text_Buffer::search_forward (
    int startPos,
    const char * searchString,
    int * foundPos,
    int matchCase = 0 ) const
```

Search forwards in buffer for string `searchString`, starting with the character `startPos`, and returning the result in `foundPos`.

Returns 1 if found, 0 if not.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchString</i>	UTF-8 string that we want to find
<i>foundPos</i>	byte offset where the string was found
<i>matchCase</i>	if set, match character case

Returns

1 if found, 0 if not

12.142.3.37 secondary_selection_text()

```
char * Fl_Text_Buffer::secondary_selection_text ( )
```

Returns the text in the secondary selection.

When you are done with the text, free it using the free() function.

12.142.3.38 selection_text()

```
char * Fl_Text_Buffer::selection_text ( )
```

Returns the currently selected text.

When you are done with the text, free it using the free() function.

12.142.3.39 skip_displayed_characters()

```
int Fl_Text_Buffer::skip_displayed_characters (
    int lineStartPos,
    int nChars )
```

Count forward from buffer position `startPos` in displayed characters.

Displayed characters are the characters shown on the screen to represent characters in the buffer, where tabs and control characters are expanded.

Parameters

<i>lineStartPos</i>	byte offset into buffer
<i>nChars</i>	number of bytes that are sent to the display

Returns

byte offset in input after all output bytes are sent

12.142.3.40 tab_distance()

```
int Fl_Text_Buffer::tab_distance ( ) const [inline]
```

Gets the tab width.

The tab width is measured in characters. The pixel position is calculated using an average character width.

12.142.3.41 text() [1/2]

```
char * Fl_Text_Buffer::text ( ) const
```

Get a copy of the entire contents of the text buffer.

Memory is allocated to contain the returned string, which the caller must free.

Returns

newly allocated text buffer - must be free'd, text is UTF-8

12.142.3.42 text() [2/2]

```
void Fl_Text_Buffer::text (
    const char * text )
```

Replaces the entire contents of the text buffer.

Parameters

<i>text</i>	Text must be valid UTF-8. If null, an empty string is substituted.
-------------	--

12.142.3.43 text_range()

```
char * Fl_Text_Buffer::text_range (
    int start,
    int end ) const
```

Get a copy of a part of the text buffer.

Return a copy of the text between *start* and *end* character positions from text buffer *buf*. Positions start at 0, and the range does not include the character pointed to by *end*. When you are done with the text, free it using the `free()` function.

Parameters

<i>start</i>	byte offset to first character
<i>end</i>	byte offset after last character in range

Returns

newly allocated text buffer - must be free'd, text is UTF-8

12.142.3.44 undo()

```
int Fl_Text_Buffer::undo (
    int * cursorPos = 0 )
```

Undo text modification according to the undo variables or insert text from the undo buffer.

Take the previous changes and undo them.

Return the previous cursor position in *cursorPos*. Returns 1 if the undo was applied. *CursorPos* will be at a character boundary.

12.142.3.45 vprintf()

```
void Fl_Text_Buffer::vprintf (
    const char * fmt,
    va_list ap )
```

Can be used by subclasses that need their own `printf()` style functionality.

Note

The expanded string is currently limited to 1024 characters.

Parameters

in	<i>fmt</i>	is a <code>printf</code> format string for the message text.
in	<i>ap</i>	is a <code>va_list</code> created by <code>va_start()</code> and closed with <code>va_end()</code> , which the caller is responsible for handling.

12.142.3.46 word_end()

```
int Fl_Text_Buffer::word_end (
    int pos ) const
```

Returns the position corresponding to the end of the word.

Parameters

<i>pos</i>	byte index into buffer
------------	------------------------

Returns

byte offset to word end

12.142.3.47 word_start()

```
int Fl_Text_Buffer::word_start (
    int pos ) const
```

Returns the position corresponding to the start of the word.

Parameters

<i>pos</i>	byte index into buffer
------------	------------------------

Returns

byte offset to word start

12.142.4 Member Data Documentation**12.142.4.1 file_encoding_warning_message**

```
const char * Fl_Text_Buffer::file_encoding_warning_message [static]
```

Initial value:

```
=
"Displayed text contains the UTF-8 transcoding\n"
"of the input file which was not UTF-8 encoded.\n"
"Some changes may have occurred."
```

This message may be displayed using the `fl_alert()` function when a file which was not UTF-8 encoded is input.

12.142.4.2 mTabDist

```
int Fl_Text_Buffer::mTabDist [protected]
```

equiv.

number of characters in a tab

12.142.4.3 transcoding_warning_action

```
void(* Fl_Text_Buffer::transcoding_warning_action) (Fl_Text_Buffer *)
```

Pointer to a function called after reading a non UTF-8 encoded file.

This function is called after reading a file if the file content was transcoded to UTF-8. Its default implementation calls `fl_alert()` with the text of [file_encoding_warning_message](#). No warning message is displayed if this pointer is set to NULL. Use [input_file_was_transcoded](#) to be informed if file input required transcoding to UTF-8.

The documentation for this class was generated from the following files:

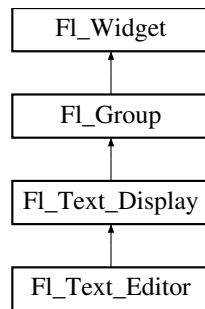
- `Fl_Text_Buffer.H`
- `Fl_Text_Buffer.cxx`

12.143 Fl_Text_Display Class Reference

Rich text display widget.

```
#include <Fl_Text_Display.H>
```

Inheritance diagram for `Fl_Text_Display`:



Classes

- struct [Style_Table_Entry](#)

This structure associates the color, font, and font size of a string to draw with an attribute mask matching attr.

Public Types

- enum {
[NORMAL_CURSOR](#) , [CARET_CURSOR](#) , [DIM_CURSOR](#) , [BLOCK_CURSOR](#) ,
[HEAVY_CURSOR](#) , [SIMPLE_CURSOR](#) }
text display cursor shapes enumeration
- enum { [CURSOR_POS](#) , [CHARACTER_POS](#) }
the character position is the left edge of a character, whereas the cursor is thought to be between the centers of two consecutive characters.
- enum {
[DRAG_NONE](#) = -2 , [DRAG_START_DND](#) = -1 , [DRAG_CHAR](#) = 0 , [DRAG_WORD](#) = 1 ,
[DRAG_LINE](#) = 2 }
drag types - they match [Fl::event_clicks\(\)](#) so that single clicking to start a collection selects by character, double clicking selects by word and triple clicking selects by line.
- enum { [WRAP_NONE](#) , [WRAP_AT_COLUMN](#) , [WRAP_AT_PIXEL](#) , [WRAP_AT_BOUNDS](#) }
wrap types - used in [wrap_mode\(\)](#)
- enum {
[ATTR_BGCOLOR](#) = 0x0001 , [ATTR_BGCOLOR_EXT_](#) = 0x0002 , [ATTR_BGCOLOR_EXT](#) = 0x0003 ,
[ATTR_UNDERLINE](#) = 0x0004 ,
[ATTR_GRAMMAR](#) = 0x0008 , [ATTR_SPELLING](#) = 0x000C , [ATTR_STRIKE_THROUGH](#) = 0x0010 ,
[ATTR_LINES_MASK](#) = 0x001C }
attribute flags in [Style_Table_Entry.attr](#)
- typedef void(* [Unfinished_Style_Cb](#)) (int, void *)

Public Member Functions

- [Fl_Text_Buffer](#) * [buffer](#) () const
Gets the current text buffer associated with the text widget.
- void [buffer](#) ([Fl_Text_Buffer](#) &buf)
Sets the current text buffer associated with the text widget.
- void [buffer](#) ([Fl_Text_Buffer](#) *buf)
Attach a text buffer to display, replacing the current buffer (if any).
- double [col_to_x](#) (double col) const
Convert a column number into an x pixel position.
- int [count_lines](#) (int start, int end, bool start_pos_is_line_start) const
Count the number of lines between two positions.
- [Fl_Color](#) [cursor_color](#) () const
Gets the text cursor color.
- void [cursor_color](#) ([Fl_Color](#) n)

- Sets the text cursor color.*
- int **cursor_style** () const
- void **cursor_style** (int style)
- Sets the text cursor style.*
- **Fl_Text_Display** (int X, int Y, int W, int H, const char *l=0)
- Creates a new text display widget.*
- **Fl_Color grammar_underline_color** () const
- Gets the underline color for style attribute ATTR_GRAMMAR.*
- void **grammar_underline_color** (**Fl_Color** color)
- Sets the underline color for style attribute ATTR_GRAMMAR.*
- int **handle** (int e) **FL_OVERRIDE**
- Event handling.*
- void **hide_cursor** ()
- Hides the text cursor.*
- void **highlight_data** (**Fl_Text_Buffer** *styleBuffer, const **Style_Table_Entry** *styleTable, int nStyles, char unfinishedStyle, Unfinished_Style_Cb unfinishedHighlightCB, void *cbArg)
- Attach (or remove) highlight information in text display and redisplay.*
- int **in_selection** (int x, int y) const
- Check if a pixel position is within the primary selection.*
- void **insert** (const char *text)
- Inserts "text" at the current cursor location.*
- int **insert_position** () const
- Gets the position of the text insertion cursor for text display.*
- void **insert_position** (int newPos)
- Sets the position of the text insertion cursor for text display.*
- int **line_end** (int startPos, bool startPosIsLineStart) const
- Returns the end of a line.*
- int **line_start** (int pos) const
- Return the beginning of a line.*
- **Fl_Align linewidth_align** () const
- Returns the alignment used for line numbers (if enabled).*
- void **linewidth_align** (**Fl_Align** val)
- Set alignment for line numbers (if enabled).*
- **Fl_Color linewidth_bgcolor** () const
- Returns the background color used for line numbers (if enabled).*
- void **linewidth_bgcolor** (**Fl_Color** val)
- Set the background color used for line numbers (if enabled).*
- **Fl_Color linewidth_fgcolor** () const
- Return the foreground color used for line numbers (if enabled).*
- void **linewidth_fgcolor** (**Fl_Color** val)
- Set the foreground color used for line numbers (if enabled).*
- **Fl_Font linewidth_font** () const
- Return the font used for line numbers (if enabled).*
- void **linewidth_font** (**Fl_Font** val)
- Set the font used for line numbers (if enabled).*
- const char * **linewidth_format** () const
- Returns the line number printf() format string.*
- void **linewidth_format** (const char *val)
- Sets the printf() style format string used for line numbers.*
- **Fl_Fontsize linewidth_size** () const
- Return the font size used for line numbers (if enabled).*

- void `linenumber_size` (`FI_Fontsize` val)
Set the font size used for line numbers (if enabled).
- int `linenumber_width` () const
Return the screen area width provided for line numbers.
- void `linenumber_width` (int width)
Set width of screen area for line numbers.
- int `move_down` ()
Moves the current insert position down one line.
- int `move_left` ()
Moves the current insert position left one character.
- int `move_right` ()
Moves the current insert position right one character.
- int `move_up` ()
Moves the current insert position up one line.
- void `next_word` (void)
Moves the current insert position right one word.
- void `overstrike` (const char *text)
Replaces text at the current insert position.
- int `position_style` (int lineStartPos, int lineLen, int lineIndex) const
Find the correct style for a character.
- int `position_to_xy` (int pos, int *x, int *y) const
Convert a character index into a pixel position.
- void `previous_word` (void)
Moves the current insert position left one word.
- virtual void `recalc_display` ()
Recalculate the display's visible lines and scrollbar sizes.
- void `redisplay_range` (int start, int end)
Marks text from start to end as needing a redraw.
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`
Change the size of the displayed text area.
- int `rewind_lines` (int startPos, int nLines)
Skip a number of lines back.
- void `scroll` (int topLineNum, int horizOffset)
Scrolls the current buffer to start at the specified line and column.
- `FI_Align scrollbar_align` () const
Gets the scrollbar alignment type.
- void `scrollbar_align` (`FI_Align` a)
Sets the scrollbar alignment type.
- int `scrollbar_size` () const
Gets the current size of the scrollbars' troughs, in pixels.
- void `scrollbar_size` (int newSize)
Sets the pixel size of the scrollbars' troughs to newSize, in pixels.
- int `scrollbar_width` () const
Returns the global value `FI::scrollbar_size()` unless a specific `scrollbar_width_` has been set.
- void `scrollbar_width` (int width)
Sets the global `FI::scrollbar_size()`, and forces this instance of the widget to use it.
- `FI_Color secondary_selection_color` () const
Gets the background color for the secondary selection block.
- void `secondary_selection_color` (`FI_Color` color)
Sets the background color for the secondary selection block.
- int `shortcut` () const

- void [shortcut](#) (int s)
- void [show_cursor](#) (int b=1)
Shows the text cursor.
- void [show_insert_position](#) ()
Scrolls the text buffer to show the current insert position.
- int [skip_lines](#) (int startPos, int nLines, bool startPosIsLineStart)
Skip a number of lines forward.
- [FL_Color](#) [spelling_underline_color](#) () const
Gets the underline color for style attribute ATTR_SPELLING.
- void [spelling_underline_color](#) ([FL_Color](#) color)
Sets the underline color for style attribute ATTR_SPELLING.
- [FL_Text_Buffer](#) * [style_buffer](#) () const
Gets the current style buffer associated with the text widget.
- [FL_Color](#) [textcolor](#) () const
Gets the default color of text in the widget.
- void [textcolor](#) ([FL_Color](#) n)
Sets the default color of text in the widget.
- [FL_Font](#) [textfont](#) () const
Gets the default font used when drawing text in the widget.
- void [textfont](#) ([FL_Font](#) s)
Sets the default font used when drawing text in the widget.
- [FL_Fontsize](#) [textsize](#) () const
Gets the default size of text in the widget.
- void [textsize](#) ([FL_Fontsize](#) s)
Sets the default size of text in the widget.
- int [word_end](#) (int pos) const
Moves the insert position to the end of the current word.
- int [word_start](#) (int pos) const
Moves the insert position to the beginning of the current word.
- void [wrap_mode](#) (int wrap, int wrap_margin)
Set the new text wrap mode.
- int [wrapped_column](#) (int row, int column) const
Nobody knows what this function does.
- int [wrapped_row](#) (int row) const
Nobody knows what this function does.
- double [x_to_col](#) (double x) const
Convert an x pixel position into a column number.
- [~FL_Text_Display](#) ()
Free a text display and release its associated memory.

Public Member Functions inherited from [FL_Group](#)

- [FL_Widget](#) *& [_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FL_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FL_Widget](#) *o)
See void [FL_Group::add\(FL_Widget &w\)](#)
- void [add_resizable](#) ([FL_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FL_Widget](#) *const * [array](#) () const

- Returns a pointer to the array of children.*

 - `FL_Group const * as_group () const FL_OVERRIDE`
 - `FL_Group * as_group () FL_OVERRIDE`

Returns an `FL_Group` pointer if this widget is an `FL_Group`.
- `void begin ()`

Sets the current group so you can build the widget tree by just constructing the widgets.
- `FL_Widget * child (int n) const`

Returns `array()[n]`.
- `int children () const`

Returns how many child widgets the group has.
- `void clear ()`

Deletes all child widgets from memory recursively.
- `unsigned int clip_children ()`

Returns the current clipping mode.
- `void clip_children (int c)`

Controls whether the group widget clips the drawing of child widgets to its bounding box.
- `virtual int delete_child (int n)`

Removes the widget at `index` from the group and deletes it.
- `void end ()`

Exactly the same as `current(this->parent())`.
- `int find (const FL_Widget &o) const`

*See `int FL_Group::find(const FL_Widget *w) const`.*
- `int find (const FL_Widget *) const`

Searches the child array for the widget and returns the index.
- `FL_Group (int, int, int, int, const char * = 0)`

Creates a new `FL_Group` widget using the given position, size, and label string.
- `void focus (FL_Widget *W)`
- `void forms_end ()`

This is for forms compatibility only.
- `void init_sizes ()`

Resets the internal array of widget sizes and positions.
- `void insert (FL_Widget &, int i)`

The widget is removed from its current group (if any) and then inserted into this group.
- `void insert (FL_Widget &o, FL_Widget *before)`

This does `insert(w, find(before))`.
- `void remove (FL_Widget &)`

Removes a widget from the group but does not delete it.
- `void remove (FL_Widget *o)`

Removes the widget `o` from the group.
- `void remove (int index)`

Removes the widget at `index` from the group but does not delete it.
- `FL_Widget * resizable () const`

Returns the group's resizable widget.
- `void resizable (FL_Widget &o)`

Sets the group's resizable widget.
- `void resizable (FL_Widget *o)`

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FL_Group ()`

The destructor also deletes all the children.

Public Member Functions inherited from [Fl_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
 - Activates the widget.*
- unsigned int [active](#) () const
 - Returns whether the widget is active.*
- int [active_r](#) () const
 - Returns whether the widget and all of its parents are active.*
- [Fl_Align align](#) () const
 - Gets the label alignment.*
- void [align](#) ([Fl_Align alignment](#))
 - Sets the label alignment.*
- long [argument](#) () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void [argument](#) (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [Fl_Gl_Window * as_gl_window](#) ()
 - Returns an [Fl_Gl_Window](#) pointer if this widget is an [Fl_Gl_Window](#).*
- virtual class [Fl_Gl_Window const * as_gl_window](#) () const
- virtual [Fl_Window * as_window](#) ()
 - Returns an [Fl_Window](#) pointer if this widget is an [Fl_Window](#).*
- virtual [Fl_Window const * as_window](#) () const
- void [bind_deimage](#) ([Fl_Image *img](#))
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([Fl_Image *img](#))
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [Fl_Boxtype box](#) () const
 - Gets the box type of the widget.*
- void [box](#) ([Fl_Boxtype new_box](#))
 - Sets the box type for the widget.*
- [Fl_Callback_p callback](#) () const
 - Gets the current callback function for the widget.*
- void [callback](#) ([Fl_Callback *cb](#))
 - Sets the current callback function for the widget.*
- void [callback](#) ([Fl_Callback *cb](#), [Fl_Callback_User_Data *p](#), bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void [callback](#) ([Fl_Callback *cb](#), void *p)
 - Sets the current callback function and data for the widget.*
- void [callback](#) ([Fl_Callback0 *cb](#))
 - Sets the current callback function for the widget.*
- void [callback](#) ([Fl_Callback1 *cb](#), long p=0)
 - Sets the current callback function for the widget.*
- unsigned int [changed](#) () const
 - Checks if the widget value changed since the last callback.*
- void [clear_active](#) ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (uchar c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FL_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FL_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FL_Color` bg, `FL_Color` sel)
- Sets the background and selection color of the widget.*

 - `FL_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FL_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (uchar c)
- Sets the damage bits for the widget.*

 - void `damage` (uchar c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FL_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FL_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FL_Widget` *widget, long arg, `FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FL_Widget *widget`, `void *arg=0`, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FL_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h` () `const`
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FL_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FL_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FL_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FL_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- `int image_bound` () `const`
Returns whether the image is managed by the widget.
- `int inside` (`const FL_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- `int is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FL_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FL_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FL_Color c`)
Sets the label color.
- `FL_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FL_Font f`)
Sets the font to use.
- `FL_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FL_Fontsize pix`)
Sets the font size in pixels.
- `FL_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FL_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- `bool needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- `unsigned int output` () `const`

- Returns if a widget is used for output only.*

 - `FI_Group * parent ()` const

Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`

Internal use only - "for hacks only".
- `void position (int X, int Y)`

Repositions the window or widget.
- `void redraw ()`

Schedules the drawing of the widget.
- `void redraw_label ()`

Schedules the drawing of the label.
- `FI_Color selection_color ()` const

Gets the selection color.
- `void selection_color (FI_Color a)`

Sets the selection color.
- `void set_active ()`

Marks the widget as active without sending events or changing focus.
- `void set_changed ()`

Marks the value of the widget as changed.
- `void set_output ()`

Sets a widget to output only.
- `void set_visible ()`

Makes the widget visible.
- `void set_visible_focus ()`

Enables keyboard focus navigation with this widget.
- `int shortcut_label ()` const

Returns whether the widget's label uses '&' to indicate shortcuts.
- `void shortcut_label (int value)`

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual `void show ()`

Makes a widget visible.
- `void size (int W, int H)`

Changes the size of the widget.
- `int take_focus ()`

Gives the widget the keyboard focus.
- `unsigned int takeevents ()` const

Returns if the widget is able to take events.
- `int test_shortcut ()`

Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip ()` const

Gets the current tooltip text.
- `void tooltip (const char *text)`

Sets the current tooltip text.
- `FI_Window * top_window ()` const

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset (int &xoff, int &yoff)` const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type ()` const

Gets the widget type.
- `void type (uchar t)`

Sets the widget type.

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (Fl_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- **Fl_When when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- **Fl_Window * window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual **~Fl_Widget** ()
Destroys the widget.

Protected Types

- enum {
 DRAW_LINE , **FIND_INDEX** , **FIND_INDEX_FROM_ZERO** , **GET_WIDTH** ,
 FIND_CURSOR_INDEX }

Protected Types inherited from Fl_Widget

- enum {
 INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
 FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
 ,
 OVERRIDE = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
 ,
 MENU_WINDOW = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
 ,
 GROUP_RELATIVE = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
 = 1<<19 ,
 NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
 AUTO_DELETE_USER_DATA = 1<<23 ,
 MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
 USERFLAG1 = 1<<31 }
- flags possible values enumeration.*

Protected Member Functions

- void [absolute_top_line_number](#) (int oldFirstChar)
Re-calculate absolute top line number for a change in scroll position.
- void [calc_last_char](#) ()
Update last display character index.
- void [calc_line_starts](#) (int startLine, int endLine)
Update the line starts array.
- void [clear_rect](#) (int style, int x, int y, int width, int height) const
*Clear a rectangle with the appropriate background color for *style*.*
- void [display_insert](#) ()
Scroll the display to bring insertion cursor into view.
- void [draw](#) () [FL_OVERRIDE](#)
Draw the widget.
- void [draw_cursor](#) (int, int)
*Draw a cursor with top center at *X*, *Y*.*
- void [draw_line_numbers](#) (bool clearAll)
Refresh the line number area.
- void [draw_range](#) (int start, int end)
Draw a range of text.
- void [draw_string](#) (int style, int x, int y, int toX, const char *string, int nChars) const
Draw a text segment in a single style.
- void [draw_text](#) (int X, int Y, int W, int H)
Refresh a rectangle of the text display.
- void [draw_vline](#) (int visLineNum, int leftClip, int rightClip, int leftCharIndex, int rightCharIndex)
Draw a single line of text.
- int [empty_vlines](#) () const
Return true if there are lines visible with no corresponding buffer text.
- void [extend_range_for_styles](#) (int *start, int *end)
I don't know what this does!
- void [find_line_end](#) (int pos, bool start_pos_is_line_start, int *lineEnd, int *nextLineStart) const
Finds both the end of the current line and the start of the next line.
- void [find_wrap_range](#) (const char *deletedText, int pos, int nInserted, int nDeleted, int *modRangeStart, int *modRangeEnd, int *linesInserted, int *linesDeleted)
Wrapping calculations.
- int [find_x](#) (const char *s, int len, int style, int x) const
*Find the index of the character that lies at the given *x* position / closest cursor position.*
- int [get_absolute_top_line_number](#) () const
Returns the absolute (non-wrapped) line number of the first line displayed.
- int [handle_rmb](#) (int readonly)
Handle right mouse button down events.
- int [handle_vline](#) (int mode, int lineStart, int lineLen, int leftChar, int rightChar, int topClip, int bottomClip, int leftClip, int rightClip) const
Universal pixel machine.
- int [longest_vline](#) () const
Find the longest line of all visible lines.
- void [maintain_absolute_top_line_number](#) (int state)
Line numbering stuff, currently unused.
- int [maintaining_absolute_top_line_number](#) () const
Returns true if a separate absolute top line number is being maintained.
- void [measure_deleted_lines](#) (int pos, int nDeleted)

- Wrapping calculations.*

 - double [measure_proportional_character](#) (const char *s, int colNum, int pos) const
- Wrapping calculations.*

 - int [measure_vline](#) (int visLineNum) const

Returns the width in pixels of the displayed line pointed to by "visLineNum".
- void [offset_line_starts](#) (int newTopLineNum)

Offset line start counters for a new vertical scroll position.
- int [position_to_line](#) (int pos, int *lineNum) const

Convert a position index into a line number offset.
- int [position_to_linecol](#) (int pos, int *lineNum, int *column) const

Find the line and column number of position pos.
- void [reset_absolute_top_line_number](#) ()

Reestablish the absolute (non-wrapped) top line number.
- int [scroll_](#) (int topLineNum, int horizOffset)

Scrolls the current buffer to start at the specified line and column.
- double [string_width](#) (const char *string, int length, int style) const

Find the width of a string in the font of a particular style.
- void [update_h_scrollbar](#) ()

Update horizontal scrollbar.
- void [update_line_starts](#) (int pos, int charsInserted, int charsDeleted, int linesInserted, int linesDeleted, int *scrolled)

Update line start arrays and variables.
- void [update_v_scrollbar](#) ()

Update vertical scrollbar.
- int [vline_length](#) (int visLineNum) const

Count number of bytes in a visible line.
- int [wrap_uses_character](#) (int lineEndPos) const

Check if the line break is caused by a newline or by line wrapping.
- void [wrapped_line_counter](#) (FI_Text_Buffer *buf, int startPos, int maxPos, int maxLines, bool startPosIsLineStart, int styleBufOffset, int *retPos, int *retLines, int *retLineStart, int *retLineEnd, bool countLastLineMissingNewLine=true) const

Wrapping calculations.
- int [xy_to_position](#) (int x, int y, int PosType=CHARACTER_POS) const

Translate a pixel position into a character index.
- void [xy_to_rowcol](#) (int x, int y, int *row, int *column, int PosType=CHARACTER_POS) const

Translate pixel coordinates into row and column.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect * bounds](#) ()

Returns the internal array of widget sizes and positions.
- void [draw_child](#) ([FI_Widget](#) &widget) const

Forces a child to redraw.
- void [draw_children](#) ()

Draws all children of the group.
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const

Parents normally call this to draw outside labels of child widgets.
- virtual int [on_insert](#) ([FI_Widget](#) *, int)

Allow derived groups to act when a widget is added as a child.
- virtual int [on_move](#) (int, int)

Allow derived groups to act when a widget is moved within the group.
- virtual void [on_remove](#) (int)

- Allow derived groups to act when a child widget is removed from the group.*
- int * **sizes** ()

Returns the internal array of widget sizes and positions.
- void **update_child** (FI_Widget &widget) const

Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)

Clears a flag in the flags mask.
- void **draw_backdrop** () const

If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void **draw_box** () const

Draws the widget box according its box style.
- void **draw_box** (FI_Boxtype t, FI_Color c) const

Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const

Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int **flags** () const

Gets the widget flags mask.
- void **h** (int v)

Internal use only.
- void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.
- void **x** (int v)

Internal use only.
- void **y** (int v)

Internal use only.

Static Protected Member Functions

- static void **buffer_modified_cb** (int pos, int nInserted, int nDeleted, int nRestyled, const char *deletedText, void *cbArg)

This is called whenever the buffer is modified.
- static void **buffer_predelete_cb** (int pos, int nDeleted, void *cbArg)

This is called before any characters are deleted.
- static void **h_scrollbar_cb** (FI_Scrollbar *w, FI_Text_Display *d)

Callback for drag or valueChanged on horizontal scrollbar.

- static void [scroll_timer_cb](#) (void *)
Timer callback for scroll events.
- static void [v_scrollbar_cb](#) ([FL_Scrollbar](#) *w, [FL_Text_Display](#) *d)
Callback for drag or valueChanged on vertical scrollbar.

Protected Attributes

- int **damage_range1_end**
- int **damage_range1_start**
- int **damage_range2_end**
- int **damage_range2_start**
- int **display_insert_position_hint**
- int **dragging**
- int **dragPos**
- int **dragType**
- [FL_Color](#) **grammar_underline_color_**
- [FL_Align](#) **linenumber_align_**
- [FL_Color](#) **linenumber_bgcolor_**
- [FL_Color](#) **linenumber_fgcolor_**
- [FL_Font](#) **linenumber_font_**
- const char * **linenumber_format_**
- [FL_Fontsize](#) **linenumber_size_**
- int **mAbsTopLineNum**
- [FL_Text_Buffer](#) * **mBuffer**
- double **mColumnScale**
- int **mContinuousWrap**
- [FL_Color](#) **mCursor_color**
- int **mCursorOldY**
- int **mCursorOn**
- int **mCursorPos**
- int **mCursorPreferredXPos**
- int **mCursorStyle**
- int **mCursorToHint**
- int **mFirstChar**
- void * **mHighlightCBArg**
- int **mHorizOffset**
- int **mHorizOffsetHint**
- [FL_Scrollbar](#) * **mHScrollBar**
- int **mLastChar**
- int **mLineNumLeft**
- int **mLineNumWidth**
- int * **mLineStarts**
- int **mMaxsize**
- int **mModifyingTabDistance**
- int **mNBufferLines**
- int **mNeedAbsTopLineNum**
- int **mNLinesDeleted**
- int **mNStyles**
- int **mNVisibleLines**
- [FL_Text_Buffer](#) * **mStyleBuffer**
- const [Style_Table_Entry](#) * **mStyleTable**
- int **mSuppressResync**
- int **mTopLineNum**
- int **mTopLineNumHint**
- Unfinished_Style_Cb **mUnfinishedHighlightCB**

- char **mUnfinishedStyle**
- [FL_Scrollbar](#) * **mVScrollBar**
- int **mWrapMarginPix**
- [FL_Align](#) **scrollbar_align_**
- int **scrollbar_width_**
- [FL_Color](#) **secondary_selection_color_**
- int **shortcut_**
- [FL_Color](#) **spelling_underline_color_**
- struct {
 - int **h**
 - int **w**
 - int **x**
 - int **y**
 } **text_area**
- [FL_Color](#) **textcolor_**
- [FL_Font](#) **textfont_**
- [FL_Fontsize](#) **textsize_**

Friends

- void **fl_text_drag_me** (int pos, [FL_Text_Display](#) *d)
- int **fl_text_drag_prepare** (int pos, int key, [FL_Text_Display](#) *d)

Additional Inherited Members

Static Public Member Functions inherited from [FL_Group](#)

- static [FL_Group](#) * **current** ()
 - Returns the currently active group.*
- static void **current** ([FL_Group](#) *g)
 - Sets the current group.*

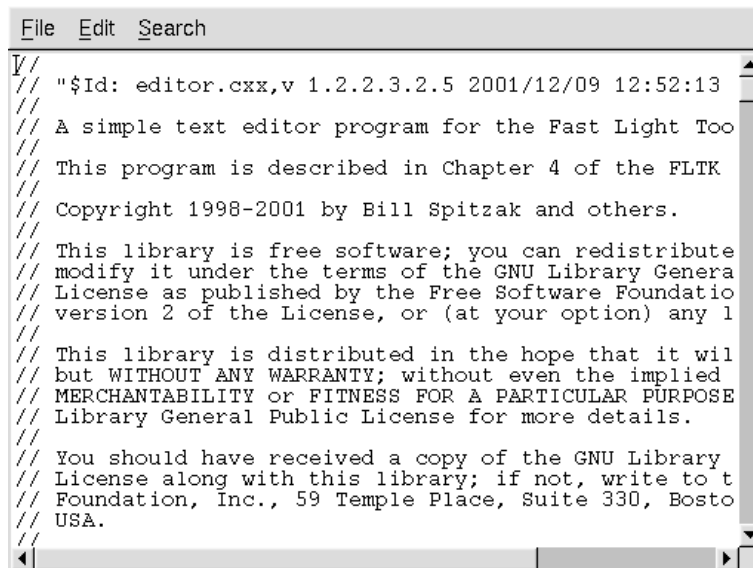
Static Public Member Functions inherited from [FL_Widget](#)

- static void **default_callback** ([FL_Widget](#) *widget, void *data)
 - The default callback for all widgets that don't set a callback.*
- static unsigned int **label_shortcut** (const char *t)
 - Returns the Unicode value of the '&x' shortcut in a given text.*
- static int **test_shortcut** (const char *, const bool require_alt=false)
 - Returns true if the given text t contains the entered '&x' shortcut.*

12.143.1 Detailed Description

Rich text display widget.

This is the FLTK text display widget. It allows the user to view multiple lines of text and supports highlighting, word wrap, mixes of font faces and colors, line numbers and scrolling. The buffer that is displayed in the widget is managed by the [FL_Text_Buffer](#) class. A single Text Buffer can be displayed by multiple Text Displays.

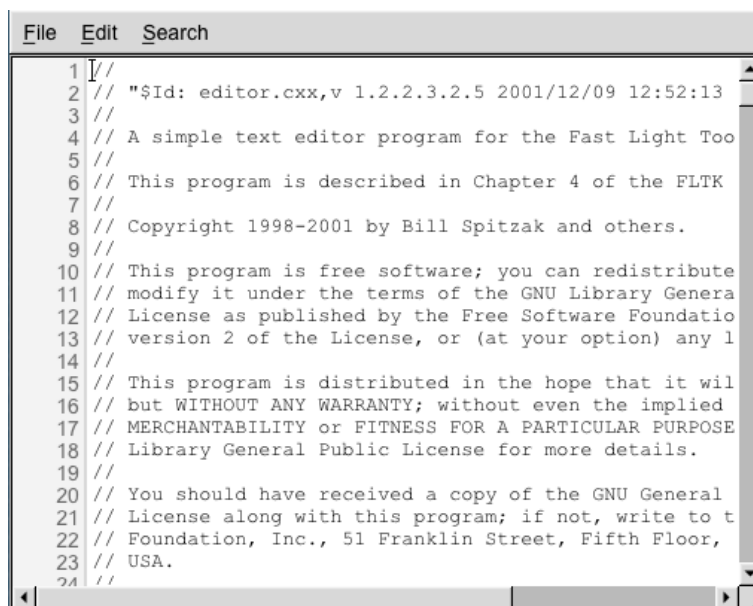


```

File Edit Search
V//
// "$Id: editor.cxx,v 1.2.2.3.2.5 2001/12/09 12:52:13
//
// A simple text editor program for the Fast Light Too
//
// This program is described in Chapter 4 of the FLTK
//
// Copyright 1998-2001 by Bill Spitzak and others.
//
// This library is free software; you can redistribute
// modify it under the terms of the GNU Library Genera
// License as published by the Free Software Foundatio
// version 2 of the License, or (at your option) any 1
//
// This library is distributed in the hope that it wil
// but WITHOUT ANY WARRANTY; without even the implied
// MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE
// Library General Public License for more details.
//
// You should have received a copy of the GNU Library
// License along with this library; if not, write to t
// Foundation, Inc., 59 Temple Place, Suite 330, Bosto
// USA.
//

```

Figure 12.58 Fl_Text_Display widget



```

File Edit Search
1 V//
2 // "$Id: editor.cxx,v 1.2.2.3.2.5 2001/12/09 12:52:13
3 //
4 // A simple text editor program for the Fast Light Too
5 //
6 // This program is described in Chapter 4 of the FLTK
7 //
8 // Copyright 1998-2001 by Bill Spitzak and others.
9 //
10 // This program is free software; you can redistribute
11 // modify it under the terms of the GNU Library Genera
12 // License as published by the Free Software Foundatio
13 // version 2 of the License, or (at your option) any 1
14 //
15 // This program is distributed in the hope that it wil
16 // but WITHOUT ANY WARRANTY; without even the implied
17 // MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE
18 // Library General Public License for more details.
19 //
20 // You should have received a copy of the GNU General
21 // License along with this program; if not, write to t
22 // Foundation, Inc., 51 Franklin Street, Fifth Floor,
23 // USA.
24 //

```

Figure 12.59 Fl_Text_Display widget with line numbers enabled

Example Use

```

#include <FL/Fl_Text_Display.H>
..
int main() {
..
    Fl_Text_Buffer *buff = new Fl_Text_Buffer();
    Fl_Text_Display *disp = new Fl_Text_Display(10, 10, 640, 480);
    disp->buffer(buff); // attach text buffer to display widget
    buff->text("line one\nline two"); // add some text to buffer
..
}

```

Features

- Word wrap: [wrap_mode\(\)](#), [wrapped_column\(\)](#), [wrapped_row\(\)](#)
- Font control: [textfont\(\)](#), [textsize\(\)](#), [textcolor\(\)](#)

- Font styling: [highlight_data\(\)](#)
- Cursor: [cursor_style\(\)](#), [show_cursor\(\)](#), [hide_cursor\(\)](#), [cursor_color\(\)](#)
- Line numbers: [linenumber_width\(\)](#), [linenumber_font\(\)](#), [linenumber_size\(\)](#), [linenumber_fgcolor\(\)](#), [linenumber_bgcolor\(\)](#), [linenumber_align\(\)](#), [linenumber_format\(\)](#)

Note that other features may be available via [Fl_Text_Editor](#) and [Fl_Text_Buffer](#) classes.

Note

Line numbers were added in FLTK 1.3.3.

See also

[Fl_Widget::shortcut_label\(int\)](#)

12.143.2 Member Enumeration Documentation

12.143.2.1 anonymous enum

anonymous enum

text display cursor shapes enumeration

Enumerator

NORMAL_CURSOR	I-beam.
CARET_CURSOR	caret under the text
DIM_CURSOR	dim I-beam
BLOCK_CURSOR	unfilled box under the current character
HEAVY_CURSOR	thick I-beam
SIMPLE_CURSOR	as cursor as Fl_Input cursor

12.143.2.2 anonymous enum

anonymous enum

wrap types - used in [wrap_mode\(\)](#)

Enumerator

WRAP_NONE	don't wrap text at all
WRAP_AT_COLUMN	wrap text at the given text column
WRAP_AT_PIXEL	wrap text at a pixel position
WRAP_AT_BOUNDS	wrap text so that it fits into the widget width

12.143.2.3 anonymous enum

anonymous enum

attribute flags in [Style_Table_Entry.attr](#)

Enumerator

ATTR_BGCOLOR	use the background color in the <code>bgcolor</code> field
ATTR_BGCOLOR_EXT_	(internal use)
ATTR_BGCOLOR_EXT	extend background color to the end of the line
ATTR_UNDERLINE	a single underline, underline types are mutually exclusive

Enumerator

ATTR_GRAMMAR	grammar suggestion (blue dotted underline)
ATTR_SPELLING	spelling suggestion (red dotted underline)
ATTR_STRIKE_THROUGH	line through the middle of the text
ATTR_LINES_MASK	the mask for all underline and strike through types

12.143.3 Constructor & Destructor Documentation

12.143.3.1 Fl_Text_Display()

```
Fl_Text_Display::Fl_Text_Display (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new text display widget.

Parameters

<i>X,Y,W,H</i>	position and size of widget
<i>l</i>	label text, defaults to none

12.143.3.2 ~Fl_Text_Display()

```
Fl_Text_Display::~~Fl_Text_Display ( )
```

Free a text display and release its associated memory.

Note

The text buffer that the text display displays is a separate entity and is not freed, nor are the style buffer or style table.

See also

[Fl_Text_Display::buffer\(Fl_Text_Buffer* buf\)](#)

12.143.4 Member Function Documentation

12.143.4.1 absolute_top_line_number()

```
void Fl_Text_Display::absolute_top_line_number (
    int oldFirstChar ) [protected]
```

Re-calculate absolute top line number for a change in scroll position.
Does nothing if the absolute top line number is not being maintained.

12.143.4.2 buffer() [1/3]

```
Fl_Text_Buffer * Fl_Text_Display::buffer ( ) const [inline]
```

Gets the current text buffer associated with the text widget.
Multiple text widgets can be associated with the same text buffer.

Returns

current text buffer

See also

[Fl_Text_Display::buffer\(Fl_Text_Buffer* buf\)](#)

[Fl_Text_Display::buffer\(Fl_Text_Buffer& buf\)](#)

12.143.4.3 buffer() [2/3]

```
void Fl_Text_Display::buffer (
    Fl_Text_Buffer & buf ) [inline]
```

Sets the current text buffer associated with the text widget.

Multiple text widgets can be associated with the same text buffer.

Parameters

<i>buf</i>	new text buffer
------------	-----------------

See also

[Fl_Text_Display::buffer\(Fl_Text_Buffer* buf\)](#)

12.143.4.4 buffer() [3/3]

```
void Fl_Text_Display::buffer (
    Fl_Text_Buffer * buf )
```

Attach a text buffer to display, replacing the current buffer (if any).

Multiple text widgets can be associated with the same text buffer.

Note

The caller is responsible for the old (replaced) buffer (if any). This method does not delete the old buffer.

Parameters

<i>buf</i>	attach this text buffer
------------	-------------------------

12.143.4.5 buffer_modified_cb()

```
void Fl_Text_Display::buffer_modified_cb (
    int pos,
    int nInserted,
    int nDeleted,
    int nRestyled,
    const char * deletedText,
    void * cbArg ) [static], [protected]
```

This is called whenever the buffer is modified.

Callback attached to the text buffer to receive modification information.

This callback can be used to adjust the display or update other setting. It is not advisable to change any buffers or text in this callback, or line counting may get out of sync.

Parameters

<i>pos</i>	starting index of modification
<i>nInserted</i>	number of bytes we inserted (must be UTF-8 aligned!)
<i>nDeleted</i>	number of bytes deleted (must be UTF-8 aligned!)
<i>nRestyled</i>	??
<i>deletedText</i>	this is what was removed, must not be NULL if nDeleted is set

Parameters

<i>cbArg</i>	"this" pointer for static callback function
--------------	---

12.143.4.6 buffer_predelete_cb()

```
void Fl_Text_Display::buffer_predelete_cb (
    int pos,
    int nDeleted,
    void * cbArg ) [static], [protected]
```

This is called before any characters are deleted.

Callback attached to the text buffer to receive delete information before the modifications are actually made.

This callback can be used to adjust the display or update other setting. It is not advisable to change any buffers or text in this callback, or line counting may get out of sync.

Parameters

<i>pos</i>	starting index of deletion
<i>nDeleted</i>	number of bytes we will delete (must be UTF-8 aligned!)
<i>cbArg</i>	"this" pointer for static callback function

12.143.4.7 calc_last_char()

```
void Fl_Text_Display::calc_last_char ( ) [protected]
```

Update last display character index.

Given a [Fl_Text_Display](#) with a complete, up-to-date lineStarts array, update the lastChar entry to point to the last buffer position displayed.

12.143.4.8 calc_line_starts()

```
void Fl_Text_Display::calc_line_starts (
    int startLine,
    int endLine ) [protected]
```

Update the line starts array.

Scan through the text in the Text Display's buffer and recalculate the line starts array values beginning at index "startLine" and continuing through (including) "endLine". It assumes that the line starts entry preceding "startLine" (or mFirstChar if startLine is 0) is good, and re-counts newlines to fill in the requested entries. Out of range values for "startLine" and "endLine" are acceptable.

Parameters

<i>startLine,endLine</i>	range of lines to scan as line numbers
--------------------------	--

12.143.4.9 clear_rect()

```
void Fl_Text_Display::clear_rect (
    int style,
    int X,
    int Y,
    int width,
    int height ) const [protected]
```

Clear a rectangle with the appropriate background color for *style*.

Parameters

<i>style</i>	index into style table
<i>X,Y,width,height</i>	size and position of background area

12.143.4.10 col_to_x()

```
double Fl_Text_Display::col_to_x (
    double col ) const
```

Convert a column number into an x pixel position.

Parameters

<i>col</i>	an approximate column number based on the main font
------------	---

Returns

number of pixels from the left margin to the left of an average sized character

See also

[x_to_col\(\)](#)

12.143.4.11 count_lines()

```
int Fl_Text_Display::count_lines (
    int startPos,
    int endPos,
    bool startPosIsLineStart ) const
```

Count the number of lines between two positions.

Same as [Fl_Text_Buffer::count_lines\(\)](#), but takes into account wrapping if wrapping is turned on. If the caller knows that *startPos* is at a line start, it can pass *startPosIsLineStart* as `True` to make the call more efficient by avoiding the additional step of scanning back to the last newline.

Parameters

<i>startPos</i>	index to first character
<i>endPos</i>	index after last character
<i>startPosIsLineStart</i>	avoid scanning back to the line start

Returns

number of lines

12.143.4.12 cursor_color() [1/2]

```
Fl_Color Fl_Text_Display::cursor_color ( ) const [inline]
```

Gets the text cursor color.

Returns

cursor color

12.143.4.13 cursor_color() [2/2]

```
void Fl_Text_Display::cursor_color (
    Fl_Color n ) [inline]
```

Sets the text cursor color.

Parameters

<i>n</i>	new cursor color
----------	------------------

12.143.4.14 cursor_style()

```
void Fl_Text_Display::cursor_style (
    int style )
```

Sets the text cursor style.

Sets the text cursor style to one of the following:

- [Fl_Text_Display::NORMAL_CURSOR](#) - Shows an I beam.
- [Fl_Text_Display::CARET_CURSOR](#) - Shows a caret under the text.
- [Fl_Text_Display::DIM_CURSOR](#) - Shows a dimmed I beam.
- [Fl_Text_Display::BLOCK_CURSOR](#) - Shows an unfilled box around the current character.
- [Fl_Text_Display::HEAVY_CURSOR](#) - Shows a thick I beam.

This call also switches the cursor on and may trigger a redraw.

Parameters

<i>style</i>	new cursor style
--------------	------------------

12.143.4.15 display_insert()

```
void Fl_Text_Display::display_insert ( ) [protected]
```

Scroll the display to bring insertion cursor into view.

Note: it would be nice to be able to do this without counting lines twice ([scroll_\(\)](#) counts them too) and/or to count from the most efficient starting point, but the efficiency of this routine is not as important to the overall performance of the text display.

12.143.4.16 draw()

```
void Fl_Text_Display::draw (
    void ) [protected], [virtual]
```

Draw the widget.

This function tries to limit drawing to smaller areas if possible.

Reimplemented from [Fl_Group](#).

12.143.4.17 draw_cursor()

```
void Fl_Text_Display::draw_cursor (
    int X,
    int Y ) [protected]
```

Draw a cursor with top center at X, Y.

Parameters

<i>X, Y</i>	cursor position in pixels
-------------	---------------------------

12.143.4.18 draw_line_numbers()

```
void Fl_Text_Display::draw_line_numbers (
    bool clearAll ) [protected]
```

Refresh the line number area.

Parameters

<i>clearAll</i>	– (currently unused) If False, only draws the line number text, does not clear the area behind it. If True, clears the area and redraws the text. Use False to avoid a 'flash' for single buffered windows.
-----------------	---

12.143.4.19 draw_range()

```
void Fl_Text_Display::draw_range (
    int startpos,
    int endpos ) [protected]
```

Draw a range of text.

Refresh all of the text between buffer positions *startpos* and *endpos* not including the character at the position *endpos*.

If *endpos* points beyond the end of the buffer, refresh the whole display after *startpos*, including blank lines which are not technically part of any range of characters.

Parameters

<i>startpos</i>	index of first character to draw
<i>endpos</i>	index after last character to draw

12.143.4.20 draw_string()

```
void Fl_Text_Display::draw_string (
    int style,
    int X,
    int Y,
    int toX,
    const char * string,
    int nChars ) const [protected]
```

Draw a text segment in a single style.

Draw a string or blank area according to parameter *style*, using the appropriate colors and drawing method for that style, with top left corner at *X*, *Y*. If *style* says to draw text, use *string* as source of characters, and draw *nChars*, if *style* is FILL, erase rectangle where text would have drawn from *X* to *toX* and from *Y* to the maximum *y* extent of the current font(s).

Parameters

<i>style</i>	index into style lookup table
<i>X</i> , <i>Y</i>	drawing origin
<i>toX</i>	rightmost position if this is a fill operation
<i>string</i>	text if this is a drawing operation
<i>nChars</i>	number of characters to draw

12.143.4.21 draw_text()

```
void Fl_Text_Display::draw_text (
    int left,
```



```

    int top,
    int width,
    int height ) [protected]

```

Refresh a rectangle of the text display.

Parameters

<i>left,top</i>	are in coordinates of the text drawing window.
<i>width,height</i>	size in pixels

12.143.4.22 draw_vline()

```

void Fl_Text_Display::draw_vline (
    int visLineNum,
    int leftClip,
    int rightClip,
    int leftCharIndex,
    int rightCharIndex ) [protected]

```

Draw a single line of text.

Draw the text on a single line represented by *visLineNum* (the number of lines down from the top of the display), limited by *leftClip* and *rightClip* window coordinates and *leftCharIndex* and *rightCharIndex* character positions (not including the character at position *rightCharIndex*).

Parameters

<i>visLineNum</i>	index of line in the visible line number lookup
<i>leftClip,rightClip</i>	pixel position of clipped area
<i>leftCharIndex,rightCharIndex</i>	index into line of segment that we want to draw

12.143.4.23 empty_vlines()

```

int Fl_Text_Display::empty_vlines ( ) const [protected]

```

Return true if there are lines visible with no corresponding buffer text.

Returns

1 if there are empty lines

12.143.4.24 extend_range_for_styles()

```

void Fl_Text_Display::extend_range_for_styles (
    int * startpos,
    int * endpos ) [protected]

```

I don't know what this does!

Extend the range of a redraw request (from **start* to **end*) with additional redraw requests resulting from changes to the attached style buffer (which contains auxiliary information for coloring or styling text).

Parameters

<i>startpos</i>	??
<i>endpos</i>	??

Todo Unicode?

12.143.4.25 find_line_end()

```
void Fl_Text_Display::find_line_end (
    int startPos,
    bool startPosIsLineStart,
    int * lineEnd,
    int * nextLineStart ) const [protected]
```

Finds both the end of the current line and the start of the next line.

Why? In continuous wrap mode, if you need to know both, figuring out one from the other can be expensive or error prone. The problem comes when there's a trailing space or tab just before the end of the buffer. To translate an end of line value to or from the next lines start value, you need to know whether the trailing space or tab is being used as a line break or just a normal character, and to find that out would otherwise require counting all the way back to the beginning of the line.

Parameters

	<i>startPos</i>	
	<i>startPosIsLineStart</i>	
out	<i>lineEnd</i>	
out	<i>nextLineStart</i>	

12.143.4.26 find_wrap_range()

```
void Fl_Text_Display::find_wrap_range (
    const char * deletedText,
    int pos,
    int nInserted,
    int nDeleted,
    int * modRangeStart,
    int * modRangeEnd,
    int * linesInserted,
    int * linesDeleted ) [protected]
```

Wrapping calculations.

When continuous wrap is on, and the user inserts or deletes characters, wrapping can happen before and beyond the changed position. This routine finds the extent of the changes, and counts the deleted and inserted lines over that range. It also attempts to minimize the size of the range to what has to be counted and re-displayed, so the results can be useful both for delimiting where the line starts need to be recalculated, and for deciding what part of the text to redisplay.

Parameters

<i>deletedText</i>	
<i>pos</i>	
<i>nInserted</i>	
<i>nDeleted</i>	
<i>modRangeStart</i>	
<i>modRangeEnd</i>	
<i>linesInserted</i>	
<i>linesDeleted</i>	

12.143.4.27 find_x()

```
int Fl_Text_Display::find_x (
    const char * s,
    int len,
```

```
int style,
int x ) const [protected]
```

Find the index of the character that lies at the given x position / closest cursor position.

Parameters

<i>s</i>	UTF-8 text string
<i>len</i>	length of string
<i>style</i>	index into style lookup table
<i>x</i>	position in pixels - negative returns closest cursor position

Returns

index into buffer

12.143.4.28 get_absolute_top_line_number()

```
int Fl_Text_Display::get_absolute_top_line_number ( ) const [protected]
```

Returns the absolute (non-wrapped) line number of the first line displayed.

Returns 0 if the absolute top line number is not being maintained.

12.143.4.29 grammar_underline_color() [1/2]

```
Fl_Color Fl_Text_Display::grammar_underline_color ( ) const [inline]
```

Gets the underline color for style attribute ATTR_GRAMMAR.

Returns

underline color

12.143.4.30 grammar_underline_color() [2/2]

```
void Fl_Text_Display::grammar_underline_color (
    Fl_Color color ) [inline]
```

Sets the underline color for style attribute ATTR_GRAMMAR.

Parameters

<i>color</i>	underline color
--------------	-----------------

12.143.4.31 handle()

```
int Fl_Text_Display::handle (
    int e ) [virtual]
```

Event handling.

Reimplemented from [Fl_Group](#).

Reimplemented in [Fl_Text_Editor](#).

12.143.4.32 handle_rmb()

```
int Fl_Text_Display::handle_rmb (
    int readonly ) [protected]
```

Handle right mouse button down events.

Returns

0 for no op, 1 to cut, 2 to copy, 3 to paste

12.143.4.33 handle_vline()

```
int Fl_Text_Display::handle_vline (
    int mode,
    int lineStartPos,
    int lineLen,
    int leftChar,
    int rightChar,
    int Y,
    int bottomClip,
    int leftClip,
    int rightClip ) const [protected]
```

Universal pixel machine.

We use a single function that handles all line layout, measuring, and drawing

- draw a text range
- return the width of a text range in pixels
- return the index of a character that is at a pixel position

Parameters

in	<i>mode</i>	DRAW_LINE, GET_WIDTH, FIND_INDEX, FIND_INDEX_FROM_ZERO, or FIND_CURSOR_INDEX
in	<i>lineStartPos</i>	index of first character
in	<i>lineLen</i>	size of string in bytes
in	<i>leftChar, rightChar</i>	
in	<i>Y</i>	drawing position
in	<i>bottomClip, leftClip, rightClip</i>	stop work when we reach the clipped area. rightClip is the X position that we search in FIND_INDEX.

Return values

<i>DRAW_LINE</i>	index of last drawn character
<i>GET_WIDTH</i>	width in pixels of text segment if we would draw it
<i>FIND_INDEX</i>	index of character at given x position in window coordinates
<i>FIND_INDEX_FROM_ZERO</i>	index of character at given x position without scrolling and widget offsets

Todo we need to handle hidden hyphens and tabs here!

we handle all styles and selections

we must provide code to get pixel positions of the middle of a character as well

12.143.4.34 highlight_data()

```
void Fl_Text_Display::highlight_data (
    Fl_Text_Buffer * styleBuffer,
    const Style_Table_Entry * styleTable,
    int nStyles,
    char unfinishedStyle,
```

```
Unfinished_Style_Cb unfinishedHighlightCB,
void * cbArg )
```

Attach (or remove) highlight information in text display and redisplay.

Highlighting information consists of a style buffer which parallels the normal text buffer, but codes font and color information for the display; a style table which translates style buffer codes (indexed by buffer character - 'A') into fonts and colors; and a callback mechanism for as-needed highlighting, triggered by a style buffer entry of "unfinished↵ Style". Style buffer can trigger additional redisplay during a normal buffer modification if the buffer contains a primary [Fl_Text_Selection](#) (see [extend_range_for_styles\(\)](#) for more information on this protocol).

Style buffers, tables and their associated memory are managed by the caller.

Styles are ranged from 65 ('A') to 126.

Note

Style information in the style buffer must have the same byte offset as the corresponding character in the text buffer. UTF-8 characters can have a maximum length of four bytes. Style information must take this into account and fill the unused bytes with 0. See [fl_utf8len\(\)](#).

Text: "*g* r ü *n**", where normal style is 'A', and bold is 'B'

```
Text Buffer(hex): 67 72 c3 bc 6e : gr..n
Style Buffer(hex): 42 41 41 00 42 : BAA.B
```

Parameters

<i>styleBuffer</i>	this buffer works in parallel to the text buffer. For every character in the text buffer, the style buffer has a byte at the same offset that contains an index into an array of possible styles.
<i>styleTable</i>	a list of styles indexed by the style buffer
<i>nStyles</i>	number of styles in the style table
<i>unfinishedStyle</i>	if this style is found, the callback below is called
<i>unfinishedHighlightCB</i>	if a character with an unfinished style is found, this callback will be called
<i>cbArg</i>	an optional argument for the callback above, usually a pointer to the Text Display.

See also

[Fl_Text_Display::style_buffer\(\)](#)

12.143.4.35 in_selection()

```
int Fl_Text_Display::in_selection (
    int X,
    int Y ) const
```

Check if a pixel position is within the primary selection.

Parameters

X,Y	pixel position to test
-----	------------------------

Returns

1 if position (X, Y) is inside of the primary [Fl_Text_Selection](#)

12.143.4.36 insert()

```
void Fl_Text_Display::insert (
    const char * text )
```

Inserts "text" at the current cursor location.

This has the same effect as inserting the text into the buffer using `insert(insert_position(),text)` and then moving the insert position after the newly inserted text, except that it's optimized to do less redrawing.

Parameters

<i>text</i>	new text in UTF-8 encoding.
-------------	-----------------------------

12.143.4.37 insert_position() [1/2]

```
int Fl_Text_Display::insert_position ( ) const [inline]
```

Gets the position of the text insertion cursor for text display.

The insert position is the byte count (offset) from the beginning of the text buffer (starting with 0). Returns 0 (zero) if no buffer is associated to the text display. Returns `buffer()->length()` if the insert position is at the end of the buffer.

Returns

insert position index into text buffer

See also

[insert_position\(int\)](#)

12.143.4.38 insert_position() [2/2]

```
void Fl_Text_Display::insert_position (
    int newPos )
```

Sets the position of the text insertion cursor for text display.

Moves the insertion cursor in front of the character at `newPos`. This function may trigger a redraw.

Parameters

<i>newPos</i>	new caret position
---------------	--------------------

12.143.4.39 line_end()

```
int Fl_Text_Display::line_end (
    int startPos,
    bool startPosIsLineStart ) const
```

Returns the end of a line.

Same as `buffer()->line_end(startPos)`, but takes into account line breaks when wrapping is turned on. If the caller knows that `startPos` is at a line start, it can pass `startPosIsLineStart` as `True` to make the call more efficient by avoiding the additional step of scanning back to the last newline.

Note that the definition of the end of a line is less clear when continuous wrap is on. With continuous wrap off, it's just a pointer to the newline that ends the line. When it's on, it's the character beyond the last **displayable** character on the line, where a whitespace character which has been "converted" to a newline for wrapping is not considered displayable. Also note that a line can be wrapped at a non-whitespace character if the line had no whitespace. In this case, this routine returns a pointer to the start of the next line. This is also consistent with the model used by `visLineLength`.

Parameters

<i>startPos</i>	index to starting character
<i>startPosIsLineStart</i>	avoid scanning back to the line start

Returns

new position as index

12.143.4.40 line_start()

```
int Fl_Text_Display::line_start (
    int pos ) const
```

Return the beginning of a line.

Same as buffer()->line_start(pos), but returns the character after last wrap point rather than the last newline.

Parameters

<i>pos</i>	index to starting character
------------	-----------------------------

Returns

new position as index

12.143.4.41 linewidth_align()

```
void Fl_Text_Display::linewidth_align (
    Fl_Align val )
```

Set alignment for line numbers (if enabled).

Valid values are FL_ALIGN_LEFT, FL_ALIGN_CENTER or FL_ALIGN_RIGHT.

Version

1.3.3

12.143.4.42 linewidth_bgcolor()

```
void Fl_Text_Display::linewidth_bgcolor (
    Fl_Color val )
```

Set the background color used for line numbers (if enabled).

Version

1.3.3

12.143.4.43 linewidth_fgcolor()

```
void Fl_Text_Display::linewidth_fgcolor (
    Fl_Color val )
```

Set the foreground color used for line numbers (if enabled).

Version

1.3.3

12.143.4.44 linewidth_font()

```
void Fl_Text_Display::linewidth_font (
    Fl_Font val )
```

Set the font used for line numbers (if enabled).

Version

1.3.3

12.143.4.45 `linenumber_format()`

```
void Fl_Text_Display::linenumber_format (
    const char * val )
```

Sets the printf() style format string used for line numbers.

Default is "%d" for normal unpadded decimal integers.

An internal copy of `val` is allocated and managed; it is automatically freed whenever a new value is assigned, or when the widget is destroyed.

The value of `val` must *not* be NULL.

Example values:

```
- "%d"   -- For normal line numbers without padding (Default)
- "%03d" -- For 000 padding
- "%x"   -- For hexadecimal line numbers
- "%o"   -- For octal line numbers
```

Version

1.3.3

12.143.4.46 `linenumber_size()`

```
void Fl_Text_Display::linenumber_size (
    Fl_Fontsize val )
```

Set the font size used for line numbers (if enabled).

Version

1.3.3

12.143.4.47 `linenumber_width()`

```
void Fl_Text_Display::linenumber_width (
    int width )
```

Set width of screen area for line numbers.

Use to also enable/disable line numbers. A value of 0 disables line numbering, values >0 enable the line number display.

Parameters

<i>width</i>	The new width of the area for line numbers to appear, in pixels. 0 disables line numbers (default)
--------------	--

12.143.4.48 `longest_vline()`

```
int Fl_Text_Display::longest_vline ( ) const [protected]
```

Find the longest line of all visible lines.

Returns

the width of the longest visible line in pixels

12.143.4.49 `maintain_absolute_top_line_number()`

```
void Fl_Text_Display::maintain_absolute_top_line_number (
    int state ) [protected]
```

Line numbering stuff, currently unused.

In continuous wrap mode, internal line numbers are calculated after wrapping. A separate non-wrapped line count is maintained when line numbering is turned on. There is some performance cost to maintaining this line count, so normally absolute line numbers are not tracked if line numbering is off. This routine allows callers to specify that

they still want this line count maintained (for use via `Fl_Text_Display::position_to_linecol()`). More specifically, this allows the line number reported in the statistics line to be calibrated in absolute lines, rather than post-wrapped lines.

12.143.4.50 `maintaining_absolute_top_line_number()`

```
int Fl_Text_Display::maintaining_absolute_top_line_number ( ) const [protected]
```

Returns true if a separate absolute top line number is being maintained.

The absolute top line number is used for displaying line numbers in continuous wrap mode or showing in the statistics line (the latter is currently not available in FLTK).

12.143.4.51 `measure_deleted_lines()`

```
void Fl_Text_Display::measure_deleted_lines (
    int pos,
    int nDeleted ) [protected]
```

Wrapping calculations.

This is a stripped-down version of the `findWrapRange()` function above, intended to be used to calculate the number of "deleted" lines during a buffer modification. It is called *before* the modification takes place.

This function should only be called in continuous wrap mode with a non-fixed font width. In that case, it is impossible to calculate the number of deleted lines, because the necessary style information is no longer available *after* the modification. In other cases, we can still perform the calculation afterwards (possibly even more efficiently).

Parameters

<i>pos</i>	
<i>nDeleted</i>	

12.143.4.52 `measure_proportional_character()`

```
double Fl_Text_Display::measure_proportional_character (
    const char * s,
    int xPix,
    int pos ) const [protected]
```

Wrapping calculations.

Measure the width in pixels of the first character of string "s" at a particular column "colNum" and buffer position "pos". This is for measuring characters in proportional or mixed-width highlighting fonts.

A note about proportional and mixed-width fonts: the mixed width and proportional font code in `nedit` does not get much use in general editing, because `nedit` doesn't allow per-language-mode fonts, and editing programs in a proportional font is usually a bad idea, so very few users would choose a proportional font as a default. There are still probably mixed-width syntax highlighting cases where things don't redraw properly for insertion/deletion, though static display and wrapping and resizing should now be solid because they are now used for online help display.

Parameters

<i>s</i>	text string
<i>xPix</i>	x pixel position needed for calculating tab widths
<i>pos</i>	offset within string

Returns

width of character in pixels

12.143.4.53 measure_vline()

```
int Fl_Text_Display::measure_vline (
    int visLineNum ) const [protected]
```

Returns the width in pixels of the displayed line pointed to by "visLineNum".

Parameters

<i>visLineNum</i>	index into visible lines array
-------------------	--------------------------------

Returns

width of line in pixels

12.143.4.54 move_down()

```
int Fl_Text_Display::move_down ( )
```

Moves the current insert position down one line.

Returns

1 if the cursor moved, 0 if the beginning of the text was reached

12.143.4.55 move_left()

```
int Fl_Text_Display::move_left ( )
```

Moves the current insert position left one character.

Returns

1 if the cursor moved, 0 if the beginning of the text was reached

12.143.4.56 move_right()

```
int Fl_Text_Display::move_right ( )
```

Moves the current insert position right one character.

Returns

1 if the cursor moved, 0 if the end of the text was reached

12.143.4.57 move_up()

```
int Fl_Text_Display::move_up ( )
```

Moves the current insert position up one line.

Returns

1 if the cursor moved, 0 if the beginning of the text was reached

12.143.4.58 offset_line_starts()

```
void Fl_Text_Display::offset_line_starts (
    int newTopLineNum ) [protected]
```

Offset line start counters for a new vertical scroll position.

Offset the line starts array, mTopLineNum, mFirstChar and lastChar, for a new vertical scroll position given by new↔TopLineNum. If any currently displayed lines will still be visible, salvage the line starts values, otherwise, count lines from the nearest known line start (start or end of buffer, or the closest value in the mLineStarts array)

Parameters

<i>newTopLineNum</i>	index into buffer
----------------------	-------------------

12.143.4.59 overstrike()

```
void Fl_Text_Display::overstrike (
    const char * text )
```

Replaces text at the current insert position.

Parameters

<i>text</i>	new text in UTF-8 encoding
-------------	----------------------------

Todo Unicode? Find out exactly what we do here and simplify.

12.143.4.60 position_style()

```
int Fl_Text_Display::position_style (
    int lineStartPos,
    int lineLen,
    int lineIndex ) const
```

Find the correct style for a character.

Determine the drawing method to use to draw a specific character from "buf".

`lineStartPos` gives the character index where the line begins, `lineIndex`, the number of characters past the beginning of the line, and `lineLen` the number of displayed characters past the beginning of the line. Passing `lineStartPos` of -1 returns the drawing style for "no text".

Why not just: `position_style(pos)`? Because style applies to blank areas of the window beyond the text boundaries, and because this routine must also decide whether a position is inside of a rectangular [Fl_Text_Selection](#), and do so efficiently, without re-counting character positions from the start of the line.

Note that style is a somewhat incorrect name, drawing method would be more appropriate.

If `lineIndex` is pointing to the last character in a line, and the second to last character has the `ATTR_BGCOLOR_EXT` set, the background color will extend into the remaining line.

Parameters

<i>lineStartPos</i>	beginning of this line
<i>lineLen</i>	number of bytes in line
<i>lineIndex</i>	position of character within line

Returns

style for the given character

12.143.4.61 position_to_line()

```
int Fl_Text_Display::position_to_line (
    int pos,
    int * lineNum ) const [protected]
```

Convert a position index into a line number offset.

Find the line number of position `pos` relative to the first line of displayed text, counting from 0 to *visible lines - 1*. The line number is returned in `lineNum`.

Returns 0 if the line is not displayed. In this case `lineNum` is 0 as well.

Returns 1 if the line is displayed. In this case `lineNum` is the relative line number.

Parameters

in	<i>pos</i>	byte position in buffer
out	<i>lineNum</i>	relative line number of byte <i>pos</i> in buffer

Returns

whether the character at byte position *pos* is currently displayed

Return values

0	<i>pos</i> is not displayed; <i>lineNum</i> is invalid (zero)
1	<i>pos</i> is displayed; <i>lineNum</i> is valid

12.143.4.62 position_to_linecol()

```
int Fl_Text_Display::position_to_linecol (
    int pos,
    int * lineNum,
    int * column ) const [protected]
```

Find the line and column number of position *pos*.

This only works for displayed lines. If the line is not displayed, the function returns 0 (without the *mLineStarts* array it could turn in to very long calculation involving scanning large amounts of text in the buffer). If continuous wrap mode is on, returns the absolute line number (as opposed to the wrapped line number which is used for scrolling).

Parameters

	<i>pos</i>	character index
out	<i>lineNum</i>	absolute (unwrapped) line number
out	<i>column</i>	character offset to the beginning of the line

Returns

0 if *pos* is off screen, line number otherwise

Todo a column number makes little sense in the UTF-8/variable font width environment. We will have to further define what exactly we want to return. Please check the functions that call this particular function.

12.143.4.63 position_to_xy()

```
int Fl_Text_Display::position_to_xy (
    int pos,
    int * X,
    int * Y ) const
```

Convert a character index into a pixel position.

Translate a buffer text position to the XY location where the top left of the cursor would be positioned to point to that character. Returns 0 if the position is not displayed because it is **vertically out** of view. If the position is horizontally out of view, returns the X coordinate where the position would be if it were visible.

Parameters

	<i>pos</i>	character index
out	<i>X, Y</i>	pixel position of character on screen

Returns

0 if character vertically out of view, X & Y positions otherwise

12.143.4.64 redisplay_range()

```
void Fl_Text_Display::redisplay_range (
    int startpos,
    int endpos )
```

Marks text from start to end as needing a redraw.

This function will trigger a damage event and later a redraw of parts of the widget.

Parameters

<i>startpos</i>	index of first character needing redraw
<i>endpos</i>	index after last character needing redraw

12.143.4.65 reset_absolute_top_line_number()

```
void Fl_Text_Display::reset_absolute_top_line_number ( ) [protected]
```

Reestablish the absolute (non-wrapped) top line number.

Count lines from the beginning of the buffer to reestablish the absolute (non-wrapped) top line number. If mode is not continuous wrap, or the number is not being maintained, does nothing.

12.143.4.66 resize()

```
void Fl_Text_Display::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Change the size of the displayed text area.

Calling this function will trigger a recalculation of all visible lines and of all scrollbar sizes.

Parameters

<i>X,Y,W,H</i>	new position and size of this widget
----------------	--------------------------------------

Reimplemented from [Fl_Group](#).

12.143.4.67 rewind_lines()

```
int Fl_Text_Display::rewind_lines (
    int startPos,
    int nLines )
```

Skip a number of lines back.

Same as `buffer()->rewind_lines(startPos, nLines)`, but takes into account line breaks when wrapping is turned on.

Parameters

<i>startPos</i>	index to starting character
<i>nLines</i>	number of lines to skip back

Returns

new position as index

12.143.4.68 scroll()

```
void Fl_Text_Display::scroll (
    int topLineNum,
    int horizOffset )
```

Scrolls the current buffer to start at the specified line and column.

Parameters

<i>topLineNum</i>	top line number
<i>horizOffset</i>	column number

Todo Column numbers make little sense here.

12.143.4.69 scroll_()

```
int Fl_Text_Display::scroll_ (
    int topLineNum,
    int horizOffset ) [protected]
```

Scrolls the current buffer to start at the specified line and column.

Parameters

<i>topLineNum</i>	top line number
<i>horizOffset</i>	in pixels

Returns

0 if nothing changed, 1 if we scrolled

12.143.4.70 scroll_timer_cb()

```
void Fl_Text_Display::scroll_timer_cb (
    void * user_data ) [static], [protected]
```

Timer callback for scroll events.

This timer event scrolls the text view proportionally to how far the mouse pointer has left the text area. This allows for smooth scrolling without "wiggeling" the mouse.

12.143.4.71 scrollbar_align() [1/2]

```
Fl_Align Fl_Text_Display::scrollbar_align ( ) const [inline]
```

Gets the scrollbar alignment type.

Returns

scrollbar alignment

12.143.4.72 scrollbar_align() [2/2]

```
void Fl_Text_Display::scrollbar_align (
    Fl_Align a ) [inline]
```

Sets the scrollbar alignment type.

Parameters

<i>a</i>	new scrollbar alignment
----------	-------------------------

12.143.4.73 scrollbar_size() [1/2]

```
int Fl_Text_Display::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

12.143.4.74 scrollbar_size() [2/2]

```
void Fl_Text_Display::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting *newSize* to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

<i>in</i>	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
-----------	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

12.143.4.75 scrollbar_width() [1/2]

```
int Fl_Text_Display::scrollbar_width ( ) const [inline]
```

Returns the global value [Fl::scrollbar_size\(\)](#) unless a specific `scrollbar_width_` has been set.

Deprecated Use [scrollbar_size\(\)](#) instead.

Todo This method should eventually be removed.

12.143.4.76 scrollbar_width() [2/2]

```
void Fl_Text_Display::scrollbar_width (
    int width ) [inline]
```

Sets the global [Fl::scrollbar_size\(\)](#), and forces this instance of the widget to use it.

Deprecated Use [scrollbar_size\(\)](#) instead.

Todo This method should eventually be removed

12.143.4.77 secondary_selection_color() [1/2]

```
Fl_Color Fl_Text_Display::secondary_selection_color ( ) const [inline]
```

Gets the background color for the secondary selection block.

Returns

background color color

12.143.4.78 secondary_selection_color() [2/2]

```
void Fl_Text_Display::secondary_selection_color (
    Fl_Color color ) [inline]
```

Sets the background color for the secondary selection block.

Parameters

<i>color</i>	background color
--------------	------------------

12.143.4.79 shortcut() [1/2]

```
int Fl_Text_Display::shortcut ( ) const [inline]
```

Todo FIXME : get set methods pointing on shortcut_ have no effects as shortcut_ is unused in this class and derived!

Returns

the current shortcut key

12.143.4.80 shortcut() [2/2]

```
void Fl_Text_Display::shortcut (
    int s ) [inline]
```

Todo FIXME : get set methods pointing on shortcut_ have no effects as shortcut_ is unused in this class and derived!

Parameters

<i>s</i>	the new shortcut key
----------	----------------------

12.143.4.81 show_cursor()

```
void Fl_Text_Display::show_cursor (
    int b = 1 )
```

Shows the text cursor.

This function may trigger a redraw.

Parameters

<i>b</i>	show(1) or hide(0) the text cursor (caret).
----------	---

12.143.4.82 show_insert_position()

```
void Fl_Text_Display::show_insert_position ( )
```

Scrolls the text buffer to show the current insert position.

This function triggers a complete recalculation, ending in a call to `Fl_Text_Display::display_insert()`

12.143.4.83 skip_lines()

```
int Fl_Text_Display::skip_lines (
    int startPos,
    int nLines,
    bool startPosIsLineStart )
```

Skip a number of lines forward.

Same as `Fl_Text_Buffer::skip_lines(startPos, nLines)`, but takes into account line breaks when wrapping is turned on. If the caller knows that `startPos` is at a line start, it can pass `startPosIsLineStart` as `True` to make the call more efficient by avoiding the additional step of scanning back to the last newline.

Parameters

<i>startPos</i>	index to starting character
<i>nLines</i>	number of lines to skip ahead
<i>startPosIsLineStart</i>	avoid scanning back to the line start

Returns

new position as index

12.143.4.84 spelling_underline_color() [1/2]

```
Fl_Color Fl_Text_Display::spelling_underline_color ( ) const [inline]
```

Gets the underline color for style attribute `ATTR_SPELLING`.

Returns

underline color

12.143.4.85 spelling_underline_color() [2/2]

```
void Fl_Text_Display::spelling_underline_color (
    Fl_Color color ) [inline]
```

Sets the underline color for style attribute `ATTR_SPELLING`.

Parameters

<i>color</i>	underline color
--------------	-----------------

12.143.4.86 string_width()

```
double Fl_Text_Display::string_width (
    const char * string,
    int length,
    int style ) const [protected]
```

Find the width of a string in the font of a particular style.

Parameters

<i>string</i>	the text
---------------	----------

Parameters

<i>length</i>	number of bytes in string
<i>style</i>	index into style table

Returns

width of text segment in pixels

12.143.4.87 style_buffer()

```
Fl_Text_Buffer * Fl_Text_Display::style_buffer ( ) const [inline]
```

Gets the current style buffer associated with the text widget.

Multiple text widgets can be associated with the same style buffer.

Returns

current style buffer

See also

[Fl_Text_Display::highlight_data\(\)](#)

12.143.4.88 textcolor() [1/2]

```
Fl_Color Fl_Text_Display::textcolor ( ) const [inline]
```

Gets the default color of text in the widget.

Returns

text color unless overridden by a style

12.143.4.89 textcolor() [2/2]

```
void Fl_Text_Display::textcolor (
    Fl_Color n ) [inline]
```

Sets the default color of text in the widget.

Parameters

<i>n</i>	new text color
----------	----------------

12.143.4.90 textfont() [1/2]

```
Fl_Font Fl_Text_Display::textfont ( ) const [inline]
```

Gets the default font used when drawing text in the widget.

Returns

current text font face unless overridden by a style

12.143.4.91 textfont() [2/2]

```
void Fl_Text_Display::textfont (
    Fl_Font s ) [inline]
```

Sets the default font used when drawing text in the widget.

Parameters

<i>s</i>	default text font face
----------	------------------------

12.143.4.92 `textsize()` [1/2]

```
Fl_Fontsize Fl_Text_Display::textsize ( ) const [inline]
```

Gets the default size of text in the widget.

Returns

current text height unless overridden by a style

12.143.4.93 `textsize()` [2/2]

```
void Fl_Text_Display::textsize (
    Fl_Fontsize s ) [inline]
```

Sets the default size of text in the widget.

Parameters

<i>s</i>	new text size
----------	---------------

12.143.4.94 `update_h_scrollbar()`

```
void Fl_Text_Display::update_h_scrollbar ( ) [protected]
```

Update horizontal scrollbar.
Update the minimum, maximum, slider size, page increment, and value for the horizontal scrollbar.

12.143.4.95 `update_line_starts()`

```
void Fl_Text_Display::update_line_starts (
    int pos,
    int charsInserted,
    int charsDeleted,
    int linesInserted,
    int linesDeleted,
    int * scrolled ) [protected]
```

Update line start arrays and variables.

Update the line starts array, `mTopLineNum`, `mFirstChar` and `lastChar` for this text display after a modification to the text buffer, given by the position `pos` where the change began, and the numbers of characters and lines inserted and deleted.

Parameters

	<i>pos</i>	index into buffer of recent changes
	<i>charsInserted</i>	number of bytes(!) inserted
	<i>charsDeleted</i>	number of bytes(!) deleted
	<i>linesInserted</i>	number of lines
	<i>linesDeleted</i>	number of lines
out	<i>scrolled</i>	set to 1 if the text display needs to be scrolled

12.143.4.96 `update_v_scrollbar()`

```
void Fl_Text_Display::update_v_scrollbar ( ) [protected]
```

Update vertical scrollbar.

Update the minimum, maximum, slider size, page increment, and value for the vertical scrollbar.

12.143.4.97 `vline_length()`

```
int Fl_Text_Display::vline_length (
    int visLineNum ) const [protected]
```

Count number of bytes in a visible line.

Return the length of a line (number of bytes) by examining entries in the line starts array rather than by scanning for newlines.

Parameters

<i>visLineNum</i>	index of line in visible line array
-------------------	-------------------------------------

Returns

number of bytes in this line

12.143.4.98 `word_end()`

```
int Fl_Text_Display::word_end (
    int pos ) const [inline]
```

Moves the insert position to the end of the current word.

Parameters

<i>pos</i>	start calculation at this index
------------	---------------------------------

Returns

index of first character after the end of the word

12.143.4.99 `word_start()`

```
int Fl_Text_Display::word_start (
    int pos ) const [inline]
```

Moves the insert position to the beginning of the current word.

Parameters

<i>pos</i>	start calculation at this index
------------	---------------------------------

Returns

beginning of the words

12.143.4.100 `wrap_mode()`

```
void Fl_Text_Display::wrap_mode (
    int wrap,
    int wrapMargin )
```

Set the new text wrap mode.

If `wrap` mode is not zero, this call enables automatic word wrapping at column `wrapMargin`. Word-wrapping does not change the text buffer itself, only the way the text is displayed. Different Text Displays can have different wrap modes, even if they share the same Text Buffer.

Valid wrap modes are:

- WRAP_NONE : don't wrap text at all
- WRAP_AT_COLUMN : wrap text at the given text column
- WRAP_AT_PIXEL : wrap text at a pixel position
- WRAP_AT_BOUNDS : wrap text so that it fits into the widget width

Parameters

<i>wrap</i>	new wrap mode (see above)
<i>wrapMargin</i>	in WRAP_AT_COLUMN mode, text will wrap at the n'th character. For variable width fonts, an average character width is calculated. The column width is calculated using the current textfont or the first style when this function is called. If the font size changes, this function must be called again. In WRAP_AT_PIXEL mode, this is the pixel position.

12.143.4.101 wrap_uses_character()

```
int Fl_Text_Display::wrap_uses_character (
    int lineEndPos ) const [protected]
```

Check if the line break is caused by a newline or by line wrapping.

Line breaks in continuous wrap mode usually happen at newlines (\n) or whitespace. This line-terminating character is not included in line width measurements and has a special status as a non-visible character. However, lines with no whitespace are wrapped without the benefit of a line terminating character, and this distinction causes endless trouble with all of the text display code which was originally written without continuous wrap mode and always expects to wrap at a newline character.

Given the position of the end of the line, as returned by [Fl_Text_Display::line_end\(\)](#) or [Fl_Text_Buffer::line_end\(\)](#), this returns true if there is a line terminating character, and false if there's not. On the last character in the buffer, this function can't tell for certain whether a trailing space was used as a wrap point, and just guesses that it wasn't. So if an exact accounting is necessary, don't use this function.

Parameters

<i>lineEndPos</i>	index of character where the line wraps
-------------------	---

Returns

1 if a \n character causes the line wrap

12.143.4.102 wrapped_column()

```
int Fl_Text_Display::wrapped_column (
    int row,
    int column ) const
```

Nobody knows what this function does.

Correct a column number based on an unconstrained position (as returned by [TextDXYToUnconstrainedPosition](#)) to be relative to the last actual newline in the buffer before the row and column position given, rather than the last line start created by line wrapping. This is an adapter for rectangular selections and code written before continuous wrap mode, which thinks that the unconstrained column is the number of characters from the last newline. Obviously this is time consuming, because it involves character re-counting.

Parameters

<i>row</i>	
<i>column</i>	

Returns

something unknown

Todo What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one? Function TextDXYToUnconstrainedPosition does not exist (nedit port?)

Todo Unicode?

12.143.4.103 wrapped_line_counter()

```
void Fl_Text_Display::wrapped_line_counter (
    Fl_Text_Buffer * buf,
    int startPos,
    int maxPos,
    int maxLines,
    bool startPosIsLineStart,
    int styleBufOffset,
    int * retPos,
    int * retLines,
    int * retLineStart,
    int * retLineEnd,
    bool countLastLineMissingNewLine = true ) const [protected]
```

Wrapping calculations.

Count forward from startPos to either maxPos or maxLines (whichever is reached first), and return all relevant positions and line count. The provided textBuffer may differ from the actual text buffer of the widget. In that case it must be a (partial) copy of the actual text buffer and the styleBufOffset argument must indicate the starting position of the copy, to take into account the correct style information.

Parameters

in	<i>buf</i>	The text buffer to operate on
in	<i>startPos</i>	Starting index position into the buffer
in	<i>maxPos</i>	Maximum index position into the buffer we'll reach
in	<i>maxLines</i>	Maximum number of lines we'll reach
in	<i>startPosIsLineStart</i>	Flag indicating if startPos is start of line. (If set, prevents our having to find the line start)
in	<i>styleBufOffset</i>	Offset index position into style buffer.
out	<i>retPos</i>	Position where counting ended. When counting lines, the position returned is the start of the line "maxLines" lines beyond "startPos".
out	<i>retLines</i>	Number of line breaks counted
out	<i>retLineStart</i>	Start of the line where counting ended
out	<i>retLineEnd</i>	End position of the last line traversed
out	<i>countLastLineMissingNewLine</i>	

12.143.4.104 wrapped_row()

```
int Fl_Text_Display::wrapped_row (
    int row ) const
```

Nobody knows what this function does.

Correct a row number from an unconstrained position (as returned by TextDXYToUnconstrainedPosition) to a straight number of newlines from the top line of the display. Because rectangular selections are based on newlines, rather than display wrapping, and anywhere a rectangular selection needs a row, it needs it in terms of un-wrapped lines.

Parameters

<i>row</i>	
------------	--

Returns

something unknown

Todo What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one? Function TextDXYToUnconstrainedPosition does not exist (nedit port?)

12.143.4.105 x_to_col()

```
double Fl_Text_Display::x_to_col (
    double x ) const
```

Convert an x pixel position into a column number.

Parameters

<i>x</i>	number of pixels from the left margin
----------	---------------------------------------

Returns

an approximate column number based on the main font

12.143.4.106 xy_to_position()

```
int Fl_Text_Display::xy_to_position (
    int X,
    int Y,
    int posType = CHARACTER_POS ) const [protected]
```

Translate a pixel position into a character index.

Translate window coordinates to the nearest (insert cursor or character cell) text position. The parameter `posType` specifies how to interpret the position: `CURSOR_POS` means translate the coordinates to the nearest cursor position, and `CHARACTER_POS` means return the position of the character closest to (X, Y).

Parameters

<i>X, Y</i>	pixel position
<i>posType</i>	CURSOR_POS or CHARACTER_POS

Returns

index into text buffer

12.143.4.107 xy_to_rowcol()

```
void Fl_Text_Display::xy_to_rowcol (
    int X,
    int Y,
    int * row,
    int * column,
    int posType = CHARACTER_POS ) const [protected]
```

Translate pixel coordinates into row and column.

Translate window coordinates to the nearest row and column number for positioning the cursor. This, of course, makes no sense when the font is proportional, since there are no absolute columns. The parameter `posType`

specifies how to interpret the position: `CURSOR_POS` means translate the coordinates to the nearest position between characters, and `CHARACTER_POS` means translate the position to the nearest character cell.

Parameters

	<i>X, Y</i>	pixel coordinates
out	<i>row, column</i>	nearest row and column
	<i>posType</i>	<code>CURSOR_POS</code> or <code>CHARACTER_POS</code>

The documentation for this class was generated from the following files:

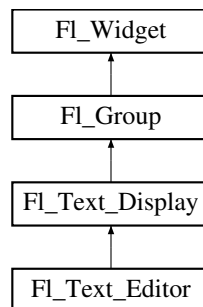
- `Fl_Text_Display.H`
- `Fl_Text_Display.cxx`

12.144 Fl_Text_Editor Class Reference

This is the FLTK text editor widget.

```
#include <Fl_Text_Editor.H>
```

Inheritance diagram for `Fl_Text_Editor`:



Classes

- struct [Key_Binding](#)
Simple linked list item associating a key/state to a function.

Public Types

- typedef `int(* Key_Func) (int key, Fl_Text_Editor *editor)`
Key function binding callback type.

Public Types inherited from [Fl_Text_Display](#)

- enum {
[NORMAL_CURSOR](#) , [CARET_CURSOR](#) , [DIM_CURSOR](#) , [BLOCK_CURSOR](#) ,
[HEAVY_CURSOR](#) , [SIMPLE_CURSOR](#) }
text display cursor shapes enumeration
- enum { [CURSOR_POS](#) , [CHARACTER_POS](#) }
the character position is the left edge of a character, whereas the cursor is thought to be between the centers of two consecutive characters.
- enum {
[DRAG_NONE](#) = -2 , [DRAG_START_DND](#) = -1 , [DRAG_CHAR](#) = 0 , [DRAG_WORD](#) = 1 ,
[DRAG_LINE](#) = 2 }
drag types - they match [Fl::event_clicks\(\)](#) so that single clicking to start a collection selects by character, double clicking selects by word and triple clicking selects by line.
- enum { [WRAP_NONE](#) , [WRAP_AT_COLUMN](#) , [WRAP_AT_PIXEL](#) , [WRAP_AT_BOUNDS](#) }

wrap types - used in wrap_mode()

- enum {
ATTR_BGCOLOR = 0x0001 , **ATTR_BGCOLOR_EXT_** = 0x0002 , **ATTR_BGCOLOR_EXT** = 0x0003 ,
ATTR_UNDERLINE = 0x0004 ,
ATTR_GRAMMAR = 0x0008 , **ATTR_SPELLING** = 0x000C , **ATTR_STRIKE_THROUGH** = 0x0010 ,
ATTR_LINES_MASK = 0x001C }

attribute flags in Style_Table_Entry.attr

- typedef void(* **Unfinished_Style_Cb**) (int, void *)

Public Member Functions

- void **add_default_key_bindings** ([Key_Binding](#) **list)
Adds all of the default editor key bindings to the specified key binding list.
- void **add_key_binding** (int key, int state, [Key_Func](#) f)
Adds a key of state state with the function f.
- void **add_key_binding** (int key, int state, [Key_Func](#) f, [Key_Binding](#) **list)
Adds a key of state state with the function function to an arbitrary key binding list list.
- [Key_Func](#) **bound_key_function** (int key, int state) const
Returns the function associated with a key binding.
- [Key_Func](#) **bound_key_function** (int key, int state, [Key_Binding](#) *list) const
Returns the function associated with a key binding.
- void **default_key_function** ([Key_Func](#) f)
Sets the default key function for unassigned keys.
- **Fl_Text_Editor** (int X, int Y, int W, int H, const char *l=0)
The constructor creates a new text editor widget.
- int **handle** (int e) **FL_OVERRIDE**
Event handling.
- int **insert_mode** ()
Gets the current insert mode; if non-zero, new text is inserted before the current cursor position.
- void **insert_mode** (int b)
Sets the current insert mode; if non-zero, new text is inserted before the current cursor position.
- void **remove_all_key_bindings** ()
Removes all of the key bindings associated with the text editor or list.
- void **remove_all_key_bindings** ([Key_Binding](#) **list)
Removes all of the key bindings associated with the text editor or list.
- void **remove_key_binding** (int key, int state)
Removes the key binding associated with the key "key" of state "state".
- void **remove_key_binding** (int key, int state, [Key_Binding](#) **list)
Removes the key binding associated with the key key of state state from the Key_Binding list list.
- int **tab_nav** () const
Check if Tab focus navigation is enabled.
- void **tab_nav** (int val)
Enables or disables Tab key focus navigation.

Public Member Functions inherited from Fl_Text_Display

- [Fl_Text_Buffer](#) * **buffer** () const
Gets the current text buffer associated with the text widget.
- void **buffer** ([Fl_Text_Buffer](#) &buf)
Sets the current text buffer associated with the text widget.
- void **buffer** ([Fl_Text_Buffer](#) *buf)
Attach a text buffer to display, replacing the current buffer (if any).

- double `col_to_x` (double col) const
Convert a column number into an x pixel position.
- int `count_lines` (int start, int end, bool start_pos_is_line_start) const
Count the number of lines between two positions.
- `FI_Color cursor_color` () const
Gets the text cursor color.
- void `cursor_color` (`FI_Color` n)
Sets the text cursor color.
- int `cursor_style` () const
- void `cursor_style` (int style)
Sets the text cursor style.
- `FI_Text_Display` (int X, int Y, int W, int H, const char *l=0)
Creates a new text display widget.
- `FI_Color grammar_underline_color` () const
Gets the underline color for style attribute ATTR_GRAMMAR.
- void `grammar_underline_color` (`FI_Color` color)
Sets the underline color for style attribute ATTR_GRAMMAR.
- void `hide_cursor` ()
Hides the text cursor.
- void `highlight_data` (`FI_Text_Buffer` *styleBuffer, const `Style_Table_Entry` *styleTable, int nStyles, char unfinishedStyle, Unfinished_Style_Cb unfinishedHighlightCB, void *cbArg)
Attach (or remove) highlight information in text display and redisplay.
- int `in_selection` (int x, int y) const
Check if a pixel position is within the primary selection.
- void `insert` (const char *text)
Inserts "text" at the current cursor location.
- int `insert_position` () const
Gets the position of the text insertion cursor for text display.
- void `insert_position` (int newPos)
Sets the position of the text insertion cursor for text display.
- int `line_end` (int startPos, bool startPosIsLineStart) const
Returns the end of a line.
- int `line_start` (int pos) const
Return the beginning of a line.
- `FI_Align linenumber_align` () const
Returns the alignment used for line numbers (if enabled).
- void `linenumber_align` (`FI_Align` val)
Set alignment for line numbers (if enabled).
- `FI_Color linenumber_bgcolor` () const
Returns the background color used for line numbers (if enabled).
- void `linenumber_bgcolor` (`FI_Color` val)
Set the background color used for line numbers (if enabled).
- `FI_Color linenumber_fgcolor` () const
Return the foreground color used for line numbers (if enabled).
- void `linenumber_fgcolor` (`FI_Color` val)
Set the foreground color used for line numbers (if enabled).
- `FI_Font linenumber_font` () const
Return the font used for line numbers (if enabled).
- void `linenumber_font` (`FI_Font` val)
Set the font used for line numbers (if enabled).
- const char * `linenumber_format` () const

- Returns the line number printf() format string.*

 - void `linenumber_format` (const char *val)

Sets the printf() style format string used for line numbers.
- `FI_Fontsize linenumber_size` () const

Return the font size used for line numbers (if enabled).
- void `linenumber_size` (`FI_Fontsize` val)

Set the font size used for line numbers (if enabled).
- int `linenumber_width` () const

Return the screen area width provided for line numbers.
- void `linenumber_width` (int width)

Set width of screen area for line numbers.
- int `move_down` ()

Moves the current insert position down one line.
- int `move_left` ()

Moves the current insert position left one character.
- int `move_right` ()

Moves the current insert position right one character.
- int `move_up` ()

Moves the current insert position up one line.
- void `next_word` (void)

Moves the current insert position right one word.
- void `overstrike` (const char *text)

Replaces text at the current insert position.
- int `position_style` (int lineStartPos, int lineLen, int lineIndex) const

Find the correct style for a character.
- int `position_to_xy` (int pos, int *x, int *y) const

Convert a character index into a pixel position.
- void `previous_word` (void)

Moves the current insert position left one word.
- virtual void `recalc_display` ()

Recalculate the display's visible lines and scrollbar sizes.
- void `redisplay_range` (int start, int end)

Marks text from start to end as needing a redraw.
- void `resize` (int X, int Y, int W, int H) `FL_OVERRIDE`

Change the size of the displayed text area.
- int `rewind_lines` (int startPos, int nLines)

Skip a number of lines back.
- void `scroll` (int topLineNum, int horizOffset)

Scrolls the current buffer to start at the specified line and column.
- `FI_Align scrollbar_align` () const

Gets the scrollbar alignment type.
- void `scrollbar_align` (`FI_Align` a)

Sets the scrollbar alignment type.
- int `scrollbar_size` () const

Gets the current size of the scrollbars' troughs, in pixels.
- void `scrollbar_size` (int newSize)

Sets the pixel size of the scrollbars' troughs to newSize, in pixels.
- int `scrollbar_width` () const

Returns the global value `FI::scrollbar_size()` unless a specific `scrollbar_width_` has been set.
- void `scrollbar_width` (int width)

Sets the global `FI::scrollbar_size()`, and forces this instance of the widget to use it.

- [FI_Color secondary_selection_color](#) () const
Gets the background color for the secondary selection block.
- void [secondary_selection_color](#) ([FI_Color color](#))
Sets the background color for the secondary selection block.
- int [shortcut](#) () const
- void [shortcut](#) (int s)
- void [show_cursor](#) (int b=1)
Shows the text cursor.
- void [show_insert_position](#) ()
Scrolls the text buffer to show the current insert position.
- int [skip_lines](#) (int startPos, int nLines, bool startPosIsLineStart)
Skip a number of lines forward.
- [FI_Color spelling_underline_color](#) () const
Gets the underline color for style attribute ATTR_SPELLING.
- void [spelling_underline_color](#) ([FI_Color color](#))
Sets the underline color for style attribute ATTR_SPELLING.
- [FI_Text_Buffer * style_buffer](#) () const
Gets the current style buffer associated with the text widget.
- [FI_Color textcolor](#) () const
Gets the default color of text in the widget.
- void [textcolor](#) ([FI_Color n](#))
Sets the default color of text in the widget.
- [FI_Font textfont](#) () const
Gets the default font used when drawing text in the widget.
- void [textfont](#) ([FI_Font s](#))
Sets the default font used when drawing text in the widget.
- [FI_Fontsize textsize](#) () const
Gets the default size of text in the widget.
- void [textsize](#) ([FI_Fontsize s](#))
Sets the default size of text in the widget.
- int [word_end](#) (int pos) const
Moves the insert position to the end of the current word.
- int [word_start](#) (int pos) const
Moves the insert position to the beginning of the current word.
- void [wrap_mode](#) (int wrap, int wrap_margin)
Set the new text wrap mode.
- int [wrapped_column](#) (int row, int column) const
Nobody knows what this function does.
- int [wrapped_row](#) (int row) const
Nobody knows what this function does.
- double [x_to_col](#) (double x) const
Convert an x pixel position into a column number.
- [~FI_Text_Display](#) ()
Free a text display and release its associated memory.

Public Member Functions inherited from FL_Group

- [FL_Widget](#) * & [_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FL_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FL_Widget](#) *o)
See void [FL_Group::add\(FL_Widget &w\)](#)
- void [add_resizable](#) ([FL_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FL_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FL_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FL_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an [FL_Group](#) pointer if this widget is an [FL_Group](#).
- void [begin](#) ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FL_Widget](#) * [child](#) (int n) const
Returns [array\(\)\[n\]](#).
- int [children](#) () const
Returns how many child widgets the group has.
- void [clear](#) ()
Deletes all child widgets from memory recursively.
- unsigned int [clip_children](#) ()
Returns the current clipping mode.
- void [clip_children](#) (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int [delete_child](#) (int n)
*Removes the widget at *index* from the group and deletes it.*
- void [end](#) ()
Exactly the same as [current\(this->parent\(\)\)](#).
- int [find](#) (const [FL_Widget](#) &o) const
*See int [FL_Group::find\(const FL_Widget *w\) const](#).*
- int [find](#) (const [FL_Widget](#) *) const
Searches the child array for the widget and returns the index.
- [FL_Group](#) (int, int, int, int, const char * = 0)
Creates a new [FL_Group](#) widget using the given position, size, and label string.
- void [focus](#) ([FL_Widget](#) *W)
- void [forms_end](#) ()
This is for forms compatibility only.
- void [init_sizes](#) ()
Resets the internal array of widget sizes and positions.
- void [insert](#) ([FL_Widget](#) &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void [insert](#) ([FL_Widget](#) &o, [FL_Widget](#) *before)
This does [insert\(w, find\(before\)\)](#).
- void [remove](#) ([FL_Widget](#) &)
Removes a widget from the group but does not delete it.
- void [remove](#) ([FL_Widget](#) *o)
Removes the widget o from the group.
- void [remove](#) (int index)

- Removes the widget at `index` from the group but does not delete it.*
- `FI_Widget * resizable () const`
Returns the group's resizable widget.
- `void resizable (FI_Widget &o)`
Sets the group's resizable widget.
- `void resizable (FI_Widget *o)`
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FI_Group ()`
The destructor also deletes all the children.

Public Member Functions inherited from `FI_Widget`

- `void _clear_fullscreen ()`
- `void _set_fullscreen ()`
- `void activate ()`
Activates the widget.
- `unsigned int active () const`
Returns whether the widget is active.
- `int active_r () const`
Returns whether the widget and all of its parents are active.
- `FI_Align align () const`
Gets the label alignment.
- `void align (FI_Align alignment)`
Sets the label alignment.
- `long argument () const`
Gets the current user data (long) argument that is passed to the callback function.
- `void argument (long v)`
Sets the current user data (long) argument that is passed to the callback function.
- `virtual class FI_Gl_Window * as_gl_window ()`
Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- `virtual class FI_Gl_Window const * as_gl_window () const`
- `virtual FI_Window * as_window ()`
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- `virtual FI_Window const * as_window () const`
- `void bind_deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- `void bind_deimage (int f)`
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- `void bind_image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- `void bind_image (int f)`
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box () const`
Gets the box type of the widget.
- `void box (FI_Boxtype new_box)`
Sets the box type for the widget.
- `FI_Callback_p callback () const`
Gets the current callback function for the widget.
- `void callback (FI_Callback *cb)`
Sets the current callback function for the widget.
- `void callback (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)`

- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback *cb`, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0 *cb`)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1 *cb`, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar c=0`)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color bg`)
- Sets the background color of the widget.*

 - void `color` (`FI_Color bg`, `FI_Color sel`)
- Sets the background and selection color of the widget.*

 - `FI_Color color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget *w`) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar c`)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar c`, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FI_Image * deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FI_Image * deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

- void `deimage (FI_Image &img)`
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage (FI_Image *img)`
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound ()` const
Returns whether the inactive image is managed by the widget.
- void `do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with default arguments.
- void `do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`
Calls the widget callback function with arbitrary arguments.
- void `draw_label (int, int, int, int, FI_Align) const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h ()` const
Gets the widget height.
- virtual void `hide ()`
Makes a widget invisible.
- `FI_Image * image ()`
Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image * image ()` const
Gets the image that is used as part of the widget label when in the active state.
- void `image (FI_Image &img)`
Sets the image to use as part of the widget label when in the active state.
- void `image (FI_Image *img)`
Sets the image to use as part of the widget label when in the active state.
- int `image_bound ()` const
Returns whether the image is managed by the widget.
- int `inside (const FI_Widget *wgt) const`
Checks if this widget is a child of wgt.
- int `is_label_copied ()` const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label ()` const
Gets the current label text.
- void `label (const char *text)`
Sets the current label pointer.
- void `label (FI_Labeltype a, const char *b)`
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor ()` const
Gets the label color.
- void `labelcolor (FI_Color c)`
Sets the label color.
- `FI_Font labelfont ()` const
Gets the font to use.
- void `labelfont (FI_Font f)`
Sets the font to use.
- `FI_Fontsize labelsize ()` const
Gets the font size in pixels.
- void `labelsize (FI_Fontsize pix)`
Sets the font size in pixels.
- `FI_Labeltype labeltype ()` const

- Gets the label type.*

 - void `labeltype` (`FI_Labeltype` a)
- Sets the label type.*

 - void `measure_label` (int &ww, int &hh) const

Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const

Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)

Sets whether this widget needs a keyboard.
- unsigned int `output` () const

Returns if a widget is used for output only.
- `FI_Group` * `parent` () const

Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)

Internal use only - "for hacks only".
- void `position` (int X, int Y)

Repositions the window or widget.
- void `redraw` ()

Schedules the drawing of the widget.
- void `redraw_label` ()

Schedules the drawing of the label.
- `FI_Color` `selection_color` () const

Gets the selection color.
- void `selection_color` (`FI_Color` a)

Sets the selection color.
- void `set_active` ()

Marks the widget as active without sending events or changing focus.
- void `set_changed` ()

Marks the value of the widget as changed.
- void `set_output` ()

Sets a widget to output only.
- void `set_visible` ()

Makes the widget visible.
- void `set_visible_focus` ()

Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const

Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()

Makes a widget visible.
- void `size` (int W, int H)

Changes the size of the widget.
- int `take_focus` ()

Gives the widget the keyboard focus.
- unsigned int `takeevents` () const

Returns if the widget is able to take events.
- int `test_shortcut` ()

Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

Gets the current tooltip text.

- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (uchar t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When when` () const
Returns the conditions under which the callback is called.
- void `when` (uchar i)
Sets the flags used to decide when a callback is called.
- `FI_Window * window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Static Public Member Functions

- static int `kf_backspace` (int c, `FI_Text_Editor` *e)
Does a backspace for key 'c' in the current buffer of editor 'e'.
- static int `kf_c_s_move` (int c, `FI_Text_Editor` *e)
Extends the current selection in the direction indicated by control key 'c' in editor 'e'.
- static int `kf_copy` (int c, `FI_Text_Editor` *e)
Does a copy of selected text or the current character in the current buffer of editor 'e'.
- static int `kf_ctrl_move` (int c, `FI_Text_Editor` *e)
Moves the current text cursor in the direction indicated by control key 'c' in editor 'e'.

- static int `kf_cut` (int c, `Fl_Text_Editor *e`)
Does a cut of selected text in the current buffer of editor 'e'.
- static int `kf_default` (int c, `Fl_Text_Editor *e`)
Inserts the text associated with key 'c' in editor 'e'.
- static int `kf_delete` (int c, `Fl_Text_Editor *e`)
Does a delete of selected text or the current character in the current buffer of editor 'e'.
- static int `kf_down` (int c, `Fl_Text_Editor *e`)
Moves the text cursor one line down for editor 'e'.
- static int `kf_end` (int c, `Fl_Text_Editor *e`)
Moves the text cursor to the end of the current line in editor 'e'.
- static int `kf_enter` (int c, `Fl_Text_Editor *e`)
Inserts a newline for key 'c' at the current cursor position in editor 'e'.
- static int `kf_home` (int, `Fl_Text_Editor *e`)
Moves the text cursor to the beginning of the current line in editor 'e'.
- static int `kf_ignore` (int c, `Fl_Text_Editor *e`)
Ignores the key 'c' in editor 'e'.
- static int `kf_insert` (int c, `Fl_Text_Editor *e`)
Toggles the insert mode for editor 'e'.
- static int `kf_left` (int c, `Fl_Text_Editor *e`)
Moves the text cursor one character to the left in editor 'e'.
- static int `kf_m_s_move` (int c, `Fl_Text_Editor *e`)
Extends the current selection in the direction indicated by meta key 'c' in editor 'e'.
- static int `kf_meta_move` (int c, `Fl_Text_Editor *e`)
Moves the current text cursor in the direction indicated by meta key 'c' in editor 'e'.
- static int `kf_move` (int c, `Fl_Text_Editor *e`)
Moves the text cursor in the direction indicated by key 'c' in editor 'e'.
- static int `kf_page_down` (int c, `Fl_Text_Editor *e`)
Moves the text cursor down one page for editor 'e'.
- static int `kf_page_up` (int c, `Fl_Text_Editor *e`)
Moves the text cursor up one page for editor 'e'.
- static int `kf_paste` (int c, `Fl_Text_Editor *e`)
Does a paste of selected text in the current buffer of editor 'e'.
- static int `kf_redo` (int c, `Fl_Text_Editor *e`)
Redo last undo action.
- static int `kf_right` (int c, `Fl_Text_Editor *e`)
Moves the text cursor one character to the right for editor 'e'.
- static int `kf_select_all` (int c, `Fl_Text_Editor *e`)
Selects all text in the current buffer in editor 'e'.
- static int `kf_shift_move` (int c, `Fl_Text_Editor *e`)
Extends the current selection in the direction of key 'c' in editor 'e'.
- static int `kf_undo` (int c, `Fl_Text_Editor *e`)
Undo last edit in the current buffer of editor 'e'.
- static int `kf_up` (int c, `Fl_Text_Editor *e`)
Moves the text cursor one line up for editor 'e'.

Static Public Member Functions inherited from `Fl_Group`

- static `Fl_Group * current` ()
Returns the currently active group.
- static void `current` (`Fl_Group *g`)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Member Functions

- int [handle_key](#) ()
Handles a key press in the editor.
- void [maybe_do_callback](#) ([FI_Callback_Reason](#) reason=FL_REASON_CHANGED)
does or does not a callback according to [changed\(\)](#) and [when\(\)](#) settings

Protected Member Functions inherited from [FI_Text_Display](#)

- void [absolute_top_line_number](#) (int oldFirstChar)
Re-calculate absolute top line number for a change in scroll position.
- void [calc_last_char](#) ()
Update last display character index.
- void [calc_line_starts](#) (int startLine, int endLine)
Update the line starts array.
- void [clear_rect](#) (int style, int x, int y, int width, int height) const
*Clear a rectangle with the appropriate background color for *style*.*
- void [display_insert](#) ()
Scroll the display to bring insertion cursor into view.
- void [draw](#) () [FL_OVERRIDE](#)
Draw the widget.
- void [draw_cursor](#) (int, int)
Draw a cursor with top center at X, Y.
- void [draw_line_numbers](#) (bool clearAll)
Refresh the line number area.
- void [draw_range](#) (int start, int end)
Draw a range of text.
- void [draw_string](#) (int style, int x, int y, int toX, const char *string, int nChars) const
Draw a text segment in a single style.
- void [draw_text](#) (int X, int Y, int W, int H)
Refresh a rectangle of the text display.
- void [draw_vline](#) (int visLineNum, int leftClip, int rightClip, int leftCharIndex, int rightCharIndex)
Draw a single line of text.
- int [empty_vlines](#) () const
Return true if there are lines visible with no corresponding buffer text.
- void [extend_range_for_styles](#) (int *start, int *end)
I don't know what this does!
- void [find_line_end](#) (int pos, bool start_pos_is_line_start, int *lineEnd, int *nextLineStart) const
Finds both the end of the current line and the start of the next line.
- void [find_wrap_range](#) (const char *deletedText, int pos, int nInserted, int nDeleted, int *modRangeStart, int *modRangeEnd, int *linesInserted, int *linesDeleted)
Wrapping calculations.
- int [find_x](#) (const char *s, int len, int style, int x) const

- Find the index of the character that lies at the given x position / closest cursor position.*

 - int `get_absolute_top_line_number` () const
Returns the absolute (non-wrapped) line number of the first line displayed.
- int `handle_rmb` (int readonly)
Handle right mouse button down events.
- int `handle_vline` (int mode, int lineStart, int lineLen, int leftChar, int rightChar, int topClip, int bottomClip, int leftClip, int rightClip) const
Universal pixel machine.
- int `longest_vline` () const
Find the longest line of all visible lines.
- void `maintain_absolute_top_line_number` (int state)
Line numbering stuff, currently unused.
- int `maintaining_absolute_top_line_number` () const
Returns true if a separate absolute top line number is being maintained.
- void `measure_deleted_lines` (int pos, int nDeleted)
Wrapping calculations.
- double `measure_proportional_character` (const char *s, int colNum, int pos) const
Wrapping calculations.
- int `measure_vline` (int visLineNum) const
Returns the width in pixels of the displayed line pointed to by "visLineNum".
- void `offset_line_starts` (int newTopLineNum)
Offset line start counters for a new vertical scroll position.
- int `position_to_line` (int pos, int *lineNum) const
Convert a position index into a line number offset.
- int `position_to_linecol` (int pos, int *lineNum, int *column) const
Find the line and column number of position pos.
- void `reset_absolute_top_line_number` ()
Reestablish the absolute (non-wrapped) top line number.
- int `scroll_` (int topLineNum, int horizOffset)
Scrolls the current buffer to start at the specified line and column.
- double `string_width` (const char *string, int length, int style) const
Find the width of a string in the font of a particular style.
- void `update_h_scrollbar` ()
Update horizontal scrollbar.
- void `update_line_starts` (int pos, int charsInserted, int charsDeleted, int linesInserted, int linesDeleted, int *scrolled)
Update line start arrays and variables.
- void `update_v_scrollbar` ()
Update vertical scrollbar.
- int `vline_length` (int visLineNum) const
Count number of bytes in a visible line.
- int `wrap_uses_character` (int lineEndPos) const
Check if the line break is caused by a newline or by line wrapping.
- void `wrapped_line_counter` (FI_Text_Buffer *buf, int startPos, int maxPos, int maxLines, bool startPosIs↵ LineStart, int styleBufOffset, int *retPos, int *retLines, int *retLineStart, int *retLineEnd, bool countLast↵ LineMissingNewLine=true) const
Wrapping calculations.
- int `xy_to_position` (int x, int y, int PosType=CHARACTER_POS) const
Translate a pixel position into a character index.
- void `xy_to_rowcol` (int x, int y, int *row, int *column, int PosType=CHARACTER_POS) const
Translate pixel coordinates into row and column.

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * [bounds](#) ()
Returns the internal array of widget sizes and positions.
- void [draw_child](#) ([FI_Widget](#) &widget) const
Forces a child to redraw.
- void [draw_children](#) ()
Draws all children of the group.
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int [on_insert](#) ([FI_Widget](#) *, int)
Allow derived groups to act when a widget is added as a child.
- virtual int [on_move](#) (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void [on_remove](#) (int)
Allow derived groups to act when a child widget is removed from the group.
- int * [sizes](#) ()
Returns the internal array of widget sizes and positions.
- void [update_child](#) ([FI_Widget](#) &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int [flags](#) () const
Gets the widget flags mask.
- void [h](#) (int v)
Internal use only.
- void [set_flag](#) (unsigned int c)
Sets a flag in the flags mask.
- void [w](#) (int v)

Internal use only.

- void `x` (int `v`)

Internal use only.

- void `y` (int `v`)

Internal use only.

Static Protected Attributes

- static `Key_Binding * global_key_bindings`

Global key binding list.

Additional Inherited Members

Protected Types inherited from `FI_Text_Display`

- enum {
`DRAW_LINE` , `FIND_INDEX` , `FIND_INDEX_FROM_ZERO` , `GET_WIDTH` ,
`FIND_CURSOR_INDEX` }

Protected Types inherited from `FI_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }

flags possible values enumeration.

Static Protected Member Functions inherited from `FI_Text_Display`

- static void `buffer_modified_cb` (int `pos`, int `nInserted`, int `nDeleted`, int `nRestyled`, const char `*deletedText`, void `*cbArg`)

This is called whenever the buffer is modified.

- static void `buffer_predelete_cb` (int `pos`, int `nDeleted`, void `*cbArg`)

This is called before any characters are deleted.

- static void `h_scrollbar_cb` (`FI_Scrollbar *w`, `FI_Text_Display *d`)

Callback for drag or valueChanged on horizontal scrollbar.

- static void `scroll_timer_cb` (void `*`)

Timer callback for scroll events.

- static void `v_scrollbar_cb` (`FI_Scrollbar *w`, `FI_Text_Display *d`)

Callback for drag or valueChanged on vertical scrollbar.

Protected Attributes inherited from `FI_Text_Display`

- int `damage_range1_end`
- int `damage_range1_start`
- int `damage_range2_end`

- int **damage_range2_start**
- int **display_insert_position_hint**
- int **dragging**
- int **dragPos**
- int **dragType**
- [FI_Color](#) **grammar_underline_color_**
- [FI_Align](#) **linenumber_align_**
- [FI_Color](#) **linenumber_bgcolor_**
- [FI_Color](#) **linenumber_fgcolor_**
- [FI_Font](#) **linenumber_font_**
- const char * **linenumber_format_**
- [FI_Fontsize](#) **linenumber_size_**
- int **mAbsTopLineNum**
- [FI_Text_Buffer](#) * **mBuffer**
- double **mColumnScale**
- int **mContinuousWrap**
- [FI_Color](#) **mCursor_color**
- int **mCursorOldY**
- int **mCursorOn**
- int **mCursorPos**
- int **mCursorPreferredXPos**
- int **mCursorStyle**
- int **mCursorToHint**
- int **mFirstChar**
- void * **mHighlightCBArg**
- int **mHorizOffset**
- int **mHorizOffsetHint**
- [FI_Scrollbar](#) * **mHScrollBar**
- int **mLastChar**
- int **mLineNumLeft**
- int **mLineNumWidth**
- int * **mLineStarts**
- int **mMaxsize**
- int **mModifyingTabDistance**
- int **mNBufferLines**
- int **mNeedAbsTopLineNum**
- int **mNLinesDeleted**
- int **mNStyles**
- int **mNVisibleLines**
- [FI_Text_Buffer](#) * **mStyleBuffer**
- const [Style_Table_Entry](#) * **mStyleTable**
- int **mSuppressResync**
- int **mTopLineNum**
- int **mTopLineNumHint**
- Unfinished_Style_Cb **mUnfinishedHighlightCB**
- char **mUnfinishedStyle**
- [FI_Scrollbar](#) * **mVScrollBar**
- int **mWrapMarginPix**
- [FI_Align](#) **scrollbar_align_**
- int **scrollbar_width_**
- [FI_Color](#) **secondary_selection_color_**
- int **shortcut_**
- [FI_Color](#) **spelling_underline_color_**

- struct {
 - int **h**
 - int **w**
 - int **x**
 - int **y**
 } **text_area**
- [Fl_Color](#) **textcolor_**
- [Fl_Font](#) **textfont_**
- [Fl_Fontsize](#) **textsize_**

12.144.1 Detailed Description

This is the FLTK text editor widget.

It allows the user to edit multiple lines of text and supports highlighting and scrolling. The buffer that is displayed in the widget is managed by the [Fl_Text_Buffer](#) class.

12.144.2 Member Function Documentation

12.144.2.1 add_key_binding()

```
void Fl_Text_Editor::add_key_binding (
    int key,
    int state,
    Key_Func function,
    Key_Binding ** list )
```

Adds a key of state *state* with the function *function* to an arbitrary key binding list *list*.

This can be used in derived classes to add global key bindings by using the global (static) [Key_Binding](#) list [Fl_Text_Editor::global_key_bindings](#).

12.144.2.2 handle()

```
int Fl_Text_Editor::handle (
    int e ) [virtual]
```

Event handling.

Reimplemented from [Fl_Text_Display](#).

12.144.2.3 insert_mode() [1/2]

```
int Fl_Text_Editor::insert_mode ( ) [inline]
```

Gets the current insert mode; if non-zero, new text is inserted before the current cursor position. Otherwise, new text replaces text at the current cursor position.

12.144.2.4 insert_mode() [2/2]

```
void Fl_Text_Editor::insert_mode (
    int b ) [inline]
```

Sets the current insert mode; if non-zero, new text is inserted before the current cursor position. Otherwise, new text replaces text at the current cursor position.

12.144.2.5 kf_backspace()

```
int Fl_Text_Editor::kf_backspace (
    int c,
    Fl_Text_Editor * e ) [static]
```

Does a backspace for key 'c' in the current buffer of editor 'e'.

Any current selection is deleted. Otherwise, the character left is deleted and the cursor moved. The key value 'c' is currently unused.

12.144.2.6 kf_c_s_move()

```
int Fl_Text_Editor::kf_c_s_move (
    int c,
    Fl_Text_Editor * e ) [static]
```

Extends the current selection in the direction indicated by control key 'c' in editor 'e'.

See also

[kf_ctrl_move\(\)](#).

12.144.2.7 kf_copy()

```
int Fl_Text_Editor::kf_copy (
    int c,
    Fl_Text_Editor * e ) [static]
```

Does a copy of selected text or the current character in the current buffer of editor 'e'.
The key value 'c' is currently unused.

12.144.2.8 kf_ctrl_move()

```
int Fl_Text_Editor::kf_ctrl_move (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the current text cursor in the direction indicated by control key 'c' in editor 'e'.

Supported values for 'c' are currently:

```
FL_Home    -- moves the cursor to the beginning of the document
FL_End     -- moves the cursor to the end of the document
FL_Left    -- moves the cursor left one word
FL_Right   -- moves the cursor right one word
FL_Up      -- scrolls up one line, without moving cursor
FL_Down    -- scrolls down one line, without moving cursor
FL_Page_Up -- moves the cursor to the beginning of the top line on the current page
FL_Page_Down -- moves the cursor to the beginning of the last line on the current page
```

12.144.2.9 kf_cut()

```
int Fl_Text_Editor::kf_cut (
    int c,
    Fl_Text_Editor * e ) [static]
```

Does a cut of selected text in the current buffer of editor 'e'.

The key value 'c' is currently unused.

12.144.2.10 kf_default()

```
int Fl_Text_Editor::kf_default (
    int c,
    Fl_Text_Editor * e ) [static]
```

Inserts the text associated with key 'c' in editor 'e'.

Honors the current selection and insert/overstrike mode.

12.144.2.11 kf_delete()

```
int Fl_Text_Editor::kf_delete (
    int c,
    Fl_Text_Editor * e ) [static]
```

Does a delete of selected text or the current character in the current buffer of editor 'e'.

The key value 'c' is currently unused.

12.144.2.12 kf_down()

```
int Fl_Text_Editor::kf_down (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor one line down for editor 'e'.

Same as kf_move(FL_Down, e). The key value 'c' is currently unused.

12.144.2.13 kf_end()

```
int Fl_Text_Editor::kf_end (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor to the end of the current line in editor 'e'.

Same as kf_move(FL_End, e). The key value 'c' is currently unused.

12.144.2.14 kf_enter()

```
int Fl_Text_Editor::kf_enter (
    int c,
    Fl_Text_Editor * e ) [static]
```

Inserts a newline for key 'c' at the current cursor position in editor 'e'.

The key value 'c' is currently unused.

12.144.2.15 kf_home()

```
int Fl_Text_Editor::kf_home (
    int ,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor to the beginning of the current line in editor 'e'.

Same as kf_move(FL_Home, e). The key value 'c' is currently unused.

12.144.2.16 kf_ignore()

```
int Fl_Text_Editor::kf_ignore (
    int c,
    Fl_Text_Editor * e ) [static]
```

Ignores the key 'c' in editor 'e'.

This method can be used as a keyboard binding to disable a key that might otherwise be handled or entered as text.

An example would be disabling FL_Escape, so that it isn't added to the buffer when invoked by the user.

12.144.2.17 kf_insert()

```
int Fl_Text_Editor::kf_insert (
    int c,
    Fl_Text_Editor * e ) [static]
```

Toggles the insert mode for editor 'e'.

The key value 'c' is currently unused.

12.144.2.18 kf_left()

```
int Fl_Text_Editor::kf_left (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor one character to the left in editor 'e'.

Same as kf_move(FL_Left, e). The key value 'c' is currently unused.

12.144.2.19 kf_m_s_move()

```
int Fl_Text_Editor::kf_m_s_move (
    int c,
    Fl_Text_Editor * e ) [static]
```

Extends the current selection in the direction indicated by meta key 'c' in editor 'e'.

See also

[kf_meta_move\(\)](#).

12.144.2.20 kf_meta_move()

```
int Fl_Text_Editor::kf_meta_move (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the current text cursor in the direction indicated by meta key 'c' in editor 'e'.

Supported values for 'c' are currently:

```
FL_Up      -- moves cursor to the beginning of the current document
FL_Down    -- moves cursor to the end of the current document
FL_Left    -- moves the cursor to the beginning of the current line
FL_Right   -- moves the cursor to the end of the current line
```

12.144.2.21 kf_move()

```
int Fl_Text_Editor::kf_move (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor in the direction indicated by key 'c' in editor 'e'.

Supported values for 'c' are currently:

```
FL_Home    -- moves the cursor to the beginning of the current line
FL_End     -- moves the cursor to the end of the current line
FL_Left    -- moves the cursor left one character
FL_Right   -- moves the cursor right one character
FL_Up      -- moves the cursor up one line
FL_Down    -- moves the cursor down one line
FL_Page_Up -- moves the cursor up one page
FL_Page_Down -- moves the cursor down one page
```

12.144.2.22 kf_page_down()

```
int Fl_Text_Editor::kf_page_down (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor down one page for editor 'e'.

Same as `kf_move(FL_Page_Down, e)`. The key value 'c' is currently unused.

12.144.2.23 kf_page_up()

```
int Fl_Text_Editor::kf_page_up (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor up one page for editor 'e'.

Same as `kf_move(FL_Page_Up, e)`. The key value 'c' is currently unused.

12.144.2.24 kf_paste()

```
int Fl_Text_Editor::kf_paste (
    int c,
    Fl_Text_Editor * e ) [static]
```

Does a paste of selected text in the current buffer of editor 'e'.

Any current selection is replaced with the pasted content. The key value 'c' is currently unused.

12.144.2.25 kf_redo()

```
int Fl_Text_Editor::kf_redo (
    int c,
    Fl_Text_Editor * e ) [static]
```

Redo last undo action.

Also deselects previous selection. The key value 'c' is currently unused.

12.144.2.26 kf_right()

```
int Fl_Text_Editor::kf_right (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor one character to the right for editor 'e'.

Same as `kf_move(FL_Right, e)`. The key value 'c' is currently unused.

12.144.2.27 kf_select_all()

```
int Fl_Text_Editor::kf_select_all (
    int c,
    Fl_Text_Editor * e ) [static]
```

Selects all text in the current buffer in editor 'e'.

The key value 'c' is currently unused.

12.144.2.28 kf_shift_move()

```
int Fl_Text_Editor::kf_shift_move (
    int c,
    Fl_Text_Editor * e ) [static]
```

Extends the current selection in the direction of key 'c' in editor 'e'.

See also

[kf_move\(\)](#)

12.144.2.29 kf_undo()

```
int Fl_Text_Editor::kf_undo (
    int c,
    Fl_Text_Editor * e ) [static]
```

Undo last edit in the current buffer of editor 'e'.

Also deselects previous selection. The key value 'c' is currently unused.

12.144.2.30 kf_up()

```
int Fl_Text_Editor::kf_up (
    int c,
    Fl_Text_Editor * e ) [static]
```

Moves the text cursor one line up for editor 'e'.

Same as `kf_move(FL_Up, e)`. The key value 'c' is currently unused.

12.144.2.31 remove_key_binding()

```
void Fl_Text_Editor::remove_key_binding (
    int key,
    int state,
    Key_Binding ** list )
```

Removes the key binding associated with the key `key` of state `state` from the [Key_Binding](#) list `list`.

This can be used in derived classes to remove global key bindings by using the global (static) [Key_Binding](#) list `Fl_Text_Editor::global_key_bindings`.

12.144.2.32 `tab_nav()` [1/2]

```
int Fl_Text_Editor::tab_nav ( ) const
```

Check if Tab focus navigation is enabled.

If disabled (default), hitting Tab inserts a tab character into the editor buffer.

If enabled, hitting Tab navigates focus to the next widget, and Shift-Tab navigates focus to the previous widget.

Returns

if Tab inserts tab characters or moves the focus

Return values

0	Tab inserts tab characters (default)
1	Tab navigation is enabled.

See also

[tab_nav\(int\), Fl::OPTION_ARROW_FOCUS.](#)

Version

1.3.4 ABI feature

12.144.2.33 `tab_nav()` [2/2]

```
void Fl_Text_Editor::tab_nav (
    int val )
```

Enables or disables Tab key focus navigation.

When disabled (default), tab characters are inserted into [Fl_Text_Editor](#). Only the mouse can change focus. This behavior is desirable when [Fl_Text_Editor](#) is used, e.g. in a source code editor.

When enabled, Tab navigates focus to the next widget, and Shift-Tab navigates focus to the previous widget. This behavior is desirable when [Fl_Text_Editor](#) is used e.g. in a database input form.

Currently, this method is implemented as a convenience method that adjusts the key bindings for the Tab key. This implementation detail may change in the future. Know that changing the editor's key bindings for Tab and Shift-Tab may affect tab navigation.

Parameters

in	<i>val</i>	If <i>val</i> is 0, Tab inserts a tab character (default). If <i>val</i> is 1, Tab navigates widget focus.
----	------------	---

See also

[tab_nav\(\)](#), [Fl::OPTION_ARROW_FOCUS.](#)

Version

1.3.4 ABI feature

12.144.3 Member Data Documentation**12.144.3.1** `global_key_bindings`

```
Key_Binding* Fl_Text_Editor::global_key_bindings [static], [protected]
```

Global key binding list.

Derived classes can add key bindings for all [Fl_Text_Editor](#) widgets by adding a [Key_Binding](#) to this list.

See also

```
add_key_binding(int key, int state, Key_Func f, Key_Binding** list);
```

The documentation for this class was generated from the following files:

- FI_Text_Editor.H
- FI_Text_Editor.cxx

12.145 FI_Text_Selection Class Reference

This is an internal class for [FI_Text_Buffer](#) to manage text selections.

```
#include <FI_Text_Buffer.H>
```

Public Member Functions

- int [end](#) () const
Returns the byte offset to the character after the last selected character.
- int [includes](#) (int pos) const
Returns true if position `pos` is in the [FI_Text_Selection](#).
- int [length](#) () const
Returns the size in bytes of the selection.
- int [position](#) (int *startpos, int *endpos) const
- bool [selected](#) () const
Returns true if any text is selected.
- void [selected](#) (bool b)
Modifies the 'selected' flag.
- int [selected](#) (int *startpos, int *endpos) const
Returns the status and the positions of this selection.
- void [set](#) (int startpos, int endpos)
Sets the selection range.
- int [start](#) () const
Returns the byte offset to the first selected character.
- void [update](#) (int pos, int nDeleted, int nInserted)
Updates a selection after text was modified.

Protected Attributes

- int **mEnd**
byte offset to the character after the last selected character
- bool **mSelected**
this flag is set if any text is selected
- int **mStart**
byte offset to the first selected character

Friends

- class [FI_Text_Buffer](#)

12.145.1 Detailed Description

This is an internal class for [Fl_Text_Buffer](#) to manage text selections.

All methods use byte (not UTF-8 character) offsets and start at 0. This class works correctly with UTF-8 strings assuming that the parameters for all calls are on character boundaries.

If the selection is inactive (not currently used), then [selected\(\)](#) returns `false` and [start\(\)](#) and [end\(\)](#) return 0 (zero).

The stored offsets are in ascending order, hence the following conditions are true (pseudo code):

```
if ( !selected() ) : (start() == 0) && (end() == 0) && (start() == end())
if ( selected() ) : start() < end()
always           : 0 <= start() <= end()
always           : length() == end() - start()
```

The selection size in bytes can always (unconditionally) be computed by

```
int size = sel->end() - sel->start();
```

See also

[length\(\)](#)

Note

The **protected** member variables `mStart` and `mEnd` are not necessarily 0 (zero) if `mSelected == false` because they are not cleared when `selected(false)` is called (as of Jul 2017). This may be changed in the future.

12.145.2 Member Function Documentation

12.145.2.1 end()

```
int Fl_Text_Selection::end ( ) const [inline]
```

Returns the byte offset to the character after the last selected character.

The returned offset is only valid if [selected\(\)](#) returns true (non-zero). The offset is 0 if no text is selected (since FLTK 1.4.0).

Note

In FLTK 1.3.x the returned offset could be non-zero even if [selected\(\)](#) would have returned 0.

Returns

byte offset or 0 if not selected.

12.145.2.2 includes()

```
int Fl_Text_Selection::includes (
    int pos ) const
```

Returns true if position `pos` is in the [Fl_Text_Selection](#).

`pos` must be at a character boundary.

12.145.2.3 length()

```
int Fl_Text_Selection::length ( ) const [inline]
```

Returns the size in bytes of the selection.

This is a convenience method. It always returns the same as

```
end() - start()
```

and it returns 0 if [selected\(\) == false](#).

Returns

size in bytes or 0 if not selected.

Since

FLTK 1.4.0

12.145.2.4 position()

```
int Fl_Text_Selection::position (
    int * startpos,
    int * endpos ) const [inline]
```

Deprecated "in 1.4.0 - use selected(startpos, endpos) instead"

12.145.2.5 selected() [1/3]

```
bool Fl_Text_Selection::selected ( ) const [inline]
```

Returns true if any text is selected.

Returns

true if any text has been selected, or false if no text is selected.

12.145.2.6 selected() [2/3]

```
void Fl_Text_Selection::selected (
    bool b ) [inline]
```

Modifies the 'selected' flag.

Parameters

<i>b</i>	new flag
----------	----------

12.145.2.7 selected() [3/3]

```
int Fl_Text_Selection::selected (
    int * startpos,
    int * endpos ) const
```

Returns the status and the positions of this selection.

This method returns the same as [selected\(\)](#) as an int (0 or 1) in its return value and the offsets to the start of the selection in *startpos* and to the byte after the last selected character in *endpos*, if [selected\(\)](#) is true. If [selected\(\)](#) is false, both offsets are set to 0.

Note

In FLTK 1.3.x *startpos* and *endpos* were **not modified** if [selected\(\)](#) was false.

Parameters

<i>startpos</i>	return byte offset to first selected character
<i>endpos</i>	return byte offset pointing after last selected character

Returns

whether the selection is active ([selected\(\)](#)) or not

Return values

0	if not selected
1	if selected

See also

[selected\(\)](#), [start\(\)](#), [end\(\)](#)

12.145.2.8 set()

```
void Fl_Text_Selection::set (
    int startpos,
    int endpos )
```

Sets the selection range.

`startpos` and `endpos` must be at a character boundary.

If `startpos != endpos` [selected\(\)](#) is set to true, else to false.

If `startpos` is greater than `endpos` they are swapped so that `startpos <= endpos`.

Parameters

in	<i>startpos</i>	byte offset to first selected character
in	<i>endpos</i>	byte offset pointing after last selected character

12.145.2.9 start()

```
int Fl_Text_Selection::start ( ) const [inline]
```

Returns the byte offset to the first selected character.

The returned offset is only valid if [selected\(\)](#) returns true. If the selection is not valid the returned offset is 0 since FLTK 1.4.0.

Note

In FLTK 1.3.x the returned offset could be non-zero even if [selected\(\)](#) would have returned 0.

Returns

byte offset or 0 if not selected.

12.145.2.10 update()

```
void Fl_Text_Selection::update (
    int pos,
    int nDeleted,
    int nInserted )
```

Updates a selection after text was modified.

Updates an individual selection for changes in the corresponding text.

Parameters

<i>pos</i>	byte offset into text buffer at which the change occurred
<i>nDeleted</i>	number of bytes deleted from the buffer
<i>nInserted</i>	number of bytes inserted into the buffer

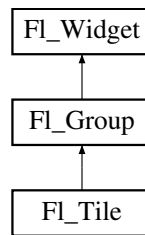
The documentation for this class was generated from the following files:

- [Fl_Text_Buffer.H](#)
- [Fl_Text_Buffer.cxx](#)

12.146 FI_Tile Class Reference

The [Fl_Tile](#) class lets you resize its children by dragging the border between them.

Inheritance diagram for FL_Tile:



Classes

- struct [Size_Range](#)

Public Member Functions

- virtual void [drag_intersection](#) (int oldx, int oldy, int newx, int newy)
Drags the intersection at (oldx,oldy) to (newx,newy).
- [FL_Tile](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new FL_Tile widget using the given position, size, and label string.
- int [handle](#) (int event) [FL_OVERRIDE](#)
Handles the specified event.
- void [init_size_range](#) (int default_min_w=-1, int default_min_h=-1)
Initialize the size range mode of FL_Tile and set the default minimum width and height.
- virtual void [move_intersection](#) (int oldx, int oldy, int newx, int newy)
Drags the intersection at (oldx,oldy) to (newx,newy).
- void [position](#) (int oldx, int oldy, int newx, int newy)
- void [position](#) (int x, int y)
- void [resize](#) (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Resizes the FL_Tile widget and its children.
- void [size_range](#) ([FL_Widget](#) *w, int minw, int minh, int maxw=0x7FFFFFFF, int maxh=0x7FFFFFFF)
Set the allowed size range for the give child widget.
- void [size_range](#) (int index, int minw, int minh, int maxw=0x7FFFFFFF, int maxh=0x7FFFFFFF)
Set the allowed size range for the child at the given index.
- ~[FL_Tile](#) () [FL_OVERRIDE](#)
Destructor.

Public Member Functions inherited from [FL_Group](#)

- [FL_Widget](#) *& [_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FL_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FL_Widget](#) *o)
See void FL_Group::add(FL_Widget &w)
- void [add_resizable](#) ([FL_Widget](#) &o)
Adds a widget to the group and makes it the resizable widget.
- [FL_Widget](#) *const * [array](#) () const
Returns a pointer to the array of children.
- [FL_Group](#) const * [as_group](#) () const [FL_OVERRIDE](#)
- [FL_Group](#) * [as_group](#) () [FL_OVERRIDE](#)
Returns an FL_Group pointer if this widget is an FL_Group.
- void [begin](#) ()

- Sets the current group so you can build the widget tree by just constructing the widgets.*
- `FL_Widget * child (int n) const`

Returns `array()[n]`.
- `int children () const`

Returns how many child widgets the group has.
- `void clear ()`

Deletes all child widgets from memory recursively.
- `unsigned int clip_children ()`

Returns the current clipping mode.
- `void clip_children (int c)`

Controls whether the group widget clips the drawing of child widgets to its bounding box.
- `virtual int delete_child (int n)`

Removes the widget at `index` from the group and deletes it.
- `void end ()`

Exactly the same as `current(this->parent())`.
- `int find (const FL_Widget &o) const`

*See `int FL_Group::find(const FL_Widget *w) const`.*
- `int find (const FL_Widget *) const`

Searches the child array for the widget and returns the index.
- `FL_Group (int, int, int, int, const char * = 0)`

Creates a new `FL_Group` widget using the given position, size, and label string.
- `void focus (FL_Widget *W)`
- `void forms_end ()`

This is for forms compatibility only.
- `void init_sizes ()`

Resets the internal array of widget sizes and positions.
- `void insert (FL_Widget &, int i)`

The widget is removed from its current group (if any) and then inserted into this group.
- `void insert (FL_Widget &o, FL_Widget *before)`

This does `insert(w, find(before))`.
- `void remove (FL_Widget &)`

Removes a widget from the group but does not delete it.
- `void remove (FL_Widget *o)`

Removes the widget `o` from the group.
- `void remove (int index)`

Removes the widget at `index` from the group but does not delete it.
- `FL_Widget * resizable () const`

Returns the group's resizable widget.
- `void resizable (FL_Widget &o)`

Sets the group's resizable widget.
- `void resizable (FL_Widget *o)`

The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- `virtual ~FL_Group ()`

The destructor also deletes all the children.

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (FI_Align alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window * as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window const * as_gl_window** () const
- virtual **FI_Window * as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window const * as_window** () const
- void **bind_deimage** (FI_Image *img)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (FI_Boxtype new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (FI_Callback *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void **callback** (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void **callback** (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const
Checks if the widget value changed since the last callback.
- void **clear_active** ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (uchar c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FL_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FL_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FL_Color` bg, `FL_Color` sel)
- Sets the background and selection color of the widget.*

 - `FL_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FL_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (uchar c)
- Sets the damage bits for the widget.*

 - void `damage` (uchar c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FL_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FL_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FL_Widget` *widget, long arg, `FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h` () `const`
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- `int image_bound` () `const`
Returns whether the image is managed by the widget.
- `int inside` (`const FI_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- `int is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- `bool needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- `unsigned int output` () `const`

- Returns if a widget is used for output only.*
- `FI_Group * parent () const`
Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`
Internal use only - "for hacks only".
- `void position (int X, int Y)`
Repositions the window or widget.
- `void redraw ()`
Schedules the drawing of the widget.
- `void redraw_label ()`
Schedules the drawing of the label.
- `FI_Color selection_color () const`
Gets the selection color.
- `void selection_color (FI_Color a)`
Sets the selection color.
- `void set_active ()`
Marks the widget as active without sending events or changing focus.
- `void set_changed ()`
Marks the value of the widget as changed.
- `void set_output ()`
Sets a widget to output only.
- `void set_visible ()`
Makes the widget visible.
- `void set_visible_focus ()`
Enables keyboard focus navigation with this widget.
- `int shortcut_label () const`
Returns whether the widget's label uses '&' to indicate shortcuts.
- `void shortcut_label (int value)`
Sets whether the widget's label uses '&' to indicate shortcuts.
- `virtual void show ()`
Makes a widget visible.
- `void size (int W, int H)`
Changes the size of the widget.
- `int take_focus ()`
Gives the widget the keyboard focus.
- `unsigned int takeevents () const`
Returns if the widget is able to take events.
- `int test_shortcut ()`
Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip () const`
Gets the current tooltip text.
- `void tooltip (const char *text)`
Sets the current tooltip text.
- `FI_Window * top_window () const`
Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset (int &xoff, int &yoff) const`
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type () const`
Gets the widget type.
- `void type (uchar t)`
Sets the widget type.

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (FI_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- FI_When **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- FI_Window * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual ~FI_Widget ()
Destroys the widget.

Protected Member Functions

- FI_Cursor **cursor** (int n)
Returns the cursor for cursor index n.
- int **on_insert** (FI_Widget *, int) **FL_OVERRIDE**
Insert a new entry in the size range list.
- int **on_move** (int, int) **FL_OVERRIDE**
Move the entry in the size range list.
- void **on_remove** (int) **FL_OVERRIDE**
Remove the entry from the size range list.
- void **request_grow_b** (int old_b, int &new_b, FI_Rect *final_size)
Request for children to change their layout.
- void **request_grow_l** (int old_l, int &new_l, FI_Rect *final_size)
Request for children to change their layout.
- void **request_grow_r** (int old_r, int &new_r, FI_Rect *final_size)
Request for children to change their layout.
- void **request_grow_t** (int old_t, int &new_t, FI_Rect *final_size)
Request for children to change their layout.
- void **request_shrink_b** (int old_b, int &new_b, FI_Rect *final_size)
Request for children to change their layout.

- void `request_shrink_l` (int old_l, int &new_l, `FI_Rect` *final_size)
Request for children to change their layout.
- void `request_shrink_r` (int old_r, int &new_r, `FI_Rect` *final_size)
Request for children to change their layout.
- void `request_shrink_t` (int old_t, int &new_t, `FI_Rect` *final_size)
Request for children to change their layout.
- void `set_cursor` (int n)
Set one of four cursors used for dragging etc. . .

Protected Member Functions inherited from `FI_Group`

- `FI_Rect` * `bounds` ()
Returns the internal array of widget sizes and positions.
- void `draw` () `FL_OVERRIDE`
Draws the widget.
- void `draw_child` (`FI_Widget` &widget) const
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (const `FI_Widget` &widget) const
Parents normally call this to draw outside labels of child widgets.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`FI_Widget` &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from `FI_Widget`

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FI_Boxtype` t, int x, int y, int w, int h, `FI_Color` bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const

- *Gets the widget flags mask.*
- void **h** (int v)
 - *Internal use only.*
- void **set_flag** (unsigned int c)
 - *Sets a flag in the flags mask.*
- void **w** (int v)
 - *Internal use only.*
- void **x** (int v)
 - *Internal use only.*
- void **y** (int v)
 - *Internal use only.*

Protected Attributes

- int **cursor_**
 - *current cursor index (0..3)*
- **FI_Cursor** * **cursors_**
 - *points at the array of 4 cursors (may be overridden)*
- int **default_min_h_**
- int **default_min_w_**
- **Size_Range** * **size_range_**
- int **size_range_capacity_**
- int **size_range_size_**

Additional Inherited Members

Static Public Member Functions inherited from **FI_Group**

- static **FI_Group** * **current** ()
 - *Returns the currently active group.*
- static void **current** (**FI_Group** *g)
 - *Sets the current group.*

Static Public Member Functions inherited from **FI_Widget**

- static void **default_callback** (**FI_Widget** *widget, void *data)
 - *The default callback for all widgets that don't set a callback.*
- static unsigned int **label_shortcut** (const char *t)
 - *Returns the Unicode value of the '&x' shortcut in a given text.*
- static int **test_shortcut** (const char *, const bool require_alt=false)
 - *Returns true if the given text t contains the entered '&x' shortcut.*

Protected Types inherited from **FI_Widget**

- enum {
 - INACTIVE** = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
 - FORCE_POSITION** = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
 - ,
 - OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
 - ,
 - MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
 - ,
 - GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU** = 1<<19 ,
 - NEEDS_KEYBOARD** = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,

```
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
USERFLAG1 = 1<<31 }
```

flags possible values enumeration.

12.146.1 Detailed Description

The `Fl_Tile` class lets you resize its children by dragging the border between them.

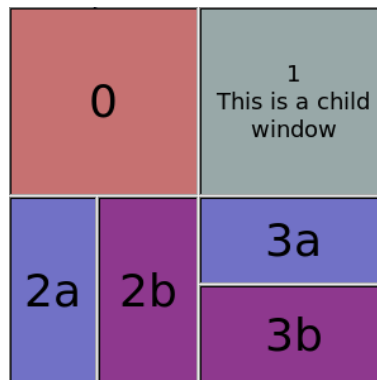


Figure 12.60 `Fl_Tile`

For the tiling to work correctly, the children of an `Fl_Tile` **must** cover the entire area of the widget, but **must not** overlap. This means that all children must touch each other at their edges, and no gaps can be left inside the `Fl_Tile`.

`Fl_Tile` does not normally draw any graphics of its own. The "borders" which can be seen in the snapshot above are actually part of the children. Their boxtypes have been set to `FL_DOWN_BOX` creating the impression of "ridges" where the boxes touch. What you see are actually two adjacent `FL_DOWN_BOX`'s drawn next to each other. All neighboring widgets share the same edge - the widget's thick borders make it appear as though the widgets aren't actually touching, but they are. If the edges of adjacent widgets do not touch, then it will be impossible to drag the corresponding edges.

Note

`Fl_Tile` works in two distinctive modes. In classic mode, the range of motion for edges and intersections is controlled using an invisible child that is marked as the `resizable()` widget of the tile group. Classic mode is described in detail a few paragraphs down.

`Fl_Tile` size_range mode

By assigning a default minimum size to all children with `Fl_Tile::init_size_range(int default_minimum_width, int default_minimum_height)`, or by assigning minimal sizes to individual children with `size_range(Fl_Widget *child, int minimum_width, int minimum_height)`, the tile group is put into `size_range` operation mode.

In this mode, the child that is marked `resizable()` will behave as it would in a regular `Fl_Group` widget. When dragging edges or intersections with the mouse, `Fl_Tile` will ensure that none of the children shrinks to a size that is smaller than requested. When resizing the `Fl_Tile` group, size ranges are not enforced by the tile. Instead, the size range of the enclosing window should be limited to a valid range.

Tile does not differentiate between visible and invisible children. If children are created smaller than their assigned minimum size, dragging intersections may cause unexpected jumps in size. Zero width or height widget are not harmful, but should be avoided.

Example for a center document tile and two tool boxes on the left and right

```
Fl_Window win(400, 300, "My App");

Fl_Tile tile(0, 0, 400, 300);

Fl_Box left_tool_box(0, 0, 100, 300, "Tools");
left_tool_box.box(FL_DOWN_BOX);
tile.size_range(&left_tool_box, 50, 50);

Fl_Box document(100, 0, 200, 300, "Document");
document.box(FL_DOWN_BOX);
```

```

tile.size_range(&document, 100, 50);

FL_Box right_tool_box(300, 0, 100, 300, "More\nTools");
right_tool_box.box(FL_DOWN_BOX);
tile.size_range(&right_tool_box, 50, 50);

tile.end();
tile.resizable(document);

win.end();
win.resizable(tile);
win.show(argc, argv);
win.size_range(200, 50);

```

FI_Tile classic mode

[FI_Tile](#) allows objects to be resized to zero dimensions. To prevent this you can use the [resizable\(\)](#) to limit where corners can be dragged to. For more information see note below.

Even though objects can be resized to zero sizes, they must initially have non-zero sizes so the [FI_Tile](#) can figure out their layout. If desired, call [position\(\)](#) after creating the children but before displaying the window to set the borders where you want.

Note on [resizable\(FI_Widget &w\)](#): The "resizable" child widget (which should be invisible) limits where the borders can be dragged to. All dragging will be limited inside the resizable widget's borders. If you don't set it, it will be possible to drag the borders right to the edges of the [FI_Tile](#) widget, and thus resize objects on the edges to zero width or height. When the entire [FI_Tile](#) widget is resized, the [resizable\(\)](#) widget will keep its border distance to all borders the same (this is normal resize behavior), so that you can effectively set a border width that will never change. To ensure correct event delivery to all child widgets the [resizable\(\)](#) widget must be the first child of the [FI_Tile](#) widget group. Otherwise some events (e.g. [FL_MOVE](#) and [FL_ENTER](#)) might be consumed by the [resizable\(\)](#) widget so that they are lost for widgets covered (overlapped) by the [resizable\(\)](#) widget.

Note

You can still resize widgets **inside** the [resizable\(\)](#) to zero width and/or height, i.e. box **2b** above to zero width and box **3a** to zero height.

See also

void [FI_Group::resizable\(FI_Widget &w\)](#)

Example for resizable with 20 pixel border distance:

```

int dx = 20, dy = dx;
FI_Tile tile(50,50,300,300);
// create resizable() box first
FL_Box r(tile.x()+dx, tile.y()+dy, tile.w()-2*dx, tile.h()-2*dy);
tile.resizable(r);
// ... create widgets inside tile (see test/tile.cxx) ...
tile.end();

```

See also the complete example program in test/tile.cxx.

12.146.2 Constructor & Destructor Documentation

12.146.2.1 FI_Tile()

```

FI_Tile::FI_Tile (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )

```

Creates a new [FI_Tile](#) widget using the given position, size, and label string.

The default boxtype is [FL_NO_BOX](#).

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [FI_Tile](#) and all of its children can be automatic (local) variables, but you must declare the [FI_Tile](#) *first*, so that it is destroyed last.

See also

class [FI_Group](#)

12.146.3 Member Function Documentation

12.146.3.1 cursor()

```
Fl_Cursor Fl_Tile::cursor (
    int n ) [inline], [protected]
```

Returns the cursor for cursor index n.

See also

[Fl_Tile::set_cursor\(int\)](#)

12.146.3.2 drag_intersection()

```
void Fl_Tile::drag_intersection (
    int oldx,
    int oldy,
    int newx,
    int newy ) [virtual]
```

Drags the intersection at (oldx,oldy) to (newx,newy).

See also

[Fl_Tile::move_intersection\(int oldx, int oldy, int newx, int newy\)](#) , but this method does not call [init_sizes\(\)](#) and is used for interactive [children](#) layout using the mouse.

Parameters

in	<i>oldx,oldy</i>	move the intersection at this coordinate, pass zero to disable drag in that direction.
in	<i>newx,newy</i>	move the intersection as close to this new coordinate as possible

12.146.3.3 handle()

```
int Fl_Tile::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Group](#).

12.146.3.4 init_size_range()

```
void Fl_Tile::init_size_range (
    int default_min_w = -1,
    int default_min_h = -1 )
```

Initialize the size range mode of [Fl_Tile](#) and set the default minimum width and height.

The default minimum width and height is the size of the mouse pointer grab area at about 4 pixel units.

Parameters

in	<i>default_min_w, default_min_h</i>	default size range for widgets that don't have an individual range assigned
----	-------------------------------------	---

12.146.3.5 move_intersection()

```
void Fl_Tile::move_intersection (
    int oldx,
    int oldy,
    int newx,
    int newy ) [virtual]
```

Drags the intersection at (oldx,oldy) to (newx,newy).

This redraws all the necessary children.

If no size ranges are set, the new intersection position is limited to the size of the tile group. The [resizable\(\)](#) option is not taken into account here.

If size ranges are set, the actual new position of the intersection will depend on the size range of every individual child. No child will be smaller than their minw and minh. After the new position is found, [move_intersection\(\)](#) will call [init_sizes\(\)](#). The [resizable\(\)](#) range is ignored.

Parameters

in	<i>oldx,oldy</i>	move the intersection at this coordinate, pass zero to disable drag in that direction.
in	<i>newx,newy</i>	move the intersection as close to this new coordinate as possible

12.146.3.6 on_insert()

```
int Fl_Tile::on_insert (
    Fl_Widget * candidate,
    int index ) [protected], [virtual]
```

Insert a new entry in the size range list.

Reimplemented from [Fl_Group](#).

12.146.3.7 on_move()

```
int Fl_Tile::on_move (
    int oldIndex,
    int newIndex ) [protected], [virtual]
```

Move the entry in the size range list.

Reimplemented from [Fl_Group](#).

12.146.3.8 on_remove()

```
void Fl_Tile::on_remove (
```

```
int index ) [protected], [virtual]
```

Remove the entry from the size range list.

Reimplemented from [Fl_Group](#).

12.146.3.9 position()

```
void Fl_Tile::position (
    int oldx,
    int oldy,
    int newx,
    int newy ) [inline]
```

Deprecated "in 1.4.0 - use `move_intersection(p)` instead"

12.146.3.10 request_grow_b()

```
void Fl_Tile::request_grow_b (
    int old_b,
    int & new_b,
    Fl_Rect * final_size ) [protected]
```

Request for children to change their layout.

Parameters

in	<i>old_b</i>	grow all children with this current bottom edge toward the bottom edge of this tile
in, out	<i>new_b</i>	try to grow to this coordinate, return the maximum possible growth (currently maxh is ignored, so we always grow to new_b)
in, out	<i>final_size</i>	write the new position and size of all affected children into this list of Fl_Rect

12.146.3.11 request_grow_l()

```
void Fl_Tile::request_grow_l (
    int old_l,
    int & new_l,
    Fl_Rect * final_size ) [protected]
```

Request for children to change their layout.

Parameters

in	<i>old_l</i>	grow all children with this current left edge toward the left edge of this tile
in, out	<i>new_l</i>	try to grow to this coordinate, return the maximum possible growth (currently maxw is ignored, so we always grow to new_l)
in, out	<i>final_size</i>	write the new position and size of all affected children into this list of Fl_Rect

12.146.3.12 request_grow_r()

```
void Fl_Tile::request_grow_r (
    int old_r,
    int & new_r,
    Fl_Rect * final_size ) [protected]
```

Request for children to change their layout.

Parameters

in	<i>old_r</i>	grow all children with this current right edge toward the right edge of this tile
in, out	<i>new_r</i>	try to grow to this coordinate, return the maximum possible growth (currently maxw is ignored, so we always grow to <i>new_r</i>)
in, out	<i>final_size</i>	write the new position and size of all affected children into this list of Fl_Rect

12.146.3.13 request_grow_t()

```
void Fl_Tile::request_grow_t (
    int old_t,
    int & new_t,
    Fl_Rect * final_size ) [protected]
```

Request for children to change their layout.

Parameters

in	<i>old_t</i>	grow all children with this current top edge toward the top edge of this tile
in, out	<i>new_t</i>	try to grow to this coordinate, return the maximum possible growth (currently maxh is ignored, so we always grow to <i>new_t</i>)
in, out	<i>final_size</i>	write the new position and size of all affected children into this list of Fl_Rect

12.146.3.14 request_shrink_b()

```
void Fl_Tile::request_shrink_b (
    int old_b,
    int & new_b,
    Fl_Rect * final_size ) [protected]
```

Request for children to change their layout.

See also

[Fl_Tile::request_shrink_l\(int old_l, int &new_l, Fl_Rect *final_size\)](#)

Parameters

in	<i>old_b</i>	shrink all children with this current bottom edge toward the top edge of this tile
in, out	<i>new_b</i>	try to shrink to this coordinate, return the maximum possible shrinkage
in, out	<i>final_size</i>	if not NULL, write the new position and size of all affected children into this list of Fl_Rect

12.146.3.15 request_shrink_l()

```
void Fl_Tile::request_shrink_l (
    int old_l,
    int & new_l,
    Fl_Rect * final_size ) [protected]
```

Request for children to change their layout.

`drag_intersection` requests that all children with the left edge at `old_l` to shrink to `new_l` towards the right side of the tile. If the child can not shrink by that amount, it will ask all other children that touch its right side to shrink by the remainder (recursion). `new_l` will return the the maximum possible value while maintaining minimum width for all children involved.

`request_shrink_r` asks children to shrink toward the left, so that their right edge is as close as possible to `new_r`. `request_shrink_t` and `request_shrink_b` provide the same functionality for vertical resizing.

Parameters

in	<i>old_l</i>	shrink all children with this current left edge
in, out	<i>new_l</i>	try to shrink to this coordinate, return the maximum possible shrinkage
in, out	<i>final_size</i>	if not NULL, write the new position and size of all affected children into this list of FI_Rect

12.146.3.16 request_shrink_r()

```
void Fl_Tile::request_shrink_r (
    int old_r,
    int & new_r,
    FI_Rect * final_size ) [protected]
```

Request for children to change their layout.

See also

[FI_Tile::request_shrink_l\(int old_l, int &new_l, FI_Rect *final_size\)](#)

Parameters

in	<i>old_r</i>	shrink all children with this current right edge toward the left edge of this tile
in, out	<i>new_r</i>	try to shrink to this coordinate, return the maximum possible shrinkage
in, out	<i>final_size</i>	if not NULL, write the new position and size of all affected children into this list of FI_Rect

12.146.3.17 request_shrink_t()

```
void Fl_Tile::request_shrink_t (
    int old_t,
    int & new_t,
    FI_Rect * final_size ) [protected]
```

Request for children to change their layout.

See also

[FI_Tile::request_shrink_l\(int old_l, int &new_l, FI_Rect *final_size\)](#)

Parameters

in	<i>old_t</i>	shrink all children with this current top edge toward the bottom edge of this tile
in, out	<i>new_t</i>	try to shrink to this coordinate, return the maximum possible shrinkage
in, out	<i>final_size</i>	if not NULL, write the new position and size of all affected children into this list of FI_Rect

12.146.3.18 resize()

```
void Fl_Tile::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the [FI_Tile](#) widget and its children.

[FI_Tile](#) implements its own [resize\(\)](#) method. It does not use [FI_Group::resize\(\)](#) to resize itself and its children.

In [size_range](#) mode, the child marked [resizable\(\)](#) is resized first. Only if its minimum size is reached, other widgets in the tile will resize too.

In classic mode or when no resizable child is set, enlarging works by moving the lower-right corner and resizing the bottom and right border widgets accordingly.

Shrinking the `Fl_Tile` works in the opposite way by shrinking the bottom and right border widgets, unless they are reduced to zero width or height, resp. or to their minimal sizes defined by the `resizable()` widget. In this case other widgets will be shrunk as well.

See the `Fl_Tile` class documentation about how the `resizable()` works.

Reimplemented from `Fl_Group`.

12.146.3.19 set_cursor()

```
void Fl_Tile::set_cursor (
    int n ) [protected]
```

Set one of four cursors used for dragging etc. . .

`Fl_Tile` uses an array of four cursors that are set depending on user actions:

- 0: normal cursor
- 1: horizontal dragging
- 2: vertical dragging
- 3: dragging an intersection

This method sets the window cursor for the given index `n`.

12.146.3.20 size_range() [1/2]

```
void Fl_Tile::size_range (
    Fl_Widget * w,
    int minw,
    int minh,
    int maxw = 0x7FFFFFFF,
    int maxh = 0x7FFFFFFF )
```

Set the allowed size range for the give child widget.

`Fl_Tile` currently supports only the minimal width and height setting.

Parameters

in	<code>w</code>	set the range for this child widget
in	<code>minw,minh</code>	minimum width and height for that child
in	<code>maxw,maxh</code>	maximum size, defaults to infinite, currently ignored

12.146.3.21 size_range() [2/2]

```
void Fl_Tile::size_range (
    int index,
    int minw,
    int minh,
    int maxw = 0x7FFFFFFF,
    int maxh = 0x7FFFFFFF )
```

Set the allowed size range for the child at the given index.

`Fl_Tile` currently supports only the minimal width and height setting.

Parameters

in	<code>index</code>	set the range for the child at this index
in	<code>minw,minh</code>	minimum width and height for that child
in	<code>maxw,maxh</code>	maximum size, defaults to infinite, currently ignored

The documentation for this class was generated from the following files:

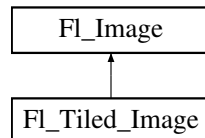
- `Fl_Tile.H`
- `Fl_Tile.cxx`

12.147 `Fl_Tiled_Image` Class Reference

This class supports tiling of images over a specified area.

```
#include <Fl_Tiled_Image.H>
```

Inheritance diagram for `Fl_Tiled_Image`:



Public Member Functions

- void `color_average` (`Fl_Color` c, float i) `FL_OVERRIDE`
The `color_average()` method averages the colors in the image with the provided FLTK color value.
- `Fl_Image * copy` () const
- `Fl_Image * copy` (int W, int H) const `FL_OVERRIDE`
Creates a resized copy of the image.
- void `desaturate` () `FL_OVERRIDE`
The `desaturate()` method converts an image to grayscale.
- void `draw` (int X, int Y)
- void `draw` (int X, int Y, int W, int H, int cx=0, int cy=0) `FL_OVERRIDE`
Draws a tiled image.
- `Fl_Tiled_Image` (`Fl_Image *i`, int W=0, int H=0)
The constructors create a new tiled image containing the specified image.
- `Fl_Image * image` ()
Gets The image that is tiled.
- virtual `~Fl_Tiled_Image` ()
The destructor frees all memory and server resources that are used by the tiled image.

Public Member Functions inherited from `Fl_Image`

- virtual class `Fl_Shared_Image * as_shared_image` ()
Returns whether an image is an `Fl_Shared_Image` or not.
- `Fl_Image * copy` () const
Creates a copy of the image in the same size.
- int `count` () const
Returns the number of data values associated with the image.
- int `d` () const
Returns the image depth.
- const char *const * `data` () const
Returns a pointer to the current image data array.
- int `data_h` () const
Returns the height of the image data.
- int `data_w` () const
Returns the width of the image data.
- void `draw` (int X, int Y)

- Draws the image to the current drawing surface.*

 - int **fail** () const

Returns a value that is not 0 if there is currently no image available.
 - **FI_Image** (int W, int H, int D)

The constructor creates an empty image with the specified width, height, and depth.
 - int **h** () const

Returns the current image drawing height in FLTK units.
 - void **inactive** ()

The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
 - virtual void **label** (**FI_Menu_Item** *m)

This method is an obsolete way to set the image attribute of a menu item.
 - virtual void **label** (**FI_Widget** *w)

This method is an obsolete way to set the image attribute of a widget or menu item.
 - int **ld** () const

Returns the current line data size in bytes.
 - virtual void **release** ()

Releases an `FI_Image` - the same as 'delete this'.
 - virtual void **scale** (int width, int height, int proportional=1, int can_expand=0)

Sets the drawing size of the image.
 - virtual void **uncache** ()

If the image has been cached for display, delete the cache data.
 - int **w** () const

Returns the current image drawing width in FLTK units.
 - virtual **~FI_Image** ()

The destructor is a virtual method that frees all memory used by the image.

Protected Attributes

- int **alloc_image_**
- **FI_Image** * **image_**

Additional Inherited Members

Static Public Member Functions inherited from **FI_Image**

- static **FI_Labeltype** **define_FL_IMAGE_LABEL** ()
- static **FI_RGB_Scaling** **RGB_scaling** ()

Returns the currently used RGB image scaling method.
- static void **RGB_scaling** (**FI_RGB_Scaling**)

Sets the RGB image scaling method used for copy(int, int).
- static **FI_RGB_Scaling** **scaling_algorithm** ()

Gets what algorithm is used when resizing a source image to draw it.
- static void **scaling_algorithm** (**FI_RGB_Scaling** algorithm)

Sets what algorithm is used when resizing a source image to draw it.

Static Public Attributes inherited from **FI_Image**

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_MEMORY_ACCESS** = -4
- static const int **ERR_NO_IMAGE** = -1
- static bool **register_images_done** = false

True after `fl_register_images()` was called, false before.

Protected Member Functions inherited from [Fl_Image](#)

- void **d** (int D)

Sets the current image depth.
- void **data** (const char *const *p, int c)

Sets the current data pointer and count of pointers in the array.
- void **draw_empty** (int X, int Y)

The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int **draw_scaled** (int X, int Y, int W, int H)

Draw the image to the current drawing surface rescaled to a given width and height.
- void **h** (int H)

Sets the height of the image data.
- void **ld** (int LD)

Sets the current line data size in bytes.
- void **w** (int W)

Sets the width of the image data.

Static Protected Member Functions inherited from [Fl_Image](#)

- static void **labeltype** (const [Fl_Label](#) *lo, int lx, int ly, int lw, int lh, [Fl_Align](#) la)
- static void **measure** (const [Fl_Label](#) *lo, int &lw, int &lh)

12.147.1 Detailed Description

This class supports tiling of images over a specified area.

The source (tile) image is **not** copied unless you call the [color_average\(\)](#), [desaturate\(\)](#), or [inactive\(\)](#) methods.

12.147.2 Constructor & Destructor Documentation

12.147.2.1 [Fl_Tiled_Image\(\)](#)

```
Fl_Tiled_Image::Fl_Tiled_Image (
    Fl_Image * i,
    int W = 0,
    int H = 0 )
```

The constructors create a new tiled image containing the specified image.

Use a width and height of 0 to tile the whole window/widget.

Note

Due to implementation constraints in FLTK 1.3.3 and later width and height of 0 may not work as expected when used as background image in widgets other than windows. You may need to center and clip the image (label) and set the label type to `FL_NORMAL_LABEL`. Doing so will let the tiled image fill the whole widget as its background image. Other combinations of label flags may or may not work.

```
#include "bg.xpm"
Fl_Pixmap *bg_xpm = new Fl_Pixmap(bg_xpm);
Fl_Tiled_Image *bg_tiled = new Fl_Tiled_Image(bg_xpm,0,0);

Fl_Box *box = new Fl_Box(40,40,300,100,"");
box->box(FL_UP_BOX);
box->labeltype(FL_NORMAL_LABEL);
box->align(FL_ALIGN_INSIDE | FL_ALIGN_CENTER | FL_ALIGN_CLIP);
box->image(bg_tiled);
```

Note

Setting an image (label) for a window may not work as expected due to implementation constraints in FLTK 1.3.x and maybe later. The reason is the way [Fl::scheme\(\)](#) initializes the window's label type and image. A possible workaround is to use another [Fl_Group](#) as the only child widget and to set the background image for this group as described above.

Todo Fix [Fl_Tiled_Image](#) as background image for widgets and windows and fix the implementation of [Fl::scheme\(const char *\)](#).

12.147.3 Member Function Documentation

12.147.3.1 color_average()

```
void Fl_Tiled_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The `color_average()` method averages the colors in the image with the provided FLTK color value.

The first argument specifies the FLTK color to be used.

The second argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_Image](#).

12.147.3.2 copy()

```
Fl_Image * Fl_Tiled_Image::copy (
    int W,
    int H ) const [virtual]
```

Creates a resized copy of the image.

The new image should be released when you are done with it.

Note: since FLTK 1.4.0 you can use [Fl_Image::release\(\)](#) for all types of images (i.e. all subclasses of [Fl_Image](#)) instead of operator `delete` for [Fl_Image](#)'s and [Fl_Image::release\(\)](#) for [Fl_Shared_Image](#)'s.

The new image data will be converted to the requested size. RGB images are resized using the algorithm set by [Fl_Image::RGB_scaling\(\)](#).

For the new image the following equations are true:

- $w() == \text{data_}w() == \bar{W}$
- $h() == \text{data_}h() == H$

Parameters

in	W,H	Requested width and height of the new image
----	-------	---

Note

The returned image can be safely cast to the same image type as that of the source image provided this type is one of [Fl_RGB_Image](#), [Fl_SVG_Image](#), [Fl_Pixmap](#), [Fl_Bitmap](#), [Fl_Tiled_Image](#), [Fl_Anim_GIF_Image](#) and [Fl_Shared_Image](#). Returned objects copied from images of other, derived, image classes belong to the parent class appearing in this list. For example, the copy of an [Fl_GIF_Image](#) is an object of class [Fl_Pixmap](#).

Since FLTK 1.4.0 this method is 'const'. If you derive your own class from [Fl_Image](#) or any subclass your overridden methods of '[Fl_Image::copy\(\) const](#)' and '[Fl_Image::copy\(int, int\) const](#)' **must** also be 'const' for inheritance to work properly. This is different than in FLTK 1.3.x and earlier where these methods have not been 'const'.

Reimplemented from [Fl_Image](#).

12.147.3.3 desaturate()

```
void Fl_Tiled_Image::desaturate ( ) [virtual]
```

The `desaturate()` method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image data before changes are applied, to avoid modifying the original image data in memory.

Reimplemented from [Fl_Image](#).

12.147.3.4 draw()

```
void Fl_Tiled_Image::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws a tiled image.

Tiled images can be used as background images for widgets and windows. However, due to implementation constraints, you must take care when setting label types and alignment flags. Only certain combinations work as expected, others may yield unexpected results and undefined behavior.

This draw method can draw multiple copies of one image in an area given by X, Y, W, H.

The optional arguments `cx` and `cy` can be used to crop the image starting at offsets (`cx`, `cy`). `cx` and `cy` must be ≥ 0 (negative values are ignored). If one of the values is greater than the image width or height resp. (`cx` \geq `image()->w()` or `cy` \geq `image()->h()`) nothing is drawn, because the resulting image would be empty.

After calculating the resulting image size the image is drawn as often as necessary to fill the given area, starting at the top left corner.

If both `W` and `H` are 0 the image is repeated as often as necessary to fill the entire window, unless there is a valid clip region. If you want to fill only one particular widget's background, then you should either set a clip region in your `draw()` method or use the label alignment flags `FL_ALIGN_INSIDE|FL_ALIGN_CLIP` to make sure the image is clipped.

This may be improved in a later version of the library.

Reimplemented from [Fl_Image](#).

The documentation for this class was generated from the following files:

- `Fl_Tiled_Image.H`
- `Fl_Tiled_Image.cxx`

12.148 Fl_Timeout Class Reference

The internal class [Fl_Timeout](#) handles all timeout related functions.

```
#include <Fl_Timeout.h>
```

Static Public Member Functions

- static void [add_timeout](#) (double time, [Fl_Timeout_Handler](#) cb, void *data)
Adds a one-shot timeout callback.
- static void [do_timeouts](#) ()
Elapse timers and call their callbacks if any timers are expired.
- static void [elapse_timeouts](#) ()
Elapse all timers w/o calling their callbacks.
- static int [has_timeout](#) ([Fl_Timeout_Handler](#) cb, void *data)
Returns true if the timeout exists and has not been called yet.
- static void [remove_timeout](#) ([Fl_Timeout_Handler](#) cb, void *data)
Remove a timeout callback.
- static void [repeat_timeout](#) (double time, [Fl_Timeout_Handler](#) cb, void *data)
Repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.
- static double [time_to_wait](#) (double ttw)
Returns the delay in seconds until the next timer expires, limited by `ttw`.

Protected Member Functions

- double [delay](#) ()
Get the timer's delay in seconds.

- void **delay** (double t)
Set the timer's delay in seconds.
- void **insert** ()
Insert this timer entry into the active timer queue.
- void **make_current** ()
Remove the timeout from the active timer queue and push it onto the stack of currently running callbacks.
- void **release** ()
Remove the top-most timeout from the stack of currently running timeout callbacks and insert it into the list of free timers.

Static Protected Member Functions

- static [FI_Timeout](#) * **current** ()
Returns the first (top-most) timeout from the current timeout stack.
- static [FI_Timeout](#) * **get** (double time, [FI_Timeout_Handler](#) cb, void *data)
Get an [FI_Timeout](#) instance for further handling.

Protected Attributes

- [FI_Timeout_Handler](#) **callback**
- void * **data**
- [FI_Timeout](#) * **next**
- int **skip**
- double **time**

Static Protected Attributes

- static [FI_Timeout](#) * **current_timeout** = 0
The list of current timeouts is used to store the timeout whose callback is called while the callback is executed.
- static [FI_Timeout](#) * **first_timeout** = 0
List of active timeouts.
- static [FI_Timeout](#) * **free_timeout** = 0
List of free timeouts after use.

12.148.1 Detailed Description

The internal class [FI_Timeout](#) handles all timeout related functions.

All code is platform independent except retrieving a timestamp which requires calling a system driver function and potentially results in different timer resolutions (from milliseconds to microseconds).

Related user documentation:

- [FI_Timeout_Handler](#)
- [FI::add_timeout\(double time, FI_Timeout_Handler cb, void *data\)](#)
- [FI::repeat_timeout\(double time, FI_Timeout_Handler cb, void *data\)](#)
- [FI::has_timeout\(FI_Timeout_Handler cb, void *data\)](#)
- [FI::remove_timeout\(FI_Timeout_Handler cb, void *data\)](#)

12.148.2 Member Function Documentation

12.148.2.1 add_timeout()

```
void Fl_Timeout::add_timeout (
    double time,
    Fl_Timeout_Handler cb,
    void * data ) [static]
```

Adds a one-shot timeout callback.

The callback function *cb* will be called by [Fl::wait\(\)](#) at *time* seconds after this function is called.

Parameters

in	<i>time</i>	delta time in seconds until the timer expires
in	<i>cb</i>	callback function
in	<i>data</i>	optional user data (default: NULL)

Implements [FI::add_timeout\(double time, FI_Timeout_Handler cb, void *data\)](#)

See also

[FI::add_timeout\(double time, FI_Timeout_Handler cb, void *data\)](#)

12.148.2.2 current()

```
FI_Timeout * FI_Timeout::current ( ) [static], [protected]
```

Returns the first (top-most) timeout from the current timeout stack.

This returns a pointer to the timeout but does not remove it from the list of current timeouts. This should be the timeout that is currently executing its callback.

Returns

FI_Timeout* The current timeout whose callback is running.

Return values

NULL	if no callback is currently running.
------	--------------------------------------

12.148.2.3 elapse_timeouts()

```
void FI_Timeout::elapse_timeouts ( ) [static]
```

Elapse all timers w/o calling their callbacks.

All timer values are adjusted by the delta time since the last call. This method does **NOT** call timer callbacks if timers are expired.

This must be called before new timers are added to the timer queue to make sure that the next timer decrement does not count down too much time.

See also

[FI_Timeout::do_timeouts\(\)](#)

12.148.2.4 get()

```
FI_Timeout * FI_Timeout::get (
    double time,
    FI_Timeout_Handler cb,
    void * data ) [static], [protected]
```

Get an [FI_Timeout](#) instance for further handling.

The timer object will be initialized with the input parameters as given by [FI::add_timeout\(\)](#) or [FI::repeat_timeout\(\)](#).

[FI_Timeout](#) objects are maintained in three queues:

- active timer queue
- list (stack, i.e. LIFO) of currently executing timer callbacks
- free timer entries.

When the FLTK program is launched all queues are empty. Whenever a new timer object is required the [get\(\)](#) method is called and a timer object is either found in the queue of free timer entries or a new timer object is created (operator new).

Active timer entries are inserted into the "active timer queue" until they expire and their callback is called. Before the callback is called the timer entry is inserted into the list of current timers, i.e. it becomes the `Fl_Timeout::current()` timeout. This can be used in `Fl::repeat_timeout()` to find out if and how long the current timeout has been delayed.

When a timer is no longer used it is popped from the `current` list and inserted into the "free timer" list so it can be reused later.

Timer queue entries are never returned to the system, there's no garbage collection. The total number of timer objects is determined by the largest number of concurrently active timers.

Parameters

in	<i>time</i>	requested delta time
in	<i>cb</i>	timer callback
in	<i>data</i>	userdata for timer callback

Returns

`Fl_Timeout*` Timer entry

See also

[Fl::add_timeout\(\)](#), [Fl::repeat_timeout\(\)](#)

12.148.2.5 has_timeout()

```
int Fl_Timeout::has_timeout (
    Fl_Timeout_Handler cb,
    void * data ) [static]
```

Returns true if the timeout exists and has not been called yet.

Parameters

in	<i>cb</i>	Timer callback (must match)
in	<i>data</i>	Callback user data (must match)

Returns

whether the timer was found in the queue

Return values

0	not found
1	found

Implements [Fl::has_timeout\(Fl_Timeout_Handler cb, void *data\)](#)

See also

[Fl::has_timeout\(Fl_Timeout_Handler cb, void *data\)](#)

12.148.2.6 insert()

```
void Fl_Timeout::insert ( ) [protected]
```

Insert this timer entry into the active timer queue.

The timer is inserted at the required position so the timer queue is always ordered by due time.

12.148.2.7 make_current()

```
void FI_Timeout::make_current ( ) [protected]
```

Remove the timeout from the active timer queue and push it onto the stack of currently running callbacks. This becomes the [current\(\)](#) timeout which can be used in [FI::repeat_timeout\(\)](#).

See also

[FI_Timeout::current\(\)](#)

12.148.2.8 release()

```
void FI_Timeout::release ( ) [protected]
```

Remove the top-most timeout from the stack of currently running timeout callbacks and insert it into the list of free timers.

Typical code in the library would look like:

```
// The timeout \p FI_Timeout *t has expired, run its callback
t->make_current();
(t->callback)(t->data);
t->release();
```

12.148.2.9 remove_timeout()

```
void FI_Timeout::remove_timeout (
    FI_Timeout_Handler cb,
    void * data ) [static]
```

Remove a timeout callback.

This method removes all matching timeouts, not just the first one. This may change in the future.

Parameters

in	<i>cb</i>	Timer callback to be removed (must match)
in	<i>data</i>	Wildcard if NULL, must match otherwise

Implements [FI::remove_timeout\(FI_Timeout_Handler cb, void *data\)](#)

See also

[FI::remove_timeout\(FI_Timeout_Handler cb, void *data\)](#)

12.148.2.10 repeat_timeout()

```
void FI_Timeout::repeat_timeout (
    double time,
    FI_Timeout_Handler cb,
    void * data ) [static]
```

Repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.

Parameters

in	<i>time</i>	delta time in seconds until the timer expires
in	<i>cb</i>	callback function
in	<i>data</i>	optional user data (default: NULL)

Implements [FI::repeat_timeout\(double time, FI_Timeout_Handler cb, void *data\)](#)

See also

[FI::repeat_timeout\(double time, FI_Timeout_Handler cb, void *data\)](#)

12.148.2.11 time_to_wait()

```
double Fl_Timeout::time_to_wait (
    double ttw ) [static]
```

Returns the delay in seconds until the next timer expires, limited by `ttw`.

This function calculates the time to wait for the FLTK event queue processing, depending on the given value `ttw`.

If at least one timer is active and its timeout value is smaller than `ttw` then this value is returned. [Fl::wait\(\)](#) will wait no longer than until the next timer expires.

If no timer is active this returns the input value `ttw` unchanged.

If at least one timer is expired this returns 0.0 so the event processing does not wait.

Parameters

<code>in</code>	<code>ttw</code>	time to wait from Fl::wait() etc. (upper limit)
-----------------	------------------	---

Returns

delay until next timeout or 0.0 (see description)

12.148.3 Member Data Documentation

12.148.3.1 current_timeout

```
Fl_Timeout * Fl_Timeout::current_timeout = 0 [static], [protected]
```

The list of current timeouts is used to store the timeout whose callback is called while the callback is executed.

This is used like a stack, the current timeout is pushed to the front of the list and once the callback is finished, that timeout is removed and entered into the free list.

Background: [Fl::repeat_timeout\(\)](#) needs to know which timeout triggered it and the exact schedule time and/or the delay of that timeout, i.e. how long the scheduled time was missed before the callback was called. A static, global variable is not sufficient since the user code can call other functions, e.g. dialogs, that run a nested event loop which can run another timeout callback. Hence this list of "current" timeouts is used like a stack (last in, first out).

See also

[Fl_Timeout::push\(\)](#) Member function (method)

12.148.3.2 first_timeout

```
Fl_Timeout * Fl_Timeout::first_timeout = 0 [static], [protected]
```

List of active timeouts.

These timeouts can be triggered when due, which calls their callbacks. The lifetime of a timeout:

- active, in this queue
- callback running, in queue `current_timeout`
- done, in list of free timeouts, ready to be reused.

12.148.3.3 free_timeout

```
Fl_Timeout * Fl_Timeout::free_timeout = 0 [static], [protected]
```

List of free timeouts after use.

Timeouts can be reused many times.

The documentation for this class was generated from the following files:

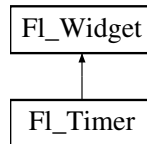
- [Fl_Timeout.h](#)
- [Fl_Timeout.cxx](#)

12.149 Fl_Timer Class Reference

This is provided only to emulate the Forms Timer widget.

```
#include <Fl_Timer.H>
```

Inheritance diagram for Fl_Timer:



Public Member Functions

- char [direction](#) () const
Gets or sets the direction of the timer.
- void [direction](#) (char d)
Gets or sets the direction of the timer.
- [Fl_Timer](#) (uchar t, int x, int y, int w, int h, const char *l)
Creates a new Fl_Timer widget using the given type, position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- char [suspended](#) () const
Gets or sets whether the timer is suspended.
- void [suspended](#) (char d)
Gets or sets whether the timer is suspended.
- double [value](#) () const
See void [Fl_Timer::value\(double\)](#)
- void [value](#) (double)
Sets the current timer value.
- ~[Fl_Timer](#) ()
Destroys the timer and removes the timeout.

Public Member Functions inherited from [Fl_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [Fl_Align](#) [align](#) () const
Gets the label alignment.
- void [align](#) ([Fl_Align](#) alignment)
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [Fl_Gl_Window](#) * [as_gl_window](#) ()

- Returns an `FI_GI_Window` pointer if this widget is an `FI_GI_Window`.*

 - virtual class `FI_GI_Window` const * **as_gi_window** () const
 - virtual `FI_Group` * **as_group** ()
- Returns an `FI_Group` pointer if this widget is an `FI_Group`.*

 - virtual `FI_Group` const * **as_group** () const
 - virtual `FI_Window` * **as_window** ()
- Returns an `FI_Window` pointer if this widget is an `FI_Window`.*

 - virtual `FI_Window` const * **as_window** () const
 - void **bind_deimage** (`FI_Image` *img)

Sets the image to use as part of the widget label when in the inactive state.

 - void **bind_deimage** (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

 - void **bind_image** (`FI_Image` *img)

Sets the image to use as part of the widget label when in the active state.

 - void **bind_image** (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.

 - `FI_Boxtype` **box** () const

Gets the box type of the widget.

 - void **box** (`FI_Boxtype` new_box)

Sets the box type for the widget.

 - `FI_Callback_p` **callback** () const

Gets the current callback function for the widget.

 - void **callback** (`FI_Callback` *cb)

Sets the current callback function for the widget.

 - void **callback** (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)

Sets the current callback function and managed user data for the widget.

 - void **callback** (`FI_Callback` *cb, void *p)

Sets the current callback function and data for the widget.

 - void **callback** (`FI_Callback0` *cb)

Sets the current callback function for the widget.

 - void **callback** (`FI_Callback1` *cb, long p=0)

Sets the current callback function for the widget.

 - unsigned int **changed** () const

Checks if the widget value changed since the last callback.

 - void **clear_active** ()

Marks the widget as inactive without sending events or changing focus.

 - void **clear_changed** ()

Marks the value of the widget as unchanged.

 - void **clear_damage** (`uchar` c=0)

Clears or sets the damage flags.

 - void **clear_output** ()

Sets a widget to accept input.

 - void **clear_visible** ()

Hides the widget.

 - void **clear_visible_focus** ()

Disables keyboard focus navigation with this widget.

 - `FI_Color` **color** () const

Gets the background color of the widget.

 - void **color** (`FI_Color` bg)

Sets the background color of the widget.

 - void **color** (`FI_Color` bg, `FI_Color` sel)

- Sets the background and selection color of the widget.*

 - [FI_Color](#) `color2` () const
 - For back compatibility only.*
 - void `color2` (unsigned a)
 - For back compatibility only.*
 - int `contains` (const [FI_Widget](#) *w) const
 - Checks if w is a child of this widget.*
 - void `copy_label` (const char *new_label)
 - Sets the current label.*
 - void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
 - [uchar](#) `damage` () const
 - Returns non-zero if `draw()` needs to be called.*
 - void `damage` ([uchar](#) c)
 - Sets the damage bits for the widget.*
 - void `damage` ([uchar](#) c, int x, int y, int w, int h)
 - Sets the damage bits for an area inside the widget.*
 - int `damage_resize` (int, int, int, int)
 - Internal use only.*
 - void `deactivate` ()
 - Deactivates the widget.*
 - [FI_Image](#) * `deimage` ()
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - const [FI_Image](#) * `deimage` () const
 - Gets the image that is used as part of the widget label when in the inactive state.*
 - void `deimage` ([FI_Image](#) &img)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - void `deimage` ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
 - int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
 - void `do_callback` ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with default arguments.*
 - void `do_callback` ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
 - void `do_callback` ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
 - Calls the widget callback function with arbitrary arguments.*
 - void `draw_label` (int, int, int, int, [FI_Align](#)) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
 - int `h` () const
 - Gets the widget height.*
 - virtual void `hide` ()
 - Makes a widget invisible.*
 - [FI_Image](#) * `image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
 - const [FI_Image](#) * `image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
 - void `image` ([FI_Image](#) &img)
 - Sets the image to use as part of the widget label when in the active state.*
 - void `image` ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the active state.*

- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget` *wgt) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *text)
Sets the current label pointer.
- void `label` (`FI_Labeltype` a, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color` `labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font` `labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fonsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fonsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)

- Sets the selection color.*

 - void [set_active](#) ()
- Marks the widget as active without sending events or changing focus.*

 - void [set_changed](#) ()
- Marks the value of the widget as changed.*

 - void [set_output](#) ()
- Sets a widget to output only.*

 - void [set_visible](#) ()
- Makes the widget visible.*

 - void [set_visible_focus](#) ()
- Enables keyboard focus navigation with this widget.*

 - int [shortcut_label](#) () const
- Returns whether the widget's label uses '&' to indicate shortcuts.*

 - void [shortcut_label](#) (int value)
- Sets whether the widget's label uses '&' to indicate shortcuts.*

 - virtual void [show](#) ()
- Makes a widget visible.*

 - void [size](#) (int W, int H)
- Changes the size of the widget.*

 - int [take_focus](#) ()
- Gives the widget the keyboard focus.*

 - unsigned int [takeevents](#) () const
- Returns if the widget is able to take events.*

 - int [test_shortcut](#) ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * [tooltip](#) () const
- Gets the current tooltip text.*

 - void [tooltip](#) (const char *text)
- Sets the current tooltip text.*

 - [FI_Window](#) * [top_window](#) () const
- Returns a pointer to the top-level window for the widget.*

 - [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - [uchar](#) [type](#) () const
- Gets the widget type.*

 - void [type](#) ([uchar](#) t)
- Sets the widget type.*

 - int [use_accents_menu](#) ()
- Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*

 - void * [user_data](#) () const
- Gets the user data for this widget.*

 - void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)
- Sets the user data for this widget.*

 - void [user_data](#) (void *v)
- Sets the user data for this widget.*

 - unsigned int [visible](#) () const
- Returns whether a widget is visible.*

 - unsigned int [visible_focus](#) () const
- Checks whether this widget has a visible focus.*

 - void [visible_focus](#) (int v)
- Modifies keyboard focus navigation.*

- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FL_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` `i`)
Sets the flags used to decide when a callback is called.
- `FL_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FL_Widget` ()
Destroys the widget.

Protected Member Functions

- void `draw` () `FL_OVERRIDE`
Draws the widget.

Protected Member Functions inherited from `FL_Widget`

- void `clear_flag` (unsigned int `c`)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FL_Boxtype` `t`, `FL_Color` `c`) const
Draws a box of type `t`, of color `c` at the widget's position and size.
- void `draw_box` (`FL_Boxtype` `t`, int `x`, int `y`, int `w`, int `h`, `FL_Color` `c`) const
Draws a box of type `t`, of color `c` at the position `X,Y` and size `W,H`.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FL_Boxtype` `t`, int `X`, int `Y`, int `W`, int `H`) const
Draws a focus rectangle around the widget.
- void `draw_focus` (`FL_Boxtype` `t`, int `x`, int `y`, int `w`, int `h`, `FL_Color` `bg`) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FL_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int `v`)
Internal use only.
- void `set_flag` (unsigned int `c`)
Sets a flag in the flags mask.

- void `w` (int `v`)
Internal use only.
- void `x` (int `v`)
Internal use only.
- void `y` (int `v`)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void `default_callback` ([FI_Widget](#) *`widget`, void *`data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *`t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

12.149.1 Detailed Description

This is provided only to emulate the Forms Timer widget. It works by making a timeout callback every 1/5 second. This is wasteful and inaccurate if you just want something to happen a fixed time in the future. You should directly call `FI::add_timeout()` instead.

12.149.2 Constructor & Destructor Documentation

12.149.2.1 FI_Timer()

```
FI_Timer::FI_Timer (
    uchar t,
    int X,
    int Y,
    int W,
    int H,
    const char * l )
```

Creates a new [FI_Timer](#) widget using the given type, position, size, and label string. The type parameter can be any of the following symbolic constants:

- `FL_NORMAL_TIMER` - The timer just does the callback and displays the string "Timer" in the widget.

- `FL_VALUE_TIMER` - The timer does the callback and displays the current timer value in the widget.
- `FL_HIDDEN_TIMER` - The timer just does the callback and does not display anything.

12.149.3 Member Function Documentation

12.149.3.1 `direction()` [1/2]

```
char Fl_Timer::direction ( ) const [inline]
```

Gets or sets the direction of the timer.

If the direction is zero then the timer will count up, otherwise it will count down from the initial `value()`.

12.149.3.2 `direction()` [2/2]

```
void Fl_Timer::direction (
    char d ) [inline]
```

Gets or sets the direction of the timer.

If the direction is zero then the timer will count up, otherwise it will count down from the initial `value()`.

12.149.3.3 `draw()`

```
void Fl_Timer::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

12.149.3.4 `handle()`

```
int Fl_Timer::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<code>event</code>	the kind of event received
----	--------------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

12.149.3.5 `suspended()`

```
char Fl_Timer::suspended ( ) const [inline]
```

Gets or sets whether the timer is suspended.

The documentation for this class was generated from the following files:

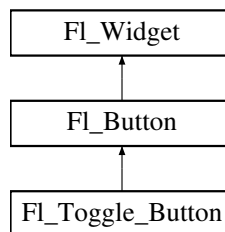
- `Fl_Timer.H`
- `forms_timer.cxx`

12.150 `Fl_Toggle_Button` Class Reference

The toggle button is a push button that needs to be clicked once to toggle on, and one more time to toggle off.

```
#include <Fl_Toggle_Button.H>
```

Inheritance diagram for `Fl_Toggle_Button`:



Public Member Functions

- [Fl_Toggle_Button](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Toggle_Button](#) widget using the given position, size, and label string.

Public Member Functions inherited from [Fl_Button](#)

- int [clear](#) ()
Same as `value(0)`.
- [uchar compact](#) ()
Return true if buttons are rendered as compact buttons.
- void [compact](#) ([uchar](#) v)
Decide if buttons should be rendered in compact mode.
- [Fl_Boxtype down_box](#) () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void [down_box](#) ([Fl_Boxtype](#) b)
Sets the down box type.
- [Fl_Color down_color](#) () const
(for backwards compatibility)
- void [down_color](#) (unsigned c)
(for backwards compatibility)
- [Fl_Button](#) (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- int [handle](#) (int) [FL_OVERRIDE](#)

- Handles the specified event.*

 - int **set** ()
 - Same as `value(1)`.*
 - void **setonly** ()
 - Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).*
 - int **shortcut** () const
 - Returns the current shortcut key for the button.*
 - void **shortcut** (const char *s)
 - (for backwards compatibility)*
 - void **shortcut** (int s)
 - Sets the shortcut key to `s`.*
 - char **value** () const
 - Returns the current value of the button (0 or 1).*
 - int **value** (int v)
 - Sets the current value of the button.*

Public Member Functions inherited from **FI_Widget**

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- **FI_Align** **align** () const
 - Gets the label alignment.*
- void **align** (**FI_Align** alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class **FI_GI_Window** * **as_gl_window** ()
 - Returns an **FI_GI_Window** pointer if this widget is an **FI_GI_Window**.*
- virtual class **FI_GI_Window** const * **as_gl_window** () const
- virtual **FI_Group** * **as_group** ()
 - Returns an **FI_Group** pointer if this widget is an **FI_Group**.*
- virtual **FI_Group** const * **as_group** () const
- virtual **FI_Window** * **as_window** ()
 - Returns an **FI_Window** pointer if this widget is an **FI_Window**.*
- virtual **FI_Window** const * **as_window** () const
- void **bind_deimage** (**FI_Image** *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** (**FI_Image** *img)
 - Sets the image to use as part of the widget label when in the active state.*
- void **bind_image** (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*

- [FI_Boxtype box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void [callback](#) ([FI_Callback](#) *cb, void *p)
Sets the current callback function and data for the widget.
- void [callback](#) ([FI_Callback0](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback1](#) *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int [changed](#) () const
Checks if the widget value changed since the last callback.
- void [clear_active](#) ()
Marks the widget as inactive without sending events or changing focus.
- void [clear_changed](#) ()
Marks the value of the widget as unchanged.
- void [clear_damage](#) ([uchar](#) c=0)
Clears or sets the damage flags.
- void [clear_output](#) ()
Sets a widget to accept input.
- void [clear_visible](#) ()
Hides the widget.
- void [clear_visible_focus](#) ()
Disables keyboard focus navigation with this widget.
- [FI_Color color](#) () const
Gets the background color of the widget.
- void [color](#) ([FI_Color](#) bg)
Sets the background color of the widget.
- void [color](#) ([FI_Color](#) bg, [FI_Color](#) sel)
Sets the background and selection color of the widget.
- [FI_Color color2](#) () const
For back compatibility only.
- void [color2](#) (unsigned a)
For back compatibility only.
- int [contains](#) (const [FI_Widget](#) *w) const
Checks if w is a child of this widget.
- void [copy_label](#) (const char *new_label)
Sets the current label.
- void [copy_tooltip](#) (const char *text)
Sets the current tooltip text.
- [uchar damage](#) () const
Returns non-zero if [draw\(\)](#) needs to be called.
- void [damage](#) ([uchar](#) c)
Sets the damage bits for the widget.
- void [damage](#) ([uchar](#) c, int x, int y, int w, int h)

- Sets the damage bits for an area inside the widget.*

 - int **damage_resize** (int, int, int, int)

Internal use only.
- void **deactivate** ()

Deactivates the widget.
- **FI_Image * deimage** ()

Gets the image that is used as part of the widget label when in the inactive state.
- const **FI_Image * deimage** () const

Gets the image that is used as part of the widget label when in the inactive state.
- void **deimage** (FI_Image &img)

Sets the image to use as part of the widget label when in the inactive state.
- void **deimage** (FI_Image *img)

Sets the image to use as part of the widget label when in the inactive state.
- int **deimage_bound** () const

Returns whether the inactive image is managed by the widget.
- void **do_callback** (FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with default arguments.
- void **do_callback** (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void **do_callback** (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)

Calls the widget callback function with arbitrary arguments.
- void **draw_label** (int, int, int, int, FI_Align) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int **h** () const

Gets the widget height.
- virtual void **hide** ()

Makes a widget invisible.
- **FI_Image * image** ()

Gets the image that is used as part of the widget label when in the active state.
- const **FI_Image * image** () const

Gets the image that is used as part of the widget label when in the active state.
- void **image** (FI_Image &img)

Sets the image to use as part of the widget label when in the active state.
- void **image** (FI_Image *img)

Sets the image to use as part of the widget label when in the active state.
- int **image_bound** () const

Returns whether the image is managed by the widget.
- int **inside** (const FI_Widget *wgt) const

Checks if this widget is a child of wgt.
- int **is_label_copied** () const

Returns whether the current label was assigned with [copy_label\(\)](#).
- const char * **label** () const

Gets the current label text.
- void **label** (const char *text)

Sets the current label pointer.
- void **label** (FI_Labeltype a, const char *b)

Shortcut to set the label text and type in one call.
- **FI_Color labelcolor** () const

Gets the label color.
- void **labelcolor** (FI_Color c)

Sets the label color.

- [FI_Font labelfont](#) () const
Gets the font to use.
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group * parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group *p](#))
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()

- Makes a widget visible.*

 - void [size](#) (int W, int H)
- Changes the size of the widget.*

 - int [take_focus](#) ()
- Gives the widget the keyboard focus.*

 - unsigned int [takeevents](#) () const
- Returns if the widget is able to take events.*

 - int [test_shortcut](#) ()
- Returns true if the widget's label contains the entered '&x' shortcut.*

 - const char * [tooltip](#) () const
- Gets the current tooltip text.*

 - void [tooltip](#) (const char *text)
- Sets the current tooltip text.*

 - [Fl_Window](#) * [top_window](#) () const
- Returns a pointer to the top-level window for the widget.*

 - [Fl_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
- Finds the x/y offset of the current widget relative to the top-level window.*

 - [uchar](#) [type](#) () const
- Gets the widget type.*

 - void [type](#) ([uchar](#) t)
- Sets the widget type.*

 - int [use_accents_menu](#) ()
- Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*

 - void * [user_data](#) () const
- Gets the user data for this widget.*

 - void [user_data](#) ([Fl_Callback_User_Data](#) *v, bool auto_free)
- Sets the user data for this widget.*

 - void [user_data](#) (void *v)
- Sets the user data for this widget.*

 - unsigned int [visible](#) () const
- Returns whether a widget is visible.*

 - unsigned int [visible_focus](#) () const
- Checks whether this widget has a visible focus.*

 - void [visible_focus](#) (int v)
- Modifies keyboard focus navigation.*

 - int [visible_r](#) () const
- Returns whether a widget and all its parents are visible.*

 - int [w](#) () const
- Gets the widget width.*

 - [Fl_When](#) [when](#) () const
- Returns the conditions under which the callback is called.*

 - void [when](#) ([uchar](#) i)
- Sets the flags used to decide when a callback is called.*

 - [Fl_Window](#) * [window](#) () const
- Returns a pointer to the nearest parent window up the widget hierarchy.*

 - int [x](#) () const
- Gets the widget position in its window.*

 - int [y](#) () const
- Gets the widget position in its window.*

 - virtual [~Fl_Widget](#) ()
- Destroys the widget.*

Additional Inherited Members

Static Public Member Functions inherited from FI_Widget

- static void `default_callback` (FI_Widget *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
`INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
`FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
 ,
`OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
 ,
`MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
 ,
`GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
`NEEDS_KEYBOARD = 1<<20` , `IMAGE_BOUND = 1<<21` , `DEIMAGE_BOUND = 1<<22` ,
`AUTO_DELETE_USER_DATA = 1<<23` ,
`MAXIMIZED = 1<<24` , `POPOP = 1<<25` , `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` ,
`USERFLAG1 = 1<<31` }
flags possible values enumeration.

Protected Member Functions inherited from FI_Button

- void `draw` () `FL_OVERRIDE`
Draws the widget.
- void `simulate_key_action` ()

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.

- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int `v`)
Internal use only.
- void `set_flag` (unsigned int `c`)
Sets a flag in the flags mask.
- void `w` (int `v`)
Internal use only.
- void `x` (int `v`)
Internal use only.
- void `y` (int `v`)
Internal use only.

Static Protected Member Functions inherited from `FI_Button`

- static void `key_release_timeout` (void *)

Static Protected Attributes inherited from `FI_Button`

- static `FI_Widget_Tracker` * `key_release_tracker` = 0

12.150.1 Detailed Description

The toggle button is a push button that needs to be clicked once to toggle on, and one more time to toggle off. The `FI_Toggle_Button` subclass displays the "on" state by drawing a pushed-in button. Buttons generate callbacks when they are clicked by the user. You control exactly when and how by changing the values for `type()` and `when()`.

12.150.2 Constructor & Destructor Documentation

12.150.2.1 `FI_Toggle_Button()`

```
FI_Toggle_Button::FI_Toggle_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `FI_Toggle_Button` widget using the given position, size, and label string. The constructor creates the button using the given position, size, and label. The inherited destructor deletes the toggle button. The Button `type()` is set to `FL_TOGGLE_BUTTON`.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

The documentation for this class was generated from the following files:

- `FI_Toggle_Button.H`
- `FI_Button.cxx`

12.151 Fl_Tooltip Class Reference

The [Fl_Tooltip](#) class provides tooltip support for all FLTK widgets.

```
#include <Fl_Tooltip.H>
```

Static Public Member Functions

- static [Fl_Color](#) [color](#) ()
Gets the background color for tooltips.
- static void [color](#) ([Fl_Color](#) c)
Sets the background color for tooltips.
- static [Fl_Widget](#) * [current](#) ()
Gets the current widget target.
- static void [current](#) ([Fl_Widget](#) *)
Sets the current widget target.
- static [Fl_Window](#) * [current_window](#) (void)
Returns the window that is used for tooltips.
- static float [delay](#) ()
Gets the tooltip delay.
- static void [delay](#) (float f)
Sets the tooltip delay.
- static void [disable](#) ()
Same as [enable\(0\)](#), disables tooltips on all widgets.
- static void [enable](#) (int b=1)
Enables tooltips on all widgets (or disables if b is false).
- static int [enabled](#) ()
Returns non-zero if tooltips are enabled.
- static void [enter_area](#) ([Fl_Widget](#) *w, int X, int Y, int W, int H, const char *tip)
You may be able to use this to provide tooltips for internal pieces of your widget.
- static [Fl_Font](#) [font](#) ()
Gets the typeface for the tooltip text.
- static void [font](#) ([Fl_Font](#) i)
Sets the typeface for the tooltip text.
- static float [hidedelay](#) ()
Gets the time until an open tooltip hides again.
- static void [hidedelay](#) (float f)
Sets the time until an open tooltip hides again.
- static float [hoverdelay](#) ()
Gets the tooltip hover delay, the delay between tooltips.
- static void [hoverdelay](#) (float f)
Sets the tooltip hover delay, the delay between tooltips.
- static int [margin_height](#) ()
Gets the amount of extra space above and below the tooltip's text.
- static void [margin_height](#) (int v)
Sets the amount of extra space above and below the tooltip's text.
- static int [margin_width](#) ()
Gets the amount of extra space left/right of the tooltip's text.
- static void [margin_width](#) (int v)
Sets the amount of extra space left/right of the tooltip's text.
- static [Fl_Fontsize](#) [size](#) ()
Gets the size of the tooltip text.
- static void [size](#) ([Fl_Fontsize](#) s)

- Sets the size of the tooltip text.
 - static `Fl_Color` `textcolor` ()
 - Gets the color of the text in the tooltip.
 - static void `textcolor` (`Fl_Color` c)
 - Sets the color of the text in the tooltip.
 - static int `wrap_width` ()
 - Gets the maximum width for tooltip's text before it word wraps.
 - static void `wrap_width` (int v)
 - Sets the maximum width for tooltip's text before it word wraps.

Static Public Attributes

- static void(* `enter`)(`Fl_Widget` *w) = nothing
- static void(* `exit`)(`Fl_Widget` *w) = nothing

Friends

- class `Fl_TooltipBox`
- void `Fl_Widget::copy_tooltip` (const char *)
- void `Fl_Widget::tooltip` (const char *)

12.151.1 Detailed Description

The `Fl_Tooltip` class provides tooltip support for all FLTK widgets. It contains only static methods.

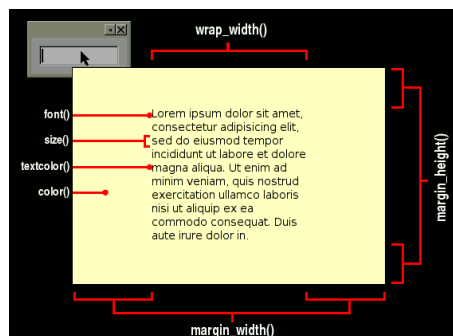


Figure 12.61 Fl_Tooltip Options

12.151.2 Member Function Documentation

12.151.2.1 `color()` [1/2]

```
static Fl_Color Fl_Tooltip::color ( ) [inline], [static]
```

Gets the background color for tooltips.
The default background color is a pale yellow.

12.151.2.2 `color()` [2/2]

```
static void Fl_Tooltip::color (
    Fl_Color c ) [inline], [static]
```

Sets the background color for tooltips.
The default background color is a pale yellow.

12.151.2.3 current()

```
void Fl_Tooltip::current (
    Fl_Widget * w ) [static]
```

Sets the current widget target.

Acts as though `enter(widget)` was done but does not pop up a tooltip. This is useful to prevent a tooltip from reappearing when a modal overlapping window is deleted. FLTK does this automatically when you click the mouse button.

12.151.2.4 delay() [1/2]

```
static float Fl_Tooltip::delay ( ) [inline], [static]
```

Gets the tooltip delay.

The default delay is 1.0 seconds.

12.151.2.5 delay() [2/2]

```
static void Fl_Tooltip::delay (
    float f ) [inline], [static]
```

Sets the tooltip delay.

The default delay is 1.0 seconds.

12.151.2.6 disable()

```
static void Fl_Tooltip::disable ( ) [inline], [static]
```

Same as `enable(0)`, disables tooltips on all widgets.

12.151.2.7 enable()

```
static void Fl_Tooltip::enable (
    int b = 1 ) [inline], [static]
```

Enables tooltips on all widgets (or disables if `b` is false).

12.151.2.8 enabled()

```
static int Fl_Tooltip::enabled ( ) [inline], [static]
```

Returns non-zero if tooltips are enabled.

12.151.2.9 enter_area()

```
void Fl_Tooltip::enter_area (
    Fl_Widget * wid,
    int x,
    int y,
    int w,
    int h,
    const char * t ) [static]
```

You may be able to use this to provide tooltips for internal pieces of your widget.

Call this after setting `Fl::belowmouse()` to your widget (because that calls the above `enter()` method). Then figure out what thing the mouse is pointing at, and call this with the widget (this pointer is used to remove the tooltip if the widget is deleted or hidden, and to locate the tooltip), the rectangle surrounding the area, relative to the top-left

corner of the widget (used to calculate where to put the tooltip), and the text of the tooltip (which must be a pointer to static data as it is not copied).

12.151.2.10 font() [1/2]

```
static Fl_Font Fl_Tooltip::font ( ) [inline], [static]
```

Gets the typeface for the tooltip text.

12.151.2.11 font() [2/2]

```
static void Fl_Tooltip::font (
    Fl_Font i ) [inline], [static]
```

Sets the typeface for the tooltip text.

12.151.2.12 hidelay() [1/2]

```
static float Fl_Tooltip::hidelay ( ) [inline], [static]
```

Gets the time until an open tooltip hides again.
The default delay is 12.0 seconds.

12.151.2.13 hidelay() [2/2]

```
static void Fl_Tooltip::hidelay (
    float f ) [inline], [static]
```

Sets the time until an open tooltip hides again.
The default delay is 12.0 seconds.

12.151.2.14 hoverdelay() [1/2]

```
static float Fl_Tooltip::hoverdelay ( ) [inline], [static]
```

Gets the tooltip hover delay, the delay between tooltips.
The default delay is 0.2 seconds.

12.151.2.15 hoverdelay() [2/2]

```
static void Fl_Tooltip::hoverdelay (
    float f ) [inline], [static]
```

Sets the tooltip hover delay, the delay between tooltips.
The default delay is 0.2 seconds.

12.151.2.16 margin_height() [1/2]

```
static int Fl_Tooltip::margin_height ( ) [inline], [static]
```

Gets the amount of extra space above and below the tooltip's text.
Default is 3.

12.151.2.17 margin_height() [2/2]

```
static void Fl_Tooltip::margin_height (
    int v ) [inline], [static]
```

Sets the amount of extra space above and below the tooltip's text.
Default is 3.

12.151.2.18 margin_width() [1/2]

```
static int Fl_Tooltip::margin_width ( ) [inline], [static]
```

Gets the amount of extra space left/right of the tooltip's text.

Default is 3.

12.151.2.19 margin_width() [2/2]

```
static void Fl_Tooltip::margin_width (
    int v ) [inline], [static]
```

Sets the amount of extra space left/right of the tooltip's text.

Default is 3.

12.151.2.20 size() [1/2]

```
static Fl_Fontsize Fl_Tooltip::size ( ) [inline], [static]
```

Gets the size of the tooltip text.

12.151.2.21 size() [2/2]

```
static void Fl_Tooltip::size (
    Fl_Fontsize s ) [inline], [static]
```

Sets the size of the tooltip text.

12.151.2.22 textcolor() [1/2]

```
static Fl_Color Fl_Tooltip::textcolor ( ) [inline], [static]
```

Gets the color of the text in the tooltip.

The default is black.

12.151.2.23 textcolor() [2/2]

```
static void Fl_Tooltip::textcolor (
    Fl_Color c ) [inline], [static]
```

Sets the color of the text in the tooltip.

The default is black.

12.151.2.24 wrap_width() [1/2]

```
static int Fl_Tooltip::wrap_width ( ) [inline], [static]
```

Gets the maximum width for tooltip's text before it word wraps.

Default is 400.

12.151.2.25 wrap_width() [2/2]

```
static void Fl_Tooltip::wrap_width (
    int v ) [inline], [static]
```

Sets the maximum width for tooltip's text before it word wraps.

Default is 400.

The documentation for this class was generated from the following files:

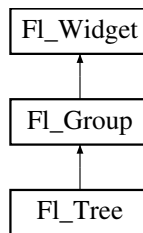
- [Fl_Tooltip.H](#)
- [Fl.cxx](#)
- [Fl_Tooltip.cxx](#)

12.152 FI_Tree Class Reference

Tree widget.

```
#include <FI_Tree.H>
```

Inheritance diagram for FI_Tree:



Public Member Functions

- `FI_Tree_Item * add (const char *path, FI_Tree_Item *newitem=0)`
Adds a new item, given a menu style 'path'.
- `FI_Tree_Item * add (FI_Tree_Item *parent_item, const char *name)`
Add a new child item labeled 'name' to the specified 'parent_item'.
- `void calc_dimensions ()`
Recalculate widget dimensions and scrollbar visibility, normally managed automatically.
- `void calc_tree ()`
Recalculates the tree's sizes and scrollbar visibility, normally managed automatically.
- `FI_Tree_Item * callback_item ()`
Gets the item that caused the callback.
- `void callback_item (FI_Tree_Item *item)`
Sets the item that was changed for this callback.
- `FI_Tree_Reason callback_reason () const`
Gets the reason for this callback.
- `void callback_reason (FI_Tree_Reason reason)`
Sets the reason for this callback.
- `void clear ()`
Clear the entire tree's children, including the root.
- `void clear_children (FI_Tree_Item *item)`
Clear all the children for 'item'.
- `int close (const char *path, int docallback=1)`
Closes the item specified by 'path'.
- `int close (FI_Tree_Item *item, int docallback=1)`
Closes the specified 'item'.
- `FI_Image * closeicon () const`
Returns the icon to be used as the 'close' icon.
- `void closeicon (FI_Image *val)`
Sets the icon to be used as the 'close' icon.
- `FI_Color connectorcolor () const`
Get the connector color used for tree connection lines.
- `void connectorcolor (FI_Color val)`
Set the connector color used for tree connection lines.
- `FI_Tree_Connector connectorstyle () const`
Returns the line drawing style for inter-connecting items.
- `void connectorstyle (FI_Tree_Connector val)`
Sets the line drawing style for inter-connecting items.

- int **connectorwidth** () const
Gets the width of the horizontal connection lines (in pixels) that appear to the left of each tree item's label.
- void **connectorwidth** (int val)
Sets the width of the horizontal connection lines (in pixels) that appear to the left of each tree item's label.
- int **deselect** (const char *path, int docallback=1)
Deselect an item specified by 'path'.
- int **deselect** (FL_Tree_Item *item, int docallback=1)
Deselect the specified item.
- int **deselect_all** (FL_Tree_Item *item=0, int docallback=1)
Deselect 'item' and all its children.
- void **display** (FL_Tree_Item *item)
Displays 'item', scrolling the tree as necessary.
- int **displayed** (FL_Tree_Item *item)
See if 'item' is currently displayed on-screen (visible within the widget).
- int **extend_selection** (FL_Tree_Item *from, FL_Tree_Item *to, int val=1, bool visible=false)
Extend a selection between 'from' and 'to' depending on 'visible'.
- int **extend_selection_dir** (FL_Tree_Item *from, FL_Tree_Item *to, int dir, int val, bool visible)
Extend the selection between and including 'from' and 'to' depending on direction 'dir', 'val', and 'visible'.
- FL_Tree_Item * **find_clicked** (int yonly=0)
Non-const version of FL_Tree::find_clicked(int yonly) const.
- const FL_Tree_Item * **find_clicked** (int yonly=0) const
Find the item that was last clicked on.
- FL_Tree_Item * **find_item** (const char *path)
*Non-const version of FL_Tree::find_item(const char *path) const.*
- const FL_Tree_Item * **find_item** (const char *path) const
Find the item, given a menu style path, e.g.
- FL_Tree_Item * **first** ()
Returns the first item in the tree, or 0 if none.
- FL_Tree_Item * **first_selected_item** ()
Returns the first selected item in the tree.
- FL_Tree_Item * **first_visible** ()
Returns the first open(), visible item in the tree, or 0 if none.
- FL_Tree_Item * **first_visible_item** ()
Returns the first open(), visible item in the tree, or 0 if none.
- **FL_Tree** (int X, int Y, int W, int H, const char *L=0)
Constructor.
- FL_Tree_Item * **get_item_focus** () const
Get the item that currently has keyboard focus.
- int **get_selected_items** (FL_Tree_Item_Array &items)
Returns the currently selected items as an array of 'ret_items'.
- int **handle** (int e) **FL_OVERRIDE**
Standard FLTK event handler for this widget.
- int **hposition** () const
Returns the horizontal scroll position as a pixel offset.
- void **hposition** (int pos)
Sets the horizontal scroll offset to position 'pos'.
- FL_Tree_Item * **insert** (FL_Tree_Item *item, const char *name, int pos)
Insert a new item 'name' into 'item's children at position 'pos'.
- FL_Tree_Item * **insert_above** (FL_Tree_Item *above, const char *name)
Inserts a new item 'name' above the specified FL_Tree_Item 'above'.

- int [is_close](#) (const char *path) const
See if item specified by 'path' is closed.
- int [is_close](#) (FI_Tree_Item *item) const
See if the specified 'item' is closed.
- int [is_hscroll_visible](#) () const
See if the horizontal scrollbar is currently visible.
- int [is_open](#) (const char *path) const
See if item specified by 'path' is open.
- int [is_open](#) (FI_Tree_Item *item) const
See if 'item' is open.
- int [is_scrollbar](#) (FI_Widget *w)
See if widget 'w' is one of the FI_Tree widget's scrollbars.
- int [is_selected](#) (const char *path)
See if item specified by 'path' is selected.
- int [is_selected](#) (FI_Tree_Item *item) const
See if the specified 'item' is selected.
- int [is_vscroll_visible](#) () const
See if the vertical scrollbar is currently visible.
- [FI_Tree_Item * item_clicked](#) ()
Return the item that was last clicked.
- [FI_Tree_Item_Draw_Mode item_draw_mode](#) () const
Get the 'item draw mode' used for the tree.
- void [item_draw_mode](#) (FI_Tree_Item_Draw_Mode mode)
Set the 'item draw mode' used for the tree to 'mode'.
- void [item_draw_mode](#) (int mode)
Set the 'item draw mode' used for the tree to integer 'mode'.
- void [item_labelbgcolor](#) (FI_Color val)
Set the default label background color used for creating new items.
- [FI_Color item_labelbgcolor](#) (void) const
Get the default label background color used for creating new items.
- void [item_labelfgcolor](#) (FI_Color val)
Set the default label foreground color used for creating new items.
- [FI_Color item_labelfgcolor](#) (void) const
Get the default label foreground color used for creating new items.
- [FI_Font item_labelfont](#) () const
Get the default font face used for creating new items.
- void [item_labelfont](#) (FI_Font val)
Set the default font face used for creating new items.
- [FI_Fontsize item_labelsize](#) () const
Get the default label fontsize used for creating new items.
- void [item_labelsize](#) (FI_Fontsize val)
Set the default label font size used for creating new items.
- int [item_pathname](#) (char *pathname, int pathnamelen, const FI_Tree_Item *item) const
Return 'pathname' of size 'pathnamelen' for the specified 'item'.
- [FI_Tree_Item_Reselect_Mode item_reselect_mode](#) () const
Returns the current item re/selection mode.
- void [item_reselect_mode](#) (FI_Tree_Item_Reselect_Mode mode)
Sets the item re/selection mode.
- int [labelmarginleft](#) () const
Get the amount of white space (in pixels) that should appear to the left of the label text.
- void [labelmarginleft](#) (int val)

- Set the amount of white space (in pixels) that should appear to the left of the label text.*

 - [Fl_Tree_Item](#) * [last](#) ()
 - Returns the last item in the tree.*
 - [Fl_Tree_Item](#) * [last_selected_item](#) ()
 - Returns the last selected item in the tree.*
 - [Fl_Tree_Item](#) * [last_visible](#) ()
 - Returns the last [open\(\)](#), visible item in the tree.*
 - [Fl_Tree_Item](#) * [last_visible_item](#) ()
 - Returns the last [open\(\)](#), visible item in the tree.*
- int [linespacing](#) () const
 - Get the amount of white space (in pixels) that should appear between items in the tree.*
- void [linespacing](#) (int val)
 - Sets the amount of white space (in pixels) that should appear between items in the tree.*
- void [load](#) (class [Fl_Preferences](#) &)
 - Load FLTK preferences.*
- int [marginbottom](#) () const
 - Get the amount of white space (in pixels) that should appear below the last visible item when the vertical scroller is scrolled to the bottom.*
- void [marginbottom](#) (int val)
 - Sets the amount of white space (in pixels) that should appear below the last visible item when the vertical scroller is scrolled to the bottom.*
- int [marginleft](#) () const
 - Get the amount of white space (in pixels) that should appear between the widget's left border and the tree's contents.*
- void [marginleft](#) (int val)
 - Set the amount of white space (in pixels) that should appear between the widget's left border and the left side of the tree's contents.*
- int [margintop](#) () const
 - Get the amount of white space (in pixels) that should appear between the widget's top border and the top of the tree's contents.*
- void [margintop](#) (int val)
 - Sets the amount of white space (in pixels) that should appear between the widget's top border and the top of the tree's contents.*
- [Fl_Tree_Item](#) * [next](#) ([Fl_Tree_Item](#) *item=0)
 - Return the next item after 'item', or 0 if no more items.*
- [Fl_Tree_Item](#) * [next_item](#) ([Fl_Tree_Item](#) *item, int dir=[FL_Down](#), bool visible=false)
 - Returns next item after 'item' in direction 'dir' depending on 'visible'.*
- [Fl_Tree_Item](#) * [next_selected_item](#) ([Fl_Tree_Item](#) *item=0, int dir=[FL_Down](#))
 - Returns the next selected item above or below 'item', depending on 'dir'.*
- [Fl_Tree_Item](#) * [next_visible_item](#) ([Fl_Tree_Item](#) *start, int dir)
 - Returns next [open\(\)](#), visible item above (dir==[FL_Up](#)) or below (dir==[FL_Down](#)) the specified 'item', or 0 if no more items.*
- int [open](#) (const char *path, int docallback=1)
 - Opens the item specified by 'path'.*
- int [open](#) ([Fl_Tree_Item](#) *item, int docallback=1)
 - Open the specified 'item'.*
- void [open_toggle](#) ([Fl_Tree_Item](#) *item, int docallback=1)
 - Toggle the open state of 'item'.*
- int [openchild_marginbottom](#) () const
 - Get the amount of white space (in pixels) that should appear below an open child tree's contents.*
- void [openchild_marginbottom](#) (int val)
 - Set the amount of white space (in pixels) that should appear below an open child tree's contents.*
- [Fl_Image](#) * [openicon](#) () const

- Returns the icon to be used as the 'open' icon.*

 - void `openicon` (`FI_Image *val`)
- Sets the icon to be used as the 'open' icon.*

 - const `FI_Tree_Prefs & prefs` () const
- `FI_Tree_Item * prev` (`FI_Tree_Item *item=0`)

Return the previous item before 'item', or 0 if no more items.
- void `recalc_tree` ()

Schedule tree to recalc the entire tree size.
- int `remove` (`FI_Tree_Item *item`)

Remove the specified 'item' from the tree.
- void `resize` (int, int, int) `FL_OVERRIDE`

Resizes the `FI_Group` widget and all of its children.
- `FI_Tree_Item * root` ()

Returns the root item.
- void `root` (`FI_Tree_Item *newitem`)

Sets the root item to 'newitem'.
- void `root_label` (const char *new_label)

Set the label for the root item to 'new_label'.
- int `scrollbar_size` () const

Gets the default size of scrollbars' troughs for this widget in pixels.
- void `scrollbar_size` (int size)

Sets the pixel size of the scrollbars' troughs to 'size' for this widget, in pixels.
- int `select` (const char *path, int docallback=1)

Select the item specified by 'path'.
- int `select` (`FI_Tree_Item *item`, int docallback=1)

Select the specified 'item'.
- int `select_all` (`FI_Tree_Item *item=0`, int docallback=1)

Select 'item' and all its children.
- int `select_only` (`FI_Tree_Item *selitem`, int docallback=1)

Select only the specified item, deselecting all others that might be selected.
- void `select_toggle` (`FI_Tree_Item *item`, int docallback=1)

Toggle the select state of the specified 'item'.
- `FI_Boxtype selectbox` () const

Sets the style of box used to draw selected items.
- void `selectbox` (`FI_Boxtype val`)

Gets the style of box used to draw selected items.
- `FI_Tree_Select selectmode` () const

Gets the tree's current selection mode.
- void `selectmode` (`FI_Tree_Select val`)

Sets the tree's selection mode.
- void `set_item_focus` (`FI_Tree_Item *item`)

Set the item that currently should have keyboard focus.
- void `show_item` (`FI_Tree_Item *item`)

Adjust the vertical scrollbar to show 'item' at the top of the display IF it is currently off-screen (for instance `show_item_top()`).
- void `show_item` (`FI_Tree_Item *item`, int yoff)

Adjust the vertical scrollbar so that 'item' is visible 'yoff' pixels from the top of the `FI_Tree` widget's display.
- void `show_item_bottom` (`FI_Tree_Item *item`)

Adjust the vertical scrollbar so that 'item' is at the bottom of the display.
- void `show_item_middle` (`FI_Tree_Item *item`)

Adjust the vertical scrollbar so that 'item' is in the middle of the display.

- void `show_item_top` (`FI_Tree_Item *item`)
Adjust the vertical scrollbar so that 'item' is at the top of the display.
- void `show_self` ()
Print the tree as 'ascii art' to stdout.
- int `showcollapse` () const
Returns 1 if the collapse icon is enabled, 0 if not.
- void `showcollapse` (int val)
Set if we should show the collapse icon or not.
- int `showroot` () const
Returns 1 if the root item is to be shown, or 0 if not.
- void `showroot` (int val)
Set if the root item should be shown or not.
- `FI_Tree_Sort` `sortorder` () const
Set the default sort order used when items are added to the tree.
- void `sortorder` (`FI_Tree_Sort` val)
Gets the sort order used to add items to the tree.
- `FI_Image` * `usericon` () const
Returns the FI_Image being used as the default user icon for all newly created items.
- void `usericon` (`FI_Image *val`)
Sets the FI_Image to be used as the default user icon for all newly created items.
- int `usericonmarginleft` () const
Get the amount of white space (in pixels) that should appear to the left of the usericon.
- void `usericonmarginleft` (int val)
Set the amount of white space (in pixels) that should appear to the left of the usericon.
- int `vposition` () const
Returns the vertical scroll position as a pixel offset.
- void `vposition` (int pos)
Sets the vertical scroll offset to position 'pos'.
- int `widgetmarginleft` () const
Get the amount of white space (in pixels) that should appear to the left of the child fltk widget (if any).
- void `widgetmarginleft` (int val)
Set the amount of white space (in pixels) that should appear to the left of the child fltk widget (if any).
- `~FI_Tree` ()
Destructor.

Public Member Functions inherited from `FI_Group`

- `FI_Widget` *& `_ddfdesign_kludge` ()
This is for forms compatibility only.
- void `add` (`FI_Widget &`)
The widget is removed from its current group (if any) and then added to the end of this group.
- void `add` (`FI_Widget *o`)
See void FI_Group::add(FI_Widget &w)
- void `add_resizable` (`FI_Widget &o`)
Adds a widget to the group and makes it the resizable widget.
- `FI_Widget` *const * `array` () const
Returns a pointer to the array of children.
- `FI_Group` const * `as_group` () const `FL_OVERRIDE`
- `FI_Group` * `as_group` () `FL_OVERRIDE`
Returns an FI_Group pointer if this widget is an FI_Group.
- void `begin` ()

- Sets the current group so you can build the widget tree by just constructing the widgets.*
- `FL_Widget * child (int n) const`
 - Returns `array()[n]`.*
- `int children () const`
 - Returns how many child widgets the group has.*
- `void clear ()`
 - Deletes all child widgets from memory recursively.*
- `unsigned int clip_children ()`
 - Returns the current clipping mode.*
- `void clip_children (int c)`
 - Controls whether the group widget clips the drawing of child widgets to its bounding box.*
- `virtual int delete_child (int n)`
 - Removes the widget at `index` from the group and deletes it.*
- `void end ()`
 - Exactly the same as `current(this->parent())`.*
- `int find (const FL_Widget &o) const`
 - See `int FL_Group::find(const FL_Widget *w) const`.*
- `int find (const FL_Widget *) const`
 - Searches the child array for the widget and returns the index.*
- `FL_Group (int, int, int, int, const char * = 0)`
 - Creates a new `FL_Group` widget using the given position, size, and label string.*
- `void focus (FL_Widget *W)`
- `void forms_end ()`
 - This is for forms compatibility only.*
- `void init_sizes ()`
 - Resets the internal array of widget sizes and positions.*
- `void insert (FL_Widget &, int i)`
 - The widget is removed from its current group (if any) and then inserted into this group.*
- `void insert (FL_Widget &o, FL_Widget *before)`
 - This does `insert(w, find(before))`.*
- `void remove (FL_Widget &)`
 - Removes a widget from the group but does not delete it.*
- `void remove (FL_Widget *o)`
 - Removes the widget `o` from the group.*
- `void remove (int index)`
 - Removes the widget at `index` from the group but does not delete it.*
- `FL_Widget * resizable () const`
 - Returns the group's resizable widget.*
- `void resizable (FL_Widget &o)`
 - Sets the group's resizable widget.*
- `void resizable (FL_Widget *o)`
 - The resizable widget defines both the resizing box and the resizing behavior of the group and its children.*
- `virtual ~FL_Group ()`
 - The destructor also deletes all the children.*

Public Member Functions inherited from FI_Widget

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **FI_Align align** () const
Gets the label alignment.
- void **align** (**FI_Align** alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **FI_Gl_Window * as_gl_window** ()
Returns an FI_Gl_Window pointer if this widget is an FI_Gl_Window.
- virtual class **FI_Gl_Window const * as_gl_window** () const
- virtual **FI_Window * as_window** ()
Returns an FI_Window pointer if this widget is an FI_Window.
- virtual **FI_Window const * as_window** () const
- void **bind_deimage** (**FI_Image *img**)
Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** (**FI_Image *img**)
Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- **FI_Boxtype box** () const
Gets the box type of the widget.
- void **box** (**FI_Boxtype** new_box)
Sets the box type for the widget.
- **FI_Callback_p callback** () const
Gets the current callback function for the widget.
- void **callback** (**FI_Callback *cb**)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback *cb**, **FI_Callback_User_Data *p**, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void **callback** (**FI_Callback *cb**, void *p)
Sets the current callback function and data for the widget.
- void **callback** (**FI_Callback0 *cb**)
Sets the current callback function for the widget.
- void **callback** (**FI_Callback1 *cb**, long p=0)
Sets the current callback function for the widget.
- unsigned int **changed** () const
Checks if the widget value changed since the last callback.
- void **clear_active** ()

- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (uchar c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FL_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FL_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FL_Color` bg, `FL_Color` sel)
- Sets the background and selection color of the widget.*

 - `FL_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FL_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - uchar `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (uchar c)
- Sets the damage bits for the widget.*

 - void `damage` (uchar c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

 - `FL_Image` * `deimage` ()
- Gets the image that is used as part of the widget label when in the inactive state.*

 - const `FL_Image` * `deimage` () const
- Gets the image that is used as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` &img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FL_Image` *img)
- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const
- Returns whether the inactive image is managed by the widget.*

 - void `do_callback` (`FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with default arguments.*

 - void `do_callback` (`FL_Widget` *widget, long arg, `FL_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
- Calls the widget callback function with arbitrary arguments.*

- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) `const`
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- `int h` () `const`
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FI_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- `const FI_Image * image` () `const`
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- `int image_bound` () `const`
Returns whether the image is managed by the widget.
- `int inside` (`const FI_Widget *wgt`) `const`
Checks if this widget is a child of `wgt`.
- `int is_label_copied` () `const`
Returns whether the current label was assigned with `copy_label()`.
- `const char * label` () `const`
Gets the current label text.
- void `label` (`const char *text`)
Sets the current label pointer.
- void `label` (`FI_Labeltype a`, `const char *b`)
Shortcut to set the label text and type in one call.
- `FI_Color labelcolor` () `const`
Gets the label color.
- void `labelcolor` (`FI_Color c`)
Sets the label color.
- `FI_Font labelfont` () `const`
Gets the font to use.
- void `labelfont` (`FI_Font f`)
Sets the font to use.
- `FI_Fontsize labelsize` () `const`
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize pix`)
Sets the font size in pixels.
- `FI_Labeltype labeltype` () `const`
Gets the label type.
- void `labeltype` (`FI_Labeltype a`)
Sets the label type.
- void `measure_label` (`int &ww`, `int &hh`) `const`
Sets width `ww` and height `hh` accordingly with the label size.
- `bool needs_keyboard` () `const`
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (`bool needs`)
Sets whether this widget needs a keyboard.
- `unsigned int output` () `const`

- Returns if a widget is used for output only.*

 - `FI_Group * parent ()` const

Returns a pointer to the parent widget.
- `void parent (FI_Group *p)`

Internal use only - "for hacks only".
- `void position (int X, int Y)`

Repositions the window or widget.
- `void redraw ()`

Schedules the drawing of the widget.
- `void redraw_label ()`

Schedules the drawing of the label.
- `FI_Color selection_color ()` const

Gets the selection color.
- `void selection_color (FI_Color a)`

Sets the selection color.
- `void set_active ()`

Marks the widget as active without sending events or changing focus.
- `void set_changed ()`

Marks the value of the widget as changed.
- `void set_output ()`

Sets a widget to output only.
- `void set_visible ()`

Makes the widget visible.
- `void set_visible_focus ()`

Enables keyboard focus navigation with this widget.
- `int shortcut_label ()` const

Returns whether the widget's label uses '&' to indicate shortcuts.
- `void shortcut_label (int value)`

Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual `void show ()`

Makes a widget visible.
- `void size (int W, int H)`

Changes the size of the widget.
- `int take_focus ()`

Gives the widget the keyboard focus.
- `unsigned int takeevents ()` const

Returns if the widget is able to take events.
- `int test_shortcut ()`

Returns true if the widget's label contains the entered '&x' shortcut.
- `const char * tooltip ()` const

Gets the current tooltip text.
- `void tooltip (const char *text)`

Sets the current tooltip text.
- `FI_Window * top_window ()` const

Returns a pointer to the top-level window for the widget.
- `FI_Window * top_window_offset (int &xoff, int &yoff)` const

Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type ()` const

Gets the widget type.
- `void type (uchar t)`

Sets the widget type.

- int **use_accents_menu** ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const
Gets the user data for this widget.
- void **user_data** (FI_Callback_User_Data *v, bool auto_free)
Sets the user data for this widget.
- void **user_data** (void *v)
Sets the user data for this widget.
- unsigned int **visible** () const
Returns whether a widget is visible.
- unsigned int **visible_focus** () const
Checks whether this widget has a visible focus.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.
- int **w** () const
Gets the widget width.
- FI_When **when** () const
Returns the conditions under which the callback is called.
- void **when** (uchar i)
Sets the flags used to decide when a callback is called.
- FI_Window * **window** () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual ~FI_Widget ()
Destroys the widget.

Protected Member Functions

- void **do_callback_for_item** (FI_Tree_Item *item, FI_Tree_Reason reason)
Do the callback for the specified 'item' using 'reason', setting the callback_item() and callback_reason().
- void **draw** () FL_OVERRIDE
Standard FLTK draw() method, handles drawing the tree widget.
- void **item_clicked** (FI_Tree_Item *val)
Set the item that was last clicked.

Protected Member Functions inherited from FI_Group

- FI_Rect * **bounds** ()
Returns the internal array of widget sizes and positions.
- void **draw_child** (FI_Widget &widget) const
Forces a child to redraw.
- void **draw_children** ()
Draws all children of the group.
- void **draw_outside_label** (const FI_Widget &widget) const
Parents normally call this to draw outside labels of child widgets.
- virtual int **on_insert** (FI_Widget *, int)
Allow derived groups to act when a widget is added as a child.

- virtual int `on_move` (int, int)
Allow derived groups to act when a widget is moved within the group.
- virtual void `on_remove` (int)
Allow derived groups to act when a child widget is removed from the group.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (FI_Widget &widget) const
Draws a child only if it needs it.

Protected Member Functions inherited from FI_Widget

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If FL_ALIGN_IMAGE_BACKDROP is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (FI_Boxtype t, FI_Color c) const
Draws a box of type t, of color c at the widget's position and size.
- void `draw_box` (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void `draw_focus` () const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void `draw_focus` (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const
Draws a focus box for the widget at the given position and size.
- void `draw_label` () const
Draws the widget's label at the defined label position.
- void `draw_label` (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- FI_Widget (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int `flags` () const
Gets the widget flags mask.
- void `h` (int v)
Internal use only.
- void `set_flag` (unsigned int c)
Sets a flag in the flags mask.
- void `w` (int v)
Internal use only.
- void `x` (int v)
Internal use only.
- void `y` (int v)
Internal use only.

Protected Attributes

- [FI_Scrollbar](#) * **_hscroll**
Horizontal scrollbar.
- int **_tih**
Tree widget inner xywh dimension: inside borders + scrollbars.
- int **_tiw**
- int **_tix**
- int **_tiy**
- int **_toh**
Tree widget outer xywh dimension: outside scrollbars, inside widget border.
- int **_tow**
- int **_tox**
- int **_toy**
- int **_tree_h**
the calculated height of the entire tree hierarchy. See [calc_tree\(\)](#)
- int **_tree_w**
the calculated width of the entire tree hierarchy. See [calc_tree\(\)](#)
- [FI_Scrollbar](#) * **_vscroll**
Vertical scrollbar.

Friends

- class [FI_Tree_Item](#)

Additional Inherited Members**Static Public Member Functions inherited from [FI_Group](#)**

- static [FI_Group](#) * **current** ()
Returns the currently active group.
- static void **current** ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from [FI_Widget](#)

- static void **default_callback** ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
, **OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
, **MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
, **GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,

```
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
USERFLAG1 = 1<<31 }
```

flags possible values enumeration.

12.152.1 Detailed Description

Tree widget.



Figure 12.62 FI_Tree example program

```
Fl_Tree // Top level widget
|--- Fl_Tree_Item // Items in the tree
|--- Fl_Tree_Prefs // Preferences for the tree
|   |--- Fl_Tree_Connector (enum) // Connection modes
|   |--- Fl_Tree_Select (enum) // Selection modes
|   |--- Fl_Tree_Sort (enum) // Sort behavior
```

Similar to `Fl_Browser`, `Fl_Tree` is a browser of `Fl_Tree_Item`'s arranged in a parented hierarchy, or 'tree'. Subtrees can be expanded or closed. Items can be added, deleted, inserted, sorted and re-ordered.

The tree items may also contain other FLTK widgets, like buttons, input fields, or even "custom" widgets.

The `callback()` is invoked depending on the value of `when()`:

- `FL_WHEN_RELEASE` – callback invoked when left mouse button is released on an item
- `FL_WHEN_CHANGED` – callback invoked when left mouse changes selection state

The simple way to define a tree:

```
#include <FL/Fl_Tree.H>
[... ]
Fl_Tree tree(X,Y,W,H);
tree.begin();
  tree.add("Flintstones/Fred");
  tree.add("Flintstones/Wilma");
  tree.add("Flintstones/Pebbles");
  tree.add("Simpsons/Homer");
  tree.add("Simpsons/Marge");
  tree.add("Simpsons/Bart");
  tree.add("Simpsons/Lisa");
tree.end();
```

FEATURES

Items can be added with `add()`, removed with `remove()`, completely cleared with `clear()`, inserted with `insert()` and `insert_above()`, selected/deselected with `select()` and `deselect()`, open/closed with `open()` and `close()`, positioned on the screen with `show_item_top()`, `show_item_middle()` and `show_item_bottom()`, item children can be swapped around with `Fl_Tree_Item::swap_children()`,

items can be moved around with `Fl_Tree_Item::move()`, an item's children can be walked with `Fl_Tree_Item::first()` and `Fl_Tree_Item::next()`, an item's children can be indexed directly with `Fl_Tree_Item::child()` and `Fl_Tree_Item::children()`, items can be moved from one subtree to another with `Fl_Tree_Item::deparent()` and `Fl_Tree_Item::reparent()`, sorting can be controlled when items are `add()`ed via `sortorder()`. You can walk the entire tree with `first()` and `next()`. You can walk visible items with `first_visible_item()` and `next_visible_item()`. You can walk selected items with `first_selected_item()` and `next_selected_item()`. Items can be found by their pathname using `find_item(const char*)`, and an item's pathname can be found with `item_pathname()`. The selected items' colors are controlled by `selection_color()` (inherited from `Fl_Widget`). A hook is provided to allow you to redefine how item's labels are drawn via `Fl_Tree::item_draw_callback()`. Items can be interactively dragged using `FL_TREE_SELECT_SINGLE_DRAGGABLE`.

SELECTION OF ITEMS

The tree can have different selection behaviors controlled by `selectmode()`. The background color used for selected items is the `Fl_Tree::selection_color()`. The foreground color for selected items is controlled internally with `fl_contrast()`.

CHILD WIDGETS

FLTK widgets (including custom widgets) can be assigned to tree items via `Fl_Tree_Item::widget()`.

When an `Fl_Tree_Item::widget()` is defined, the default behavior is for the `widget()` to be shown in place of the item's label (if it has one). Only the `widget()`'s width will be used; the `widget()`'s `x()` and `y()` position will be managed by the tree, and the `h()` will track the item's height. This default behavior can be altered (ABI 1.3.1): Setting `Fl_Tree::item_draw_mode()`'s `FL_TREE_ITEM_DRAW_LABEL_AND_WIDGET` flag causes the label + widget to be displayed together in that order, and adding the `FL_TREE_ITEM_HEIGHT_FROM_WIDGET` flag causes widget's height to define the `widget()`'s height.

ICONS

The tree's open/close icons can be redefined with `Fl_Tree::openicon()`, `Fl_Tree::closeicon()`. User icons can either be changed globally with `Fl_Tree::usericon()`, or on a per-item basis with `Fl_Tree_Item::usericon()`.

Various default preferences can be globally manipulated via `Fl_Tree_Prefs`, including colors, margins, icons, connection lines, etc.

FONTS AND COLORS

When adding new items to the tree, the new items get the defaults for fonts and colors from:

- `Fl_Tree::item_labelfont()` – The default item label font (default: `FL_HELVETICA`)
- `Fl_Tree::item_labelsize()` – The default item label size (default: `FL_NORMAL_SIZE`)
- `Fl_Tree::item_labelfgcolor()` – The default item label foreground color (default: `FL_FOREGROUND_↔ COLOR`)
- `Fl_Tree::item_labelbgcolor()` – The default item label background color (default: `0xffffffff`, which tree uses as 'transparent')

Each item (`Fl_Tree_Item`) inherits a copy of these font/color attributes when created, and each item has its own methods to let the app change these values on a per-item basis using methods of the same name:

- `Fl_Tree_Item::labelfont()` – The item's label font (default: FL_HELVETICA)
- `Fl_Tree_Item::labelsize()` – The item's label size (default: FL_NORMAL_SIZE)
- `Fl_Tree_Item::labelfgcolor()` – The item's label foreground color (default: FL_FOREGROUND_COLOR)
- `Fl_Tree_Item::labelbgcolor()` – The item's label background color (default: 0xffffffff, which uses the tree's own bg color)

CALLBACKS

The tree's `callback()` will be invoked when items change state or are open/closed. `when()` controls when mouse/keyboard events invoke the callback. `callback_item()` and `callback_reason()` can be used to determine the cause of the callback. e.g.

```
void MyTreeCallback(Fl_Widget *w, void *data) {
    Fl_Tree *tree = (Fl_Tree*)w;
    Fl_Tree_Item *item = (Fl_Tree_Item*)tree->callback_item(); // get selected item
    switch ( tree->callback_reason() ) {
        case FL_TREE_REASON_SELECTED: [...]
        case FL_TREE_REASON_DESELECTED: [...]
        case FL_TREE_REASON_RESELECTED: [...]
        case FL_TREE_REASON_OPENED: [...]
        case FL_TREE_REASON_CLOSED: [...]
    }
    :
}
```

SIMPLE EXAMPLES

To find all the selected items:

```
for ( Fl_Tree_Item *i=first_selected_item(); i; i=next_selected_item(i) )
    printf("Item %s is selected\n", i->label());
```

To get an item's full menu pathname, use `Fl_Tree::item_pathname()`, e.g.

```
[...]
char pathname[256] = "???";
tree->item_pathname(pathname, sizeof(pathname), item); // eg. "Parent/Child/Item"
[...]
```

To walk all the items of the tree from top to bottom:

```
// Walk all the items in the tree, and print their labels
for ( Fl_Tree_Item *item = tree->first(); item; item = tree->next(item) ) {
    printf("Item: %s\n", item->label());
}
```

To recursively walk all the children of a particular item, define a function that uses recursion:

```
// Find all of the item's children and print an indented report of their labels
void my_print_all_children(Fl_Tree_Item *item, int indent=0) {
    for ( int t=0; t<item->children(); t++ ) {
        printf("%*s Item: %s\n", indent, "", item->child(t)->label());
        my_print_all_children(item->child(t), indent+4); // recurse
    }
}
```

To change the default label font and color when creating new items:

```
tree = new Fl_Tree(..);
tree->item_labelfont(FL_COURIER); // Use Courier font for all new items
tree->item_labelbgcolor(FL_RED); // Use red color for labels of all new items
[...]
```

// Now create the items in the tree using the above defaults.

```
tree->add("Aaa");
tree->add("Bbb");
```

To change the font and color of all existing items in the tree:

```
// Change the font and color of all items currently in the tree
for ( Fl_Tree_Item *item = tree->first(); item; item = tree->next(item) ) {
    item->labelfont(FL_COURIER);
    item->labelcolor(FL_RED);
}
```

DISPLAY DESCRIPTION

The following image shows the tree's various visual elements and the methods that control them:

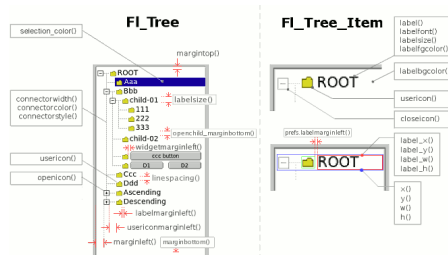


Figure 12.63 Fl_Tree elements

The following shows the protected dimension variables 'tree inner' (tix..) and 'tree outer' (tox..):

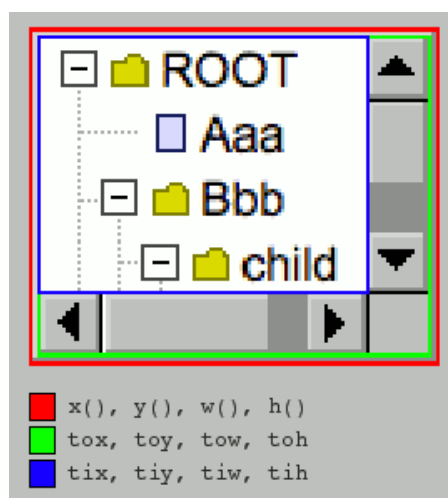


Figure 12.64 Fl_Tree inner/outer dimensions

KEYBOARD BINDINGS

The following table lists keyboard bindings for navigating the tree:

Keyboard	FL_TREE_SELECT↔ _MULTI	FL_TREE_SELECT↔ _SINGLE	FL_TREE_SELECT↔ _NONE
Ctrl-A (Linux/Windows)	Select all items	N/A	N/A
Command-A (Mac)	Select all items	N/A	N/A
Space	Selects item	Selects item	N/A
Ctrl-Space	Toggle item	Toggle item	N/A
Shift-Space	Extends selection	Selects item	N/A
Enter	Toggles open/close	Toggles open/close	Toggles open/close
Ctrl-Enter	Toggles open/close	Toggles open/close	Toggles open/close
Shift-Enter	Toggles open/close	Toggles open/close	Toggles open/close
Right / Left	Open/Close item	Open/Close item	Open/Close item
Up / Down	Move focus box up/down	Move focus box up/down	N/A
Shift-Up / Shift-Down	Extend selection up/down	Move focus up/down	N/A
Home / End	Move to top/bottom of tree	Move to top/bottom of tree	Move to top/bottom of tree
PageUp / PageDown	Page up/down	Page up/down	Page up/down

12.152.2 Member Function Documentation

12.152.2.1 add() [1/2]

```
Fl_Tree_Item * Fl_Tree::add (
    const char * path,
    Fl_Tree_Item * item = 0 )
```

Adds a new item, given a menu style 'path'.

Any parent nodes that don't already exist are created automatically. Adds the item based on the value of [sortorder\(\)](#). If 'item' is NULL, a new item is created.

To specify items or submenus that contain slashes ('/' or '\') use an escape character to protect them, e.g.

```
:
tree->add("/Holidays/Photos/12\\25\\2010"); // Adds item "12/25/2010"
tree->add("/Pathnames/c:\\\\Program Files\\\\MyApp"); // Adds item "c:\Program Files\MyApp"
:
```

Parameters

in	<i>path</i>	The path to the item, e.g. "Flintstone/Fred".
in	<i>item</i>	The new item to be added. If NULL, a new item is created with a name that is the last element in 'path'.

Returns

The new item added, or 0 on error.

Version

1.3.3

12.152.2.2 add() [2/2]

```
Fl_Tree_Item * Fl_Tree::add (
    Fl_Tree_Item * parent_item,
    const char * name )
```

Add a new child item labeled 'name' to the specified 'parent_item'.

Parameters

in	<i>parent_item</i>	The parent item the new child item will be added to. Must not be NULL.
in	<i>name</i>	The label for the new item

Returns

The new item added.

Version

1.3.0 release

12.152.2.3 calc_dimensions()

```
void Fl_Tree::calc_dimensions ( )
```

Recalculate widget dimensions and scrollbar visibility, normally managed automatically.

Low overhead way to update the tree widget's outer/inner dimensions and re-determine scrollbar visibility based on these changes without recalculating the entire size of the tree data.

Assumes that either the tree's size in `_tree_w/_tree_h` are correct so that scrollbar visibility can be calculated easily, or are both zero indicating scrollbar visibility can't be calculated yet.

This method is called when the widget is [resize\(\)](#)ed or if the scrollbar's sizes are changed (affects tree widget's inner dimensions `tix/y/w/h`), and also used by [calc_tree\(\)](#).

Version

1.3.3 ABI feature

12.152.2.4 calc_tree()

```
void Fl_Tree::calc_tree ( )
```

Recalculates the tree's sizes and scrollbar visibility, normally managed automatically.

On return:

- `_tree_w` will be the overall pixel width of the entire viewable tree
- `_tree_h` will be the overall pixel height ""
- scrollbar visibility and pan sizes are updated
- internal `_tix/_tiy/_tiw/_tih` dimensions are updated

`_tree_w/_tree_h` include the tree's margins (e.g. [marginleft\(\)](#)), whether items are open or closed, label contents and font sizes, etc.

The tree hierarchy's size is managed separately from the widget's size as an optimization; this way [resize\(\)](#) on the widget doesn't involve recalculating the tree's hierarchy needlessly, as widget size has no bearing on the tree hierarchy.

The tree hierarchy's size only changes when items are added/removed, open/closed, label contents or font sizes changed, margins changed, etc.

This calculation involves walking the *entire* tree from top to bottom, potentially a slow calculation if the tree has many items (potentially hundreds of thousands), and should therefore be called sparingly. For this reason, `recalc_tree()` is used as a way to /schedule/ calculation when changes affect the tree hierarchy's size.

Apps may want to call this method directly if the app makes changes to the tree's geometry, then immediately needs to work with the tree's new dimensions before an actual redraw (and recalc) occurs. (This use by an app should only rarely be needed)

12.152.2.5 `callback_item()` [1/2]

```
Fl_Tree_Item * Fl_Tree::callback_item ( )
```

Gets the item that caused the callback.

The `callback()` can use this value to see which item changed.

12.152.2.6 `callback_item()` [2/2]

```
void Fl_Tree::callback_item (
    Fl_Tree_Item * item )
```

Sets the item that was changed for this callback.

Used internally to pass the item that invoked the callback.

12.152.2.7 `callback_reason()` [1/2]

```
Fl_Tree_Reason Fl_Tree::callback_reason ( ) const
```

Gets the reason for this callback.

The `callback()` can use this value to see why it was called. Example:

```

:
void MyTreeCallback(Fl_Widget *w, void *userdata) {
    Fl_Tree *tree = (Fl_Tree*)w;
    Fl_Tree_Item *item = tree->callback_item(); // the item changed (can be NULL if more than one
item was changed!)
    switch ( tree->callback_reason() ) { // reason callback was invoked
        case FL_TREE_REASON_OPENED: ..item was opened..
        case FL_TREE_REASON_CLOSED: ..item was closed..
        case FL_TREE_REASON_SELECTED: ..item was selected..
        case FL_TREE_REASON_RESELECTED: ..item was reselected (double-clicked, etc)..
        case FL_TREE_REASON_DESELECTED: ..item was deselected..
    }
}
:

```

See also

`item_reselect_mode()` – enables `FL_TREE_REASON_RESELECTED` events

12.152.2.8 `callback_reason()` [2/2]

```
void Fl_Tree::callback_reason (
    Fl_Tree_Reason reason )
```

Sets the reason for this callback.

Used internally to pass the reason the callback was invoked.

12.152.2.9 `clear()`

```
void Fl_Tree::clear (
    void )
```

Clear the entire tree's children, including the root.

The tree will be left completely empty.

12.152.2.10 clear_children()

```
void Fl_Tree::clear_children (
    Fl_Tree_Item * item )
```

Clear all the children for 'item'.
Item may not be NULL.

12.152.2.11 close() [1/2]

```
int Fl_Tree::close (
    const char * path,
    int docallback = 1 )
```

Closes the item specified by 'path'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `close("Holidays/12\25\2010")`.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>path</i>	– the tree item's pathname (e.g. "Flintstones/Fred")
in	<i>docallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - callback() is not invoked • 1 - callback() is invoked if item changed (default), callback_reason() will be <code>FL_TREE_REASON_CLOSED</code>

Returns

- 1 – OK: item closed
- 0 – OK: item was already closed, no change
- -1 – ERROR: item was not found

See also

[open\(\)](#), [close\(\)](#), [is_open\(\)](#), [is_close\(\)](#), [callback_item\(\)](#), [callback_reason\(\)](#)

12.152.2.12 close() [2/2]

```
int Fl_Tree::close (
    Fl_Tree_Item * item,
    int docallback = 1 )
```

Closes the specified 'item'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	– the item to be closed. Must not be NULL.
in	<i>docallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - callback() is not invoked • 1 - callback() is invoked if item changed (default), callback_reason() will be <code>FL_TREE_REASON_CLOSED</code>

Returns

- 1 – item was closed
- 0 – item was already closed, no change

See also

[open\(\)](#), [close\(\)](#), [is_open\(\)](#), [is_close\(\)](#), [callback_item\(\)](#), [callback_reason\(\)](#)

12.152.2.13 closeicon() [1/2]

```
Fl_Image * Fl_Tree::closeicon ( ) const
```

Returns the icon to be used as the 'close' icon.

If none was set, the internal default is returned, a simple '[-]' icon.

12.152.2.14 closeicon() [2/2]

```
void Fl_Tree::closeicon (
    Fl_Image * val )
```

Sets the icon to be used as the 'close' icon.

This overrides the built in default '[-]' icon.

Parameters

in	<i>val</i>	– The new image, or zero to use the default '[-]' icon.
----	------------	---

12.152.2.15 connectorstyle()

```
void Fl_Tree::connectorstyle (
    Fl_Tree_Connector val )
```

Sets the line drawing style for inter-connecting items.

See [Fl_Tree_Connector](#) for possible values.

12.152.2.16 deselect() [1/2]

```
int Fl_Tree::deselect (
    const char * path,
    int docalldback = 1 )
```

Deselect an item specified by 'path'.

Invokes the callback depending on the value of optional parameter 'docalldback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `deselect("← Holidays/12\25\2010")`.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>path</i>	– the tree item's pathname (e.g. "Flintstones/Fred")
in	<i>docalldback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - the callback() is not invoked • 1 - the callback() is invoked if item changed state (default), callback_reason() will be <code>FL_TREE_REASON_DESELECTED</code>

Returns

- 1 - OK: item's state was changed
- 0 - OK: item was already deselected, no change was made
- -1 - ERROR: item was not found

12.152.2.17 deselect() [2/2]

```
int Fl_Tree::deselect (
    Fl_Tree_Item * item,
    int dcallback = 1 )
```

Deselect the specified `item`.

Invokes the callback depending on the value of optional parameter '`dcallback`'.

Handles calling `redraw()` if anything changed.

The callback can use `callback_item()` and `callback_reason()` respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	– the item to be deselected. Must not be NULL.
in	<i>dcallback</i>	– A flag that determines if the <code>callback()</code> is invoked or not: <ul style="list-style-type: none"> • 0 - the <code>callback()</code> is not invoked • 1 - the <code>callback()</code> is invoked if item changed state (default), <code>callback_reason()</code> will be <code>FL_TREE_REASON_DESELECTED</code>

Returns

- 0 - item was already deselected, no change was made
- 1 - item's state was changed

12.152.2.18 deselect_all()

```
int Fl_Tree::deselect_all (
    Fl_Tree_Item * item = 0,
    int dcallback = 1 )
```

Deselect '`item`' and all its children.

If item is NULL, `first()` is used.

Invokes the callback depending on the value of optional parameter '`dcallback`'.

Handles calling `redraw()` if anything changed.

The callback can use `callback_item()` and `callback_reason()` respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	The item that will be deselected (along with all its children). If NULL, <code>first()</code> is used.
in	<i>dcallback</i>	– A flag that determines if the <code>callback()</code> is invoked or not: <ul style="list-style-type: none"> • 0 - the <code>callback()</code> is not invoked • 1 - the <code>callback()</code> is invoked for each item that changed state (default), <code>callback_reason()</code> will be <code>FL_TREE_REASON_DESELECTED</code>

Returns

Count of how many items were actually changed to the deselected state.

12.152.2.19 display()

```
void Fl_Tree::display (
    Fl_Tree_Item * item )
```

Displays 'item', scrolling the tree as necessary.

Parameters

in	<i>item</i>	The item to be displayed. If NULL, first() is used.
----	-------------	---

12.152.2.20 displayed()

```
int Fl_Tree::displayed (
    Fl_Tree_Item * item )
```

See if 'item' is currently displayed on-screen (visible within the widget).

This can be used to detect if the item is scrolled off-screen. Checks to see if the item's vertical position is within the top and bottom edges of the display window. This does NOT take into account the [hide\(\)](#) / [show\(\)](#) or [open\(\)](#) / [close\(\)](#) status of the item.

Parameters

in	<i>item</i>	The item to be checked. If NULL, first() is used.
----	-------------	---

Returns

1 if displayed, 0 if scrolled off screen or no items are in tree.

12.152.2.21 draw()

```
void Fl_Tree::draw (
    void ) [protected], [virtual]
```

Standard FLTK [draw\(\)](#) method, handles drawing the tree widget.

Reimplemented from [Fl_Group](#).

12.152.2.22 extend_selection()

```
int Fl_Tree::extend_selection (
    Fl_Tree_Item * from,
    Fl_Tree_Item * to,
    int val = 1,
    bool visible = false )
```

Extend a selection between 'from' and 'to' depending on 'visible'.

Similar to the more efficient [extend_selection_dir\(Fl_Tree_Item*,Fl_Tree_Item*,int dir,int val,bool vis\)](#) method, but direction (up or down) doesn't need to be known.

We're less efficient because we search the tree for to/from, then operate on items in between. The more efficient method avoids the "search", but necessitates a direction to be specified to find 'to'.

Used by SHIFT-click to extend a selection between two items inclusive.

Handles calling [redraw\(\)](#) if anything changed.

Parameters

in	<i>from</i>	Starting item
in	<i>to</i>	Ending item

Parameters

in	<i>val</i>	Select or deselect items (0=deselect, 1=select, 2=toggle)
in	<i>visible</i>	true=affect only open() , visible items, false=affect open or closed items (default)

Returns

The number of items whose selection states were changed, if any.

Version

1.3.3 ABI feature

12.152.2.23 extend_selection_dir()

```
int Fl_Tree::extend_selection_dir (
    Fl_Tree_Item * from,
    Fl_Tree_Item * to,
    int dir,
    int val,
    bool visible )
```

Extend the selection between and including 'from' and 'to' depending on direction 'dir', 'val', and 'visible'.

Efficient: does not walk entire tree; starts with 'from' and stops at 'to' while moving in direction 'dir'. Dir must be specified though.

If dir cannot be known in advance, such as during SHIFT-click operations, the method [extend_selection\(Fl_Tree_Item*,Fl_Tree_Item*,int\)](#) should be used.

Handles calling [redraw\(\)](#) if anything changed.

Parameters

in	<i>from</i>	Starting item
in	<i>to</i>	Ending item
in	<i>dir</i>	Direction to extend selection (FL_Up or FL_Down)
in	<i>val</i>	0=deselect, 1=select, 2=toggle
in	<i>visible</i>	true=affect only open() , visible items, false=affect open or closed items (default)

Returns

The number of items whose selection states were changed, if any.

Version

1.3.3

12.152.2.24 find_clicked()

```
const Fl_Tree_Item * Fl_Tree::find_clicked (
    int yonly = 0 ) const
```

Find the item that was last clicked on.

You should use [callback_item\(\)](#) instead, which is fast, and is meant to be used within a callback to determine the item clicked.

This method walks the entire tree looking for the first item that is under the mouse. (The value of the 'yonly' flag affects whether both x and y events are checked, or just y)

Use this method */only/* if you've subclassed [Fl_Tree](#), and are receiving events before [Fl_Tree](#) has been able to process and update [callback_item\(\)](#).

Parameters

<code>in</code>	<code>yonly</code>	– 0: check both event's X and Y values. – 1: only check event's Y value, don't care about X.
-----------------	--------------------	--

Returns

The item clicked, or NULL if no item was under the current event.

Version

1.3.0

1.3.3 ABI feature: added `yonly` parameter

12.152.2.25 `find_item()`

```
const Fl_Tree_Item * Fl_Tree::find_item (
    const char * path ) const
```

Find the item, given a menu style path, e.g.

"/Parent/Child/item". There is both a const and non-const version of this method. Const version allows pure const methods to use this method to do lookups without causing compiler errors.

To specify items or submenus that contain slashes ('/' or '\') use an escape character to protect them, e.g.

```
:
tree->add("/Holidays/Photos/12\\25\\2010");           // Adds item "12/25/2010"
tree->add("/Pathnames/c:\\\\Program Files\\\\MyApp"); // Adds item "c:\Program Files\MyApp"
:
```

Parameters

<code>in</code>	<code>path</code>	– the tree item's pathname to be found (e.g. "Flintstones/Fred")
-----------------	-------------------	--

Returns

The item, or NULL if not found.

See also

[item_pathname\(\)](#)

12.152.2.26 `first()`

```
Fl_Tree_Item * Fl_Tree::first ( )
```

Returns the first item in the tree, or 0 if none.

Use this to walk the tree in the forward direction, e.g.

```
:
for ( Fl_Tree_Item *item = tree->first(); item; item = tree->next(item) )
    printf("Item: %s\n", item->label());
:
```

Returns

First item in tree, or 0 if none (tree empty).

See also

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

12.152.2.27 first_selected_item()

```
Fl_Tree_Item * Fl_Tree::first_selected_item ( )
```

Returns the first selected item in the tree.

Use this to walk the tree from top to bottom looking for all the selected items, e.g.

```

:
// Walk tree forward, from top to bottom
for ( Fl_Tree_Item *i=tree->first_selected_item(); i; i=tree->next_selected_item(i) )
    printf("Selected item: %s\n", i->label());
:

```

Returns

The first selected item, or 0 if none.

See also

[first_selected_item\(\)](#), [last_selected_item\(\)](#), [next_selected_item\(\)](#)

12.152.2.28 first_visible()

```
Fl_Tree_Item * Fl_Tree::first_visible ( )
```

Returns the first [open\(\)](#), visible item in the tree, or 0 if none.

Deprecated in 1.3.3 ABI – use [first_visible_item\(\)](#) instead.

12.152.2.29 first_visible_item()

```
Fl_Tree_Item * Fl_Tree::first_visible_item ( )
```

Returns the first [open\(\)](#), visible item in the tree, or 0 if none.

Returns

First visible item in tree, or 0 if none.

See also

[first_visible_item\(\)](#), [last_visible_item\(\)](#), [next_visible_item\(\)](#)

Version

1.3.3

12.152.2.30 get_selected_items()

```
int Fl_Tree::get_selected_items (
    Fl_Tree_Item_Array & ret_items )
```

Returns the currently selected items as an array of 'ret_items'.

Example:

```

:
// Get selected items as an array
Fl_Tree_Item_Array items;
tree->get_selected_items(items);
// Manipulate the returned array
for ( int t=0; t<items.total(); t++ ) {
    Fl_Tree_Item &item = items[t];
    ..do stuff with each selected item..
}
:

```

Parameters

out	<i>ret_items</i>	The returned array of selected items.
-----	------------------	---------------------------------------

Returns

The number of items in the returned array.

See also

[first_selected_item\(\)](#), [next_selected_item\(\)](#)

Version

1.3.3 ABI feature

12.152.2.31 handle()

```
int Fl_Tree::handle (
    int e ) [virtual]
```

Standard FLTK event handler for this widget.

Todo add [Fl_Widget_Tracker](#) (see [Fl_Browser_cxx::handle\(\)](#))

Reimplemented from [Fl_Group](#).

12.152.2.32 hposition() [1/2]

```
int Fl_Tree::hposition ( ) const
```

Returns the horizontal scroll position as a pixel offset.

The position returned is how many pixels of the tree are scrolled off the left edge of the screen.

See also

[hposition\(int\)](#), [vposition\(\)](#), [vposition\(int\)](#)

Note

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

12.152.2.33 hposition() [2/2]

```
void Fl_Tree::hposition (
    int pos )
```

Sets the horizontal scroll offset to position 'pos'.

The position is how many pixels of the tree are scrolled off the left edge of the screen.

Parameters

in	<i>pos</i>	The vertical position (in pixels) to scroll the tree to.
----	------------	--

See also

[hposition\(\)](#), [vposition\(\)](#), [vposition\(int\)](#)

Note

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

12.152.2.34 insert()

```
Fl_Tree_Item * Fl_Tree::insert (
    Fl_Tree_Item * item,
    const char * name,
    int pos )
```

Insert a new item 'name' into 'item's children at position 'pos'.

If pos is out of range the new item is

- prepended if pos < 0 or
- appended if pos > item->children().

Note: pos == children() is not considered out of range: the item is appended to the child list.

Example:

```
:
tree->add("Aaa/000");      // "000" is index 0 in Aaa's children
tree->add("Aaa/111");      // "111" is index 1 in Aaa's children
tree->add("Aaa/222");      // "222" is index 2 in Aaa's children
:
// How to use insert() to insert a new item between Aaa/111 + Aaa/222
Fl_Tree_Item *item = tree->find_item("Aaa"); // get parent item Aaa
if (item) tree->insert(item, "New item", 2); // insert as a child of Aaa at index #2
:
```

Parameters

in	<i>item</i>	The existing item to insert new child into. Must not be NULL.
in	<i>name</i>	The label for the new item
in	<i>pos</i>	The position of the new item in the child list

Returns

The new item added.

See also

[insert_above\(\)](#)

12.152.2.35 insert_above()

```
Fl_Tree_Item * Fl_Tree::insert_above (
    Fl_Tree_Item * above,
    const char * name )
```

Inserts a new item 'name' above the specified [Fl_Tree_Item](#) 'above'.

Example:

```
:
tree->add("Aaa/000");      // "000" is index 0 in Aaa's children
tree->add("Aaa/111");      // "111" is index 1 in Aaa's children
tree->add("Aaa/222");      // "222" is index 2 in Aaa's children
..
// How to use insert_above() to insert a new item above Aaa/222
Fl_Tree_Item *item = tree->find_item("Aaa/222"); // get item Aaa/222
if (item) tree->insert_above(item, "New item"); // insert new item above it
:
```

Parameters

in	<i>above</i>	– the item above which to insert the new item. Must not be NULL.
in	<i>name</i>	– the name of the new item

Returns

The new item added, or 0 if 'above' could not be found.

See also

[insert\(\)](#)

12.152.2.36 is_close() [1/2]

```
int Fl_Tree::is_close (
    const char * path ) const
```

See if item specified by 'path' is closed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `is_close("← Holidays/12\25\2010")`.

Parameters

<code>in</code>	<code>path</code>	– the tree item's pathname (e.g. "Flintstones/Fred")
-----------------	-------------------	--

Returns

- 1 - OK: item is closed
- 0 - OK: item is open
- -1 - ERROR: item was not found

12.152.2.37 is_close() [2/2]

```
int Fl_Tree::is_close (
    Fl_Tree_Item * item ) const
```

See if the specified 'item' is closed.

Parameters

<code>in</code>	<code>item</code>	– the item to be tested. Must not be NULL.
-----------------	-------------------	--

Returns

- 1 : item is closed
- 0 : item is open

12.152.2.38 is_hscroll_visible()

```
int Fl_Tree::is_hscroll_visible ( ) const
```

See if the horizontal scrollbar is currently visible.

Returns

1 if scrollbar visible, 0 if not.

Note

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

12.152.2.39 is_open() [1/2]

```
int Fl_Tree::is_open (
    const char * path ) const
```

See if item specified by 'path' is open.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `is_open("← Holidays/12\25\2010")`.

Items that are 'open' are themselves not necessarily visible; one of the item's parents might be closed.

Parameters

in	<i>path</i>	– the tree item's pathname (e.g. "Flintstones/Fred")
----	-------------	--

Returns

- 1 - OK: item is open
- 0 - OK: item is closed
- -1 - ERROR: item was not found

See also

[Fl_Tree_Item::visible_r\(\)](#)

12.152.2.40 is_open() [2/2]

```
int Fl_Tree::is_open (
    Fl_Tree_Item * item ) const
```

See if 'item' is open.

Items that are 'open' are themselves not necessarily visible; one of the item's parents might be closed.

Parameters

in	<i>item</i>	– the item to be tested. Must not be NULL.
----	-------------	--

Returns

- 1 : item is open
- 0 : item is closed

12.152.2.41 is_scrollbar()

```
int Fl_Tree::is_scrollbar (
    Fl_Widget * w )
```

See if widget 'w' is one of the [Fl_Tree](#) widget's scrollbars.

Use this to skip over the scrollbars when walking the [child\(\)](#) array. Example:

```

:
for ( int i=0; i<tree->children(); i++ ) { // walk children
    Fl_Widget *w = tree->child(i);
    if ( tree->is_scrollbar(w) ) continue; // skip scrollbars
    ..do work here..
}
:
```

Parameters

in	<i>w</i>	Widget to test
----	----------	----------------

Returns

1 if `w` is a scrollbar, 0 if not.

Todo should be `const`

12.152.2.42 is_selected() [1/2]

```
int Fl_Tree::is_selected (
    const char * path )
```

See if item specified by '`path`' is selected.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `is_selected("← Holidays/12\25\2010")`.

Parameters

<code>in</code>	<code>path</code>	– the tree item's pathname (e.g. "Flintstones/Fred")
-----------------	-------------------	--

Returns

- 1 : item selected
- 0 : item deselected
- -1 : item was not found

12.152.2.43 is_selected() [2/2]

```
int Fl_Tree::is_selected (
    Fl_Tree_Item * item ) const
```

See if the specified '`item`' is selected.

Parameters

<code>in</code>	<code>item</code>	– the item to be tested. Must not be NULL.
-----------------	-------------------	--

Returns

- 1 : item selected
- 0 : item deselected

12.152.2.44 is_vscroll_visible()

```
int Fl_Tree::is_vscroll_visible ( ) const
```

See if the vertical scrollbar is currently visible.

Returns

1 if scrollbar visible, 0 if not.

12.152.2.45 item_clicked() [1/2]

```
Fl_Tree_Item * Fl_Tree::item_clicked ( )
```

Return the item that was last clicked.

Valid only from within the [callback\(\)](#).

Returns

The item clicked, or 0 if none. 0 may also be used to indicate several items were clicked/changed.

Deprecated in 1.3.3 ABI – use [callback_item\(\)](#) instead.

12.152.2.46 item_clicked() [2/2]

```
void Fl_Tree::item_clicked (
    Fl_Tree_Item * item ) [protected]
```

Set the item that was last clicked.

Should only be used by subclasses needing to change this value. Normally [Fl_Tree](#) manages this value.

Deprecated in 1.3.3 ABI – use [callback_item\(\)](#) instead.

12.152.2.47 item_draw_mode() [1/3]

```
Fl_Tree_Item_Draw_Mode Fl_Tree::item_draw_mode ( ) const
```

Get the 'item draw mode' used for the tree.

Version

1.3.1 ABI feature

12.152.2.48 item_draw_mode() [2/3]

```
void Fl_Tree::item_draw_mode (
    Fl_Tree_Item_Draw_Mode mode )
```

Set the 'item draw mode' used for the tree to 'mode'.

This affects how items in the tree are drawn, such as when a `widget()` is defined. See [Fl_Tree_Item_Draw_Mode](#) for possible values.

Version

1.3.1 ABI feature

12.152.2.49 item_draw_mode() [3/3]

```
void Fl_Tree::item_draw_mode (
    int mode )
```

Set the 'item draw mode' used for the tree to integer 'mode'.

This affects how items in the tree are drawn, such as when a `widget()` is defined. See [Fl_Tree_Item_Draw_Mode](#) for possible values.

Version

1.3.1 ABI feature

12.152.2.50 item_labelbgcolor() [1/2]

```
void Fl_Tree::item_labelbgcolor (
    Fl_Color val )
```

Set the default label background color used for creating new items.

A special case is made for color 0xffffffff (default) which is treated as 'transparent'. To change the background color on a per-item basis, use [Fl_Tree_Item::labelbgcolor\(Fl_Color\)](#)

12.152.2.51 item_labelbgcolor() [2/2]

```
Fl_Color Fl_Tree::item_labelbgcolor (
    void ) const
```

Get the default label background color used for creating new items.

If the color is 0xffffffff, it is 'transparent'.

12.152.2.52 item_labelbgcolor()

```
void Fl_Tree::item_labelbgcolor (
    Fl_Color val )
```

Set the default label foreground color used for creating new items.

To change the foreground color on a per-item basis, use [Fl_Tree_Item::labelbgcolor\(Fl_Color\)](#)

12.152.2.53 item_labelfont()

```
void Fl_Tree::item_labelfont (
    Fl_Font val )
```

Set the default font face used for creating new items.

To change the font face on a per-item basis, use [Fl_Tree_Item::labelfont\(Fl_Font\)](#)

12.152.2.54 item_labelsize()

```
void Fl_Tree::item_labelsize (
    Fl_Fontsize val )
```

Set the default label font size used for creating new items.

To change the font size on a per-item basis, use [Fl_Tree_Item::labelsize\(Fl_Fontsize\)](#)

12.152.2.55 item_pathname()

```
int Fl_Tree::item_pathname (
    char * pathname,
    int pathnamelen,
    const Fl_Tree_Item * item ) const
```

Return 'pathname' of size 'pathnamelen' for the specified 'item'.

If 'item' is NULL, [root\(\)](#) is used.

The tree's root will be included in the pathname if [showroot\(\)](#) is on.

Menu items or submenus that contain slashes ('/' or '\') in their names will be escaped with a backslash. This is symmetrical with the [add\(\)](#) function which uses the same escape pattern to set names.

Parameters

out	<i>pathname</i>	The string to use to return the pathname
in	<i>pathnamelen</i>	The maximum length of the string (including NULL). Must not be zero.
in	<i>item</i>	The item whose pathname is to be returned.

Returns

- 0 : OK (*pathname* returns the item's pathname)
- -1 : item not found (*pathname*="")
- -2 : *pathname* not large enough (*pathname*="")

See also

[find_item\(\)](#)

12.152.2.56 item_reselect_mode() [1/2]

```
Fl_Tree_Item_Reselect_Mode Fl_Tree::item_reselect_mode ( ) const
```

Returns the current item re/selection mode.

Version

1.3.1 ABI feature

12.152.2.57 item_reselect_mode() [2/2]

```
void Fl_Tree::item_reselect_mode (
    Fl_Tree_Item_Reselect_Mode mode )
```

Sets the item re/selection mode.

See [Fl_Tree_Item_Reselect_Mode](#) for possible values.

Version

1.3.1 ABI feature

12.152.2.58 last()

```
Fl_Tree_Item * Fl_Tree::last ( )
```

Returns the last item in the tree.

This can be used to walk the tree in reverse, e.g.

```
for ( Fl_Tree_Item *item = tree->last(); item; item = tree->prev() )
    printf("Item: %s\n", item->label());
```

Returns

Last item in the tree, or 0 if none (tree empty).

See also

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

12.152.2.59 last_selected_item()

```
Fl_Tree_Item * Fl_Tree::last_selected_item ( )
```

Returns the last selected item in the tree.

Use this to walk the tree in reverse from bottom to top looking for all the selected items, e.g.

```
:
// Walk tree in reverse, from bottom to top
for ( Fl_Tree_Item *i=tree->last_selected_item(); i; i=tree->next_selected_item(i, FL_Up) )
    printf("Selected item: %s\n", i->label());
:
```

Returns

The last selected item, or 0 if none.

See also

[first_selected_item\(\)](#), [last_selected_item\(\)](#), [next_selected_item\(\)](#)

Version

1.3.3

12.152.2.60 last_visible()

```
Fl_Tree_Item * Fl_Tree::last_visible ( )
```

Returns the last [open\(\)](#), visible item in the tree.

Deprecated in 1.3.3 – use [last_visible_item\(\)](#) instead.

12.152.2.61 last_visible_item()

`Fl_Tree_Item * Fl_Tree::last_visible_item ()`
 Returns the last [open\(\)](#), visible item in the tree.

Returns

Last visible item in the tree, or 0 if none.

See also

[first_visible_item\(\)](#), [last_visible_item\(\)](#), [next_visible_item\(\)](#)

Version

1.3.3

12.152.2.62 load()

```
void Fl_Tree::load (
    class Fl_Preferences & prefs )
```

Load FLTK preferences.

Read a preferences database into the tree widget.

A preferences database is a hierarchical collection of data which can be directly loaded into the tree view for inspection.

Parameters

<code>in</code>	<code>prefs</code>	the Fl_Preferences database
-----------------	--------------------	---

12.152.2.63 next()

```
Fl_Tree_Item * Fl_Tree::next (
    Fl_Tree_Item * item = 0 )
```

Return the next item after 'item', or 0 if no more items.

Use this code to walk the entire tree:

```
:
for ( Fl_Tree_Item *i = tree->first(); i; i = tree->next(i) )
    printf("Item: %s\n", i->label());
:
```

Parameters

<code>in</code>	<code>item</code>	The item to use to find the next item. If NULL, returns 0.
-----------------	-------------------	--

Returns

Next item in tree, or 0 if at last item.

See also

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

12.152.2.64 next_item()

```
Fl_Tree_Item * Fl_Tree::next_item (
    Fl_Tree_Item * item,
```



```
int dir = FL_Down,
bool visible = false )
```

Returns next item after 'item' in direction 'dir' depending on 'visible'.

Next item will be above (if dir==FL_Up) or below (if dir==FL_Down). If 'visible' is true, only items whose parents are [open\(\)](#) will be returned. If 'visible' is false, even items whose parents are [close\(\)](#)ed will be returned.

If item is 0, the return value will be the result of this truth table:

	visible=true	visible=false
dir=FL_Up:	last_visible_item()	last()
dir=FL_Down:	first_visible_item()	first()

Example use:

```
:
// Walk down the tree showing open(), visible items
for ( Fl_Tree_Item *i=tree->first_visible_item(); i; i=tree->next_item(i, FL_Down, true) )
    printf("Item: %s\n", i->label());

// Walk up the tree showing open(), visible items
for ( Fl_Tree_Item *i=tree->last_visible_item(); i; i=tree->next_item(i, FL_Up, true) )
    printf("Item: %s\n", i->label());

// Walk down the tree showing all items (open or closed)
for ( Fl_Tree_Item *i=tree->first(); i; i=tree->next_item(i, FL_Down, false) )
    printf("Item: %s\n", i->label());

// Walk up the tree showing all items (open or closed)
for ( Fl_Tree_Item *i=tree->last(); i; i=tree->next_item(i, FL_Up, false) )
    printf("Item: %s\n", i->label());
:
```

Parameters

in	<i>item</i>	The item to use to find the next item. If NULL, returns 0.
in	<i>dir</i>	Can be FL_Up or FL_Down (default=FL_Down or 'next')
in	<i>visible</i>	true=return only open() , visible items, false=return open or closed items (default)

Returns

Next item in tree in the direction and visibility specified, or 0 if no more items of specified visibility in that direction.

See also

[first\(\)](#), [last\(\)](#), [next\(\)](#),
[first_visible_item\(\)](#), [last_visible_item\(\)](#), [next_visible_item\(\)](#),
[first_selected_item\(\)](#), [last_selected_item\(\)](#), [next_selected_item\(\)](#)

Version

1.3.3

12.152.2.65 next_selected_item()

```
Fl_Tree_Item * Fl_Tree::next_selected_item (
    Fl_Tree_Item * item = 0,
    int dir = FL_Down )
```

Returns the next selected item above or below 'item', depending on 'dir'.

If 'item' is 0, search starts at either [first\(\)](#) or [last\(\)](#), depending on 'dir': [first\(\)](#) if 'dir' is FL_Down (default), [last\(\)](#) if 'dir' is FL_Up.

Use this to walk the tree looking for all the selected items, e.g.

```

:
// Walk down the tree (forwards)
for ( Fl_Tree_Item *i=tree->first_selected_item(); i; i=tree->next_selected_item(i, FL_Down) )
    printf("Item: %s\n", i->label());

// Walk up the tree (backwards)
for ( Fl_Tree_Item *i=tree->last_selected_item(); i; i=tree->next_selected_item(i, FL_Up) )
    printf("Item: %s\n", i->label());
:

```

Parameters

in	<i>item</i>	The item above or below which we'll find the next selected item. If NULL, first() is used if FL_Down, last() if FL_Up. (default=NULL)
in	<i>dir</i>	The direction to go. FL_Up for moving up the tree, FL_Down for down the tree (default)

Returns

The next selected item, or 0 if there are no more selected items.

See also

[first_selected_item\(\)](#), [last_selected_item\(\)](#), [next_selected_item\(\)](#)

Version

1.3.3

12.152.2.66 next_visible_item()

```

Fl_Tree_Item * Fl_Tree::next_visible_item (
    Fl_Tree_Item * item,
    int dir )

```

Returns next [open\(\)](#), visible item above (`dir==FL_Up`) or below (`dir==FL_Down`) the specified 'item', or 0 if no more items.

If 'item' is 0, returns [last\(\)](#) if 'dir' is FL_Up, or [first\(\)](#) if dir is FL_Down.

```

:
// Walk down the tree (forwards)
for ( Fl_Tree_Item *i=tree->first_visible_item(); i; i=tree->next_visible_item(i, FL_Down) )
    printf("Item: %s\n", i->label());

// Walk up the tree (backwards)
for ( Fl_Tree_Item *i=tree->last_visible_item(); i; i=tree->next_visible_item(i, FL_Up) )
    printf("Item: %s\n", i->label());
:

```

Parameters

in	<i>item</i>	The item above/below which we'll find the next visible item
in	<i>dir</i>	The direction to search. Can be FL_Up or FL_Down.

Returns

The item found, or 0 if there's no visible items above/below the specified item.

Version

1.3.3

12.152.2.67 open() [1/2]

```
int Fl_Tree::open (
    const char * path,
    int docalldback = 1 )
```

Opens the item specified by 'path'.

This causes the item's children (if any) to be shown.

Invokes the callback depending on the value of optional parameter 'docalldback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `open("Holidays/12\25\2010")`.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>path</i>	– the tree item's pathname (e.g. "Flintstones/Fred")
in	<i>docalldback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - callback() is not invoked • 1 - callback() is invoked if item changed (default), callback_reason() will be <code>FL_TREE_REASON_OPENED</code>

Returns

- 1 – OK: item opened
- 0 – OK: item was already open, no change
- -1 – ERROR: item was not found

See also

[open\(\)](#), [close\(\)](#), [is_open\(\)](#), [is_close\(\)](#), [callback_item\(\)](#), [callback_reason\(\)](#)

12.152.2.68 open() [2/2]

```
int Fl_Tree::open (
    Fl_Tree_Item * item,
    int docalldback = 1 )
```

Open the specified 'item'.

This causes the item's children (if any) to be shown.

Invokes the callback depending on the value of optional parameter 'docalldback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	– the item to be opened. Must not be NULL.
in	<i>docalldback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - callback() is not invoked • 1 - callback() is invoked if item changed (default), callback_reason() will be <code>FL_TREE_REASON_OPENED</code>

Returns

- 1 – item was opened
- 0 – item was already open, no change

See also

[open\(\)](#), [close\(\)](#), [is_open\(\)](#), [is_close\(\)](#), [callback_item\(\)](#), [callback_reason\(\)](#)

12.152.2.69 open_toggle()

```
void Fl_Tree::open_toggle (
    Fl_Tree_Item * item,
    int dcallback = 1 )
```

Toggle the open state of 'item'.

Invokes the callback depending on the value of optional parameter 'dcallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	– the item whose open state is to be toggled. Must not be NULL.
in	<i>dcallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - callback() is not invoked • 1 - callback() is invoked (default), callback_reason() will be either FL_TREE_REASON_OPENED or FL_TREE_REASON_CLOSED

See also

[open\(\)](#), [close\(\)](#), [is_open\(\)](#), [is_close\(\)](#), [callback_item\(\)](#), [callback_reason\(\)](#)

12.152.2.70 openicon() [1/2]

```
Fl_Image * Fl_Tree::openicon ( ) const
```

Returns the icon to be used as the 'open' icon.

If none was set, the internal default is returned, a simple '[+]' icon.

12.152.2.71 openicon() [2/2]

```
void Fl_Tree::openicon (
    Fl_Image * val )
```

Sets the icon to be used as the 'open' icon.

This overrides the built in default '[+]' icon.

Parameters

in	<i>val</i>	– The new image, or zero to use the default '[+]' icon.
----	------------	---

12.152.2.72 prev()

```
Fl_Tree_Item * Fl_Tree::prev (
    Fl_Tree_Item * item = 0 )
```

Return the previous item before 'item', or 0 if no more items.

This can be used to walk the tree in reverse, e.g.

```

:
for ( Fl_Tree_Item *item = tree->first(); item; item = tree->prev(item) )
    printf("Item: %s\n", item->label());
:

```

Parameters

<code>in</code>	<code>item</code>	The item to use to find the previous item. If NULL, returns 0.
-----------------	-------------------	--

Returns

Previous item in tree, or 0 if at first item.

See also

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

12.152.2.73 recalc_tree()

```
void Fl_Tree::recalc_tree ( )
```

Schedule tree to recalc the entire tree size.

Note

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

12.152.2.74 remove()

```
int Fl_Tree::remove (
    Fl_Tree_Item * item )
```

Remove the specified 'item' from the tree.

item may not be NULL. If it has children, all those are removed too. If item being removed has focus, no item will have focus.

Returns

0 if done, -1 if 'item' not found.

12.152.2.75 resize()

```
void Fl_Tree::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the [Fl_Group](#) widget and all of its children.

The [Fl_Group](#) widget first resizes itself, and then it moves and resizes all its children according to the rules documented for [Fl_Group::resizable\(Fl_Widget*\)](#)

See also

[Fl_Group::resizable\(Fl_Widget*\)](#)

[Fl_Group::resizable\(\)](#)

[Fl_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [Fl_Group](#).

12.152.2.76 root()

```
void Fl_Tree::root (
    Fl_Tree_Item * newitem )
```

Sets the root item to 'newitem'.

If a root item already exists, [clear\(\)](#) is called first to clear it before replacing it with newitem.

Use this to install a custom item (derived from [Fl_Tree_Item](#)) as the root of the tree. This allows the derived class to implement custom drawing by overriding [Fl_Tree_Item::draw_item_content\(\)](#).

Version

1.3.3

12.152.2.77 root_label()

```
void Fl_Tree::root_label (
    const char * new_label )
```

Set the label for the root item to 'new_label'.

Makes an internally managed copy of 'new_label'.

12.152.2.78 scrollbar_size() [1/2]

```
int Fl_Tree::scrollbar_size ( ) const
```

Gets the default size of scrollbars' troughs for this widget in pixels.

If this value is zero (default), this widget will use the global [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

12.152.2.79 scrollbar_size() [2/2]

```
void Fl_Tree::scrollbar_size (
    int size )
```

Sets the pixel size of the scrollbars' troughs to 'size' for this widget, in pixels.

Normally you should not need this method, and should use the global [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, and is the default behavior. Normally this is what you want.

Only use this method if you really need to override just THIS instance of the widget's scrollbar size. (This need should be rare.)

Setting *size* to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>size</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	-------------	---

See also

[Fl::scrollbar_size\(\)](#)

12.152.2.80 select() [1/2]

```
int Fl_Tree::select (
    const char * path,
```

```
int docallback = 1 )
```

Select the item specified by 'path'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `select("← Holidays/12\25\2010")`.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>path</i>	– the tree item's pathname (e.g. "Flintstones/Fred")
in	<i>docallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - the callback() is not invoked • 1 - the callback() is invoked if item changed state (default), callback_reason() will be <code>FL_TREE_REASON_SELECTED</code>

Returns

- 1 : OK: item's state was changed
- 0 : OK: item was already selected, no change was made
- -1 : ERROR: item was not found

12.152.2.81 [select\(\)](#) [2/2]

```
int Fl_Tree::select (
    Fl_Tree_Item * item,
    int docallback = 1 )
```

Select the specified 'item'.

Use '[deselect\(\)](#)' to deselect it.

Invokes the callback depending on the value of optional parameter `docallback`.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	– the item to be selected. Must not be NULL.
in	<i>docallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - the callback() is not invoked • 1 - the callback() is invoked if item changed state, callback_reason() will be <code>FL_TREE_REASON_SELECTED</code>

Returns

- 1 - item's state was changed
- 0 - item was already selected, no change was made

12.152.2.82 [select_all\(\)](#)

```
int Fl_Tree::select_all (
    Fl_Tree_Item * item = 0,
    int docallback = 1 )
```

Select 'item' and all its children.

If item is NULL, [first\(\)](#) is used.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	The item that will be selected (along with all its children). If NULL, first() is used.
in	<i>docallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - the callback() is not invoked • 1 - the callback() is invoked for each item that changed state (default), callback_reason() will be FL_TREE_REASON_SELECTED

Returns

Count of how many items were actually changed to the selected state.

12.152.2.83 select_only()

```
int Fl_Tree::select_only (
    Fl_Tree_Item * selitem,
    int docallback = 1 )
```

Select only the specified item, deselecting all others that might be selected.

If 'selitem' is 0, [first\(\)](#) is used.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>selitem</i>	The item to be selected. If NULL, first() is used.
in	<i>docallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - the callback() is not invoked • 1 - the callback() is invoked for each item that changed state (default), callback_reason() will be either FL_TREE_REASON_SELECTED or FL_TREE_REASON_DESELECTED

Returns

The number of items whose selection states were changed, if any.

12.152.2.84 select_toggle()

```
void Fl_Tree::select_toggle (
    Fl_Tree_Item * item,
    int docallback = 1 )
```

Toggle the select state of the specified 'item'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback_item\(\)](#) and [callback_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

Parameters

in	<i>item</i>	– the item to be selected. Must not be NULL.
in	<i>docallback</i>	– A flag that determines if the callback() is invoked or not: <ul style="list-style-type: none"> • 0 - the callback() is not invoked • 1 - the callback() is invoked (default), callback_reason() will be either <code>FL_TREE_REASON_SELECTED</code> or <code>FL_TREE_REASON_DESELECTED</code>

12.152.2.85 [selectbox\(\)](#) [1/2]

```
Fl_Boxtype Fl_Tree::selectbox ( ) const
```

Sets the style of box used to draw selected items.

This is an fltk [Fl_Boxtype](#). The default is influenced by FLTK's current [Fl::scheme\(\)](#)

12.152.2.86 [selectbox\(\)](#) [2/2]

```
void Fl_Tree::selectbox (
    Fl_Boxtype val )
```

Gets the style of box used to draw selected items.

This is an fltk [Fl_Boxtype](#). The default is influenced by FLTK's current [Fl::scheme\(\)](#)

12.152.2.87 [selectmode\(\)](#) [1/2]

```
Fl_Tree_Select Fl_Tree::selectmode ( ) const
```

Gets the tree's current selection mode.

See [Fl_Tree_Select](#) for possible values.

12.152.2.88 [selectmode\(\)](#) [2/2]

```
void Fl_Tree::selectmode (
    Fl_Tree_Select val )
```

Sets the tree's selection mode.

See [Fl_Tree_Select](#) for possible values.

12.152.2.89 [set_item_focus\(\)](#)

```
void Fl_Tree::set_item_focus (
    Fl_Tree_Item * item )
```

Set the item that currently should have keyboard focus.

Handles calling [redraw\(\)](#) to update the focus box (if it is visible).

Parameters

in	<i>item</i>	The item that should take focus. If NULL, none will have focus.
----	-------------	---

12.152.2.90 [show_item\(\)](#) [1/2]

```
void Fl_Tree::show_item (
    Fl_Tree_Item * item )
```

Adjust the vertical scrollbar to show '*item*' at the top of the display IF it is currently off-screen (for instance [show_item_top\(\)](#)).

If it is already on-screen, no change is made.

Parameters

in	<i>item</i>	The item to be shown. If NULL, first() is used.
----	-------------	---

See also

[show_item_top\(\)](#), [show_item_middle\(\)](#), [show_item_bottom\(\)](#)

12.152.2.91 show_item() [2/2]

```
void Fl_Tree::show_item (
    Fl_Tree_Item * item,
    int yoff )
```

Adjust the vertical scrollbar so that '*item*' is visible '*yoff*' pixels from the top of the [Fl_Tree](#) widget's display. For instance, *yoff*=0 will position the item at the top.

If *yoff* is larger than the vertical scrollbar's limit, the value will be clipped. So if *yoff*=100, but scrollbar's max is 50, then 50 will be used.

Parameters

in	<i>item</i>	The item to be shown. If NULL, first() is used.
in	<i>yoff</i>	The pixel offset from the top for the displayed position.

See also

[show_item_top\(\)](#), [show_item_middle\(\)](#), [show_item_bottom\(\)](#)

12.152.2.92 show_item_bottom()

```
void Fl_Tree::show_item_bottom (
    Fl_Tree_Item * item )
```

Adjust the vertical scrollbar so that '*item*' is at the bottom of the display.

Parameters

in	<i>item</i>	The item to be shown. If NULL, first() is used.
----	-------------	---

12.152.2.93 show_item_middle()

```
void Fl_Tree::show_item_middle (
    Fl_Tree_Item * item )
```

Adjust the vertical scrollbar so that '*item*' is in the middle of the display.

Parameters

in	<i>item</i>	The item to be shown. If NULL, first() is used.
----	-------------	---

12.152.2.94 show_item_top()

```
void Fl_Tree::show_item_top (
    Fl_Tree_Item * item )
```

Adjust the vertical scrollbar so that '*item*' is at the top of the display.

Parameters

<i>in</i>	<i>item</i>	The item to be shown. If NULL, first() is used.
-----------	-------------	---

12.152.2.95 show_self()

```
void Fl_Tree::show_self ( )
```

Print the tree as 'ascii art' to stdout.
Used mainly for debugging.

Todo should be const

Version

1.3.0

12.152.2.96 showcollapse() [1/2]

```
int Fl_Tree::showcollapse ( ) const
```

Returns 1 if the collapse icon is enabled, 0 if not.

See also

[showcollapse\(int\)](#)

12.152.2.97 showcollapse() [2/2]

```
void Fl_Tree::showcollapse (
    int val )
```

Set if we should show the collapse icon or not.
If collapse icons are disabled, the user will not be able to interactively collapse items in the tree, unless the application provides some other means via [open\(\)](#) and [close\(\)](#).

Parameters

<i>in</i>	<i>val</i>	1: shows collapse icons (default), 0: hides collapse icons.
-----------	------------	--

12.152.2.98 showroot()

```
void Fl_Tree::showroot (
    int val )
```

Set if the root item should be shown or not.

Parameters

<i>in</i>	<i>val</i>	1 – show the root item (default) 0 – hide the root item.
-----------	------------	---

12.152.2.99 sortorder()

```
Fl_Tree_Sort Fl_Tree::sortorder ( ) const
```

Set the default sort order used when items are added to the tree.
See [Fl_Tree_Sort](#) for possible values.

12.152.2.100 usericon() [1/2]

```
Fl_Image * Fl_Tree::usericon ( ) const
```

Returns the [Fl_Image](#) being used as the default user icon for all newly created items.
Returns zero if no icon has been set, which is the default.

12.152.2.101 usericon() [2/2]

```
void Fl_Tree::usericon (
    Fl_Image * val )
```

Sets the [Fl_Image](#) to be used as the default user icon for all newly created items.
If you want to specify user icons on a per-item basis, use [Fl_Tree_Item::usericon\(\)](#) instead.

Parameters

in	<i>val</i>	– The new image to be used, or zero to disable user icons.
----	------------	--

12.152.2.102 vposition() [1/2]

```
int Fl_Tree::vposition ( ) const
```

Returns the vertical scroll position as a pixel offset.
The position returned is how many pixels of the tree are scrolled off the top edge of the screen.

See also

[vposition\(int\)](#), [hposition\(\)](#), [hposition\(int\)](#)

12.152.2.103 vposition() [2/2]

```
void Fl_Tree::vposition (
    int pos )
```

Sets the vertical scroll offset to position '*pos*'.
The position is how many pixels of the tree are scrolled off the top edge of the screen.

Parameters

in	<i>pos</i>	The vertical position (in pixels) to scroll the tree to.
----	------------	--

See also

[vposition\(\)](#), [hposition\(\)](#), [hposition\(int\)](#)

The documentation for this class was generated from the following files:

- [Fl_Tree.H](#)
- [Fl_Tree.cxx](#)

12.153 Fl_Tree_Item Class Reference

Tree widget item.

```
#include <Fl_Tree_Item.H>
```

Public Member Functions

- void [activate](#) (int val=1)
Change the item's activation state to the optionally specified 'val'.
- [Fl_Tree_Item](#) * [add](#) (const [Fl_Tree_Prefs](#) &prefs, char **arr)

- Descend into the path specified by 'arr', and add a new child there.*

 - `FI_Tree_Item * add` (const `FI_Tree_Prefs &prefs`, char **arr, `FI_Tree_Item *newitem`)
- Descend into path specified by 'arr' and add 'newitem' there.*

 - `FI_Tree_Item * add` (const `FI_Tree_Prefs &prefs`, const char *new_label)
- Add a new child to this item with the name 'new_label' and defaults from 'prefs'.*

 - `FI_Tree_Item * add` (const `FI_Tree_Prefs &prefs`, const char *new_label, `FI_Tree_Item *newitem`)
- Add 'item' as immediate child with 'new_label' and defaults from 'prefs'.*

 - `FI_Tree_Item * child` (int index)
- Return the child item for the given 'index'.*

 - const `FI_Tree_Item * child` (int t) const
- Return the const child item for the given 'index'.*

 - int `children` () const
- Return the number of children this item has.*

 - void `clear_children` ()
- Clear all the children for this item.*

 - void `close` ()
- Close this item and all its children.*

 - void `deactivate` ()
- Deactivate the item; the callback() won't be invoked when clicked.*

 - `FI_Tree_Item * deparent` (int index)
- Deparent child at index position 'pos'.*

 - int `depth` () const
- Returns how many levels deep this item is in the hierarchy.*

 - void `deselect` ()
- Disable the item's selection state.*

 - int `deselect_all` ()
- Deselect item and all its children.*

 - void `draw` (int X, int &Y, int W, `FI_Tree_Item *itemfocus`, int &tree_item_xmax, int lastchild=1, int render=1)
- Draw this item and its children.*

 - virtual int `draw_item_content` (int render)
- Draw the item content.*

 - int `event_on_collapse_icon` (const `FI_Tree_Prefs &prefs`) const
- Was the event on the 'collapse' button of this item?*

 - int `event_on_item` (const `FI_Tree_Prefs &prefs`) const
- Was event anywhere on the item?*

 - int `event_on_label` (const `FI_Tree_Prefs &prefs`) const
- Was event on the label() of this item?*

 - int `event_on_user_icon` (const `FI_Tree_Prefs &prefs`) const
- Was the event on the 'user icon' of this item, if any?*

 - int `find_child` (const char *name)
- Return the index of the immediate child of this item that has the label 'name'.*

 - int `find_child` (`FI_Tree_Item *item`)
- Find the index number for the specified 'item' in the current item's list of children.*

 - `FI_Tree_Item * find_child_item` (char **arr)
- Non-const version of `FI_Tree_Item::find_child_item(char **arr) const`.*

 - const `FI_Tree_Item * find_child_item` (char **arr) const
- Find child item by descending array 'arr' of names.*

 - `FI_Tree_Item * find_child_item` (const char *name)
- Non-const version of `FI_Tree_Item::find_child_item(const char *name) const`.*

 - const `FI_Tree_Item * find_child_item` (const char *name) const
- Return the /immediate/ child of current item that has the label 'name'.*

- `FI_Tree_Item * find_clicked` (const `FI_Tree_Prefs &prefs`, int `yonly=0`)
Non-const version of `FI_Tree_Item::find_clicked(const FI_Tree_Prefs&,int)` const.
- const `FI_Tree_Item * find_clicked` (const `FI_Tree_Prefs &prefs`, int `yonly=0`) const
Find the item that the last event was over.
- `FI_Tree_Item * find_item` (char `**arr`)
*Non-const version of `FI_Tree_Item::find_item(char **names)` const.*
- const `FI_Tree_Item * find_item` (char `**arr`) const
Find item by descending array of 'names'.
- `FI_Tree_Item` (const `FI_Tree_Item *o`)
Copy constructor.
- `FI_Tree_Item` (const `FI_Tree_Prefs &prefs`)
Constructor.
- `FI_Tree_Item` (`FI_Tree *tree`)
Constructor.
- int `h` () const
The item's height.
- int `has_children` () const
See if this item has children.
- `FI_Tree_Item * insert` (const `FI_Tree_Prefs &prefs`, const char `*new_label`, int `pos=0`)
Insert a new item named 'new_label' into current item's children at a specified position 'pos'.
- `FI_Tree_Item * insert_above` (const `FI_Tree_Prefs &prefs`, const char `*new_label`)
Insert a new item named 'new_label' above this item.
- char `is_activated` () const
See if the item is activated.
- char `is_active` () const
See if the item is activated. Alias for `is_activated()`.
- int `is_close` () const
See if the item is 'closed'.
- int `is_open` () const
See if the item is 'open'.
- int `is_root` () const
Is this item the root of the tree?
- char `is_selected` () const
See if the item is selected.
- int `is_visible` () const
See if the item is visible.
- const char `* label` () const
Return the label.
- void `label` (const char `*val`)
Set the label to 'name'.
- int `label_h` () const
The item's label height.
- int `label_w` () const
The item's maximum label width to right edge of `FI_Tree`'s inner width within scrollbars.
- int `label_x` () const
The item's label x position relative to the window.
- int `label_y` () const
The item's label y position relative to the window.
- `FI_Color labelbgcolor` () const
Return item's label background text color.
- void `labelbgcolor` (`FI_Color val`)

- Set item's label background color.
- **FI_Color labelcolor** () const
 - Return item's label text color. Alias for *labelfgcolor()* const).
- void **labelcolor** (FI_Color val)
 - Set item's label text color. Alias for *labelfgcolor(FI_Color)*.
- **FI_Color labelfgcolor** () const
 - Return item's label foreground text color.
- void **labelfgcolor** (FI_Color val)
 - Set item's label foreground text color.
- **FI_Font labelfont** () const
 - Get item's label font face.
- void **labelfont** (FI_Font val)
 - Set item's label font face.
- **FI_Fontsize labelsize** () const
 - Get item's label font size.
- void **labelsiz** (FI_Fontsize val)
 - Set item's label font size.
- int **move** (FI_Tree_Item *item, int op=0, int pos=0)
 - Move the current item above/below/into the specified 'item', where 'op' determines the type of move:
- int **move** (int to, int from)
 - Move an item within its parent using index numbers.
- int **move_above** (FI_Tree_Item *item)
 - Move the current item above the specified 'item'.
- int **move_below** (FI_Tree_Item *item)
 - Move the current item below the specified 'item'.
- int **move_into** (FI_Tree_Item *item, int pos=0)
 - Parent the current item as a child of the specified 'item'.
- **FI_Tree_Item * next** ()
 - Return the next item in the tree.
- **FI_Tree_Item * next_displayed** (FI_Tree_Prefs &prefs)
 - Same as *next_visible()*.
- **FI_Tree_Item * next_sibling** ()
 - Return this item's next sibling.
- **FI_Tree_Item * next_visible** (FI_Tree_Prefs &prefs)
 - Return the next *open()*, *visible()* item.
- void **open** ()
 - Open this item and all its children.
- void **open_toggle** ()
 - Toggle the item's open/closed state.
- **FI_Tree_Item * parent** ()
 - Return the parent for this item. Returns NULL if we are the root.
- const **FI_Tree_Item * parent** () const
 - Return the const parent for this item. Returns NULL if we are the root.
- void **parent** (FI_Tree_Item *val)
 - Set the parent for this item.
- const **FI_Tree_Prefs & prefs** () const
 - Return the parent tree's prefs.
- **FI_Tree_Item * prev** ()
 - Return the previous item in the tree.
- **FI_Tree_Item * prev_displayed** (FI_Tree_Prefs &prefs)
 - Same as *prev_visible()*.

- [FI_Tree_Item](#) * [prev_sibling](#) ()
Return this item's previous sibling.
- [FI_Tree_Item](#) * [prev_visible](#) ([FI_Tree_Prefs](#) &prefs)
Return the previous [open\(\)](#), [visible\(\)](#) item.
- int [remove_child](#) (const char *new_label)
Remove immediate child (and its children) by its label 'name'.
- int [remove_child](#) ([FI_Tree_Item](#) *item)
Remove 'item' from the current item's children.
- int [reparent](#) ([FI_Tree_Item](#) *newchild, int index)
Reparent specified item as a child of ourself at position 'pos'.
- [FI_Tree_Item](#) * [replace](#) ([FI_Tree_Item](#) *new_item)
Replace the current item with a new item.
- [FI_Tree_Item](#) * [replace_child](#) ([FI_Tree_Item](#) *olditem, [FI_Tree_Item](#) *newitem)
Replace existing child 'olditem' with 'newitem'.
- void [select](#) (int val=1)
Change the item's selection state to the optionally specified 'val'.
- int [select_all](#) ()
Select item and all its children.
- void [select_toggle](#) ()
Toggle the item's selection state.
- void [show_self](#) (const char *indent="") const
Print the tree as 'ascii art' to stdout.
- int [swap_children](#) ([FI_Tree_Item](#) *a, [FI_Tree_Item](#) *b)
Swap two of our immediate children, given item pointers.
- void [swap_children](#) (int ax, int bx)
Swap two of our children, given two child index values 'ax' and 'bx'.
- [FI_Tree](#) * [tree](#) ()
Return the tree for this item.
- const [FI_Tree](#) * [tree](#) () const
Return the tree for this item.
- void [update_prev_next](#) (int index)
Update our [_prev_sibling](#) and [_next_sibling](#) pointers to point to neighbors given [index](#) as being our current position in the parent's item array.
- void * [user_data](#) () const
Retrieve the user-data value that has been assigned to the item.
- void [user_data](#) (void *data)
Set a user-data value for the item.
- [FI_Image](#) * [userdeicon](#) () const
Return the deactivated version of the user icon, if any.
- void [userdeicon](#) ([FI_Image](#) *val)
Set the usericon to draw when the item is deactivated.
- [FI_Image](#) * [usericon](#) () const
Get the item's user icon as an [FI_Image](#). Returns '0' if disabled.
- void [usericon](#) ([FI_Image](#) *val)
Set the item's user icon to an [FI_Image](#).
- int [visible](#) () const
See if the item is visible. Alias for [is_visible\(\)](#).
- int [visible_r](#) () const
See if item and all its parents are [open\(\)](#) and [visible\(\)](#).
- int [w](#) () const
The entire item's width to right edge of [FI_Tree](#)'s inner width within scrollbars.

- [FI_Widget](#) * **widget** () const
Return FLTK widget assigned to this item.
- void **widget** ([FI_Widget](#) *val)
Assign an FLTK widget to this item.
- int **x** () const
The item's x position relative to the window.
- int **y** () const
The item's y position relative to the window.

Protected Member Functions

- void **_Init** (const [FI_Tree_Prefs](#) &prefs, [FI_Tree](#) *tree)
- int **calc_item_height** (const [FI_Tree_Prefs](#) &prefs) const
Return the item's 'visible' height.
- void **draw_horizontal_connector** (int x1, int x2, int y, const [FI_Tree_Prefs](#) &prefs)
Internal: Horizontal connector line based on preference settings.
- void **draw_vertical_connector** (int x, int y1, int y2, const [FI_Tree_Prefs](#) &prefs)
Internal: Vertical connector line based on preference settings.
- [FI_Color](#) **drawbgcolor** () const
Returns the recommended background color used for drawing this item.
- [FI_Color](#) **drawfgcolor** () const
Returns the recommended foreground color used for drawing this item.
- void **hide_widgets** ()
Internal: Hide the FLTK [widget\(\)](#) for this item and all children.
- int **is_flag** (unsigned short val) const
See if flag set. Returns 0 or 1.
- void **recalc_tree** ()
Call this when our geometry is changed.
- void **set_flag** (unsigned short flag, int val)
Set a flag to an on or off value. val is 0 or 1.
- void **show_widgets** ()
Internal: Show the FLTK [widget\(\)](#) for this item and all children.

12.153.1 Detailed Description

Tree widget item.

This class is a single tree item, and manages all of the item's attributes. [FI_Tree_Item](#) is used by [FI_Tree](#), which is comprised of many instances of [FI_Tree_Item](#).

[FI_Tree_Item](#) is hierarchical; it dynamically manages an [FI_Tree_Item_Array](#) of children that are themselves instances of [FI_Tree_Item](#). Each item can have zero or more children. When an item has children, [close\(\)](#) and [open\(\)](#) can be used to hide or show them.

Items have their own attributes; font size, face, color. Items maintain their own hierarchy of children.

When you make changes to items, you'll need to tell the tree to [redraw\(\)](#) for the changes to show up.

New 1.3.3 ABI feature: You can define custom items by either adding a custom widget to the item with [FI_Tree_Item::widget\(\)](#), or override the [draw_item_content\(\)](#) method if you want to just redefine how the label is drawn.

The following shows the [FI_Tree_Item](#)'s dimensions, useful when overriding the [draw_item_content\(\)](#) method:

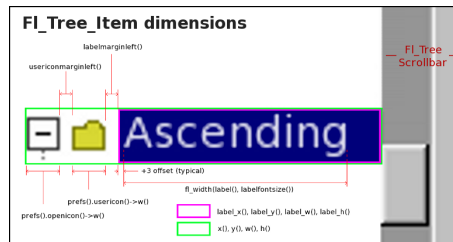


Figure 12.65 `Fl_Tree_Item`'s internal dimensions.

12.153.2 Constructor & Destructor Documentation

12.153.2.1 `Fl_Tree_Item()` [1/2]

```
Fl_Tree_Item::Fl_Tree_Item (
    const Fl_Tree_Prefs & prefs )
```

Constructor.

Makes a new instance of `Fl_Tree_Item` using defaults from 'prefs'.

Deprecated in 1.3.3 ABI – you must use `Fl_Tree_Item(Fl_Tree*)` for proper horizontal scrollbar behavior.

12.153.2.2 `Fl_Tree_Item()` [2/2]

```
Fl_Tree_Item::Fl_Tree_Item (
    Fl_Tree * tree )
```

Constructor.

Makes a new instance of `Fl_Tree_Item` for 'tree'.

This must be used instead of the older, deprecated `Fl_Tree_Item(Fl_Tree_Prefs)` constructor for proper horizontal scrollbar calculation.

Version

1.3.3 ABI feature

12.153.3 Member Function Documentation

12.153.3.1 `activate()`

```
void Fl_Tree_Item::activate (
    int val = 1 ) [inline]
```

Change the item's activation state to the optionally specified 'val'.

When deactivated, the item will be 'grayed out'; the `callback()` won't be invoked if the user clicks on the label. If a `widget()` is associated with the item, its activation state will be changed as well.

If 'val' is not specified, the item will be activated.

12.153.3.2 `add()` [1/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
    const Fl_Tree_Prefs & prefs,
    char ** arr )
```

Descend into the path specified by 'arr', and add a new child there.

Should be used only by `Fl_Tree`'s internals. Adds the item based on the value of `prefs.sortorder()`.

Returns

the item added.

Version

1.3.0 release

12.153.3.3 add() [2/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
    const Fl_Tree_Prefs & prefs,
    char ** arr,
    Fl_Tree_Item * newitem )
```

Descend into path specified by 'arr' and add 'newitem' there.

Should be used only by [Fl_Tree](#)'s internals. If item is NULL, a new item is created. Adds the item based on the value of prefs.sortorder().

Returns

the item added.

Version

1.3.3 ABI feature

12.153.3.4 add() [3/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
    const Fl_Tree_Prefs & prefs,
    const char * new_label )
```

Add a new child to this item with the name 'new_label' and defaults from 'prefs'.

An internally managed copy is made of the label string. Adds the item based on the value of prefs.sortorder().

Returns

the item added

Version

1.3.0 release

12.153.3.5 add() [4/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
    const Fl_Tree_Prefs & prefs,
    const char * new_label,
    Fl_Tree_Item * item )
```

Add 'item' as immediate child with 'new_label' and defaults from 'prefs'.

If 'item' is NULL, a new item is created. An internally managed copy is made of the label string. Adds the item based on the value of prefs.sortorder().

Returns

the item added

Version

1.3.3

12.153.3.6 calc_item_height()

```
int Fl_Tree_Item::calc_item_height (
    const Fl_Tree_Prefs & prefs ) const [protected]
```

Return the item's 'visible' height.

Takes into account the item's:

- visibility (if !is_visible(), returns 0)

- [labelfont\(\)](#) height: if [label\(\)](#) != NULL
- [widget\(\)](#) height: if [widget\(\)](#) != NULL
- [openicon\(\)](#) height (if not NULL)
- [usericon\(\)](#) height (if not NULL) Does NOT include [Fl_Tree::linespacing\(\)](#);

Returns

maximum pixel height

12.153.3.7 child()

```
const Fl_Tree_Item * Fl_Tree_Item::child (
    int t ) const
```

Return the const child item for the given 'index'.

Return const child item for the specified 'index'.

12.153.3.8 deactivate()

```
void Fl_Tree_Item::deactivate ( ) [inline]
```

Deactivate the item; the callback() won't be invoked when clicked.

Same as activate(0)

12.153.3.9 deparent()

```
Fl_Tree_Item * Fl_Tree_Item::deparent (
    int pos )
```

Deparent child at index position 'pos'.

This creates an "orphaned" item that is still allocated, but has no parent or siblings. Normally the caller would want to immediately reparent the orphan elsewhere.

A successfully orphaned item will have its [parent\(\)](#) and [prev_sibling\(\)/next_sibling\(\)](#) set to NULL.

Returns

- pointer to orphaned item on success
- NULL on error (could not deparent the item)

See also

[reparent\(\)](#)

12.153.3.10 depth()

```
int Fl_Tree_Item::depth ( ) const
```

Returns how many levels deep this item is in the hierarchy.

For instance; root has a depth of zero, and its immediate children would have a depth of 1, and so on. Use e.g. for determining the horizontal indent of this item during drawing.

12.153.3.11 deselect_all()

```
int Fl_Tree_Item::deselect_all ( ) [inline]
```

Deselect item and all its children.

Returns count of how many items were in the 'selected' state, ie. how many items were "changed".

12.153.3.12 draw()

```
void Fl_Tree_Item::draw (
    int X,
    int & Y,
    int W,
    Fl_Tree_Item * itemfocus,
    int & tree_item_xmax,
    int lastchild = 1,
    int render = 1 )
```

Draw this item and its children.

Parameters

in	<i>X</i>	Horizontal position for item being drawn
in, out	<i>Y</i>	Vertical position for item being drawn, returns new position for next item
in	<i>W</i>	Recommended width for item
in	<i>itemfocus</i>	The tree's current focus item (if any)
in, out	<i>tree_item_xmax</i>	The tree's running xmax (right-most edge so far). Mainly used by parent tree when render==0 to calculate tree's max width.
in	<i>lastchild</i>	Is this item the last child in a subtree?
in	<i>render</i>	Whether or not to render the item: 0: no rendering, just calculate size w/out drawing. 1: render item as well as size calc

Version

1.3.3 ABI feature: modified parameters

12.153.3.13 draw_horizontal_connector()

```
void Fl_Tree_Item::draw_horizontal_connector (
    int x1,
    int x2,
    int y,
    const Fl_Tree_Prefs & prefs ) [protected]
```

Internal: Horizontal connector line based on preference settings.

Parameters

in	<i>x1</i>	The left hand X position of the horizontal connector
in	<i>x2</i>	The right hand X position of the horizontal connector
in	<i>y</i>	The vertical position of the horizontal connector
in	<i>prefs</i>	The Fl_Tree prefs

12.153.3.14 draw_item_content()

```
int Fl_Tree_Item::draw_item_content (
    int render ) [virtual]
```

Draw the item content.

This method can be overridden to implement custom drawing by filling the `label_[xywh]()` area with content.

A minimal example of how to override `draw_item_content()` and draw just a normal item's background and label ourselves:

```
class MyTreeItem : public Fl_Tree_Item {
public:
    MyTreeItem() { }
    ~MyTreeItem() { }
    // DRAW OUR CUSTOM CONTENT FOR THE ITEM
```

```

int draw_item_content(int render) {
    // Our item's dimensions + text content
    int X=label_x(), Y=label_y(), W=label_w(), H=label_h();
    const char *text = label() ? label() : "";
    // Rendering? Do any drawing that's needed
    if ( render ) {
        // Draw bg -- a filled rectangle
        fl_color(drawbgcolor()); fl_rectf(X,Y,W,H);
        // Draw label
        fl_font(labelfont(), labelsz()); // use item's label font/size
        fl_color(drawfgcolor()); // use recommended fg color
        fl_draw(text, X,Y,W,H, FL_ALIGN_LEFT); // draw the item's label
    }
    // Rendered or not, we must calculate content's max X position
    int lw=0, lh=0;
    fl_measure(text, lw, lh); // get width of label text
    return X + lw; // return X + label width
}
};

```

You can draw anything you want inside `draw_item_content()` using any of the `fl_draw.H` functions, as long as it's within the label's xywh area.

To add instances of your custom item to the tree, you can use:

```

// Example #1: using add()
MyTreeItem *bart = new MyTreeItem(..); // class derived from Fl_Tree_Item
tree->add("/Simpsons/Bart", bart); // Add item as /Simpsons/Bart

```

..or you can insert or replace existing items:

```

// Example #2: using replace()
MyTreeItem *marge = new MyTreeItem(..); // class derived from Fl_Tree_Item
item = tree->add("/Simpsons/Marge"); // create item
item->replace(mi); // replace it with our own

```

Parameters

in	<i>render</i>	Whether we should render content (1), or just tally the geometry (0). <code>Fl_Tree</code> may want only to find the widest item in the tree for scrollbar calculations.
----	---------------	--

Returns

the right-most X coordinate, or 'xmax' of content we drew, i.e. the "scrollable" content. The tree uses the largest xmax to determine the maximum width of the tree's content (needed for e.g. computing the horizontal scrollbar's size).

Version

1.3.3 ABI feature

12.153.3.15 draw_vertical_connector()

```

void Fl_Tree_Item::draw_vertical_connector (
    int x,
    int y1,
    int y2,
    const Fl_Tree_Prefs & prefs ) [protected]

```

Internal: Vertical connector line based on preference settings.

Parameters

in	<i>x</i>	The x position of the vertical connector
in	<i>y1</i>	The top of the vertical connector
in	<i>y2</i>	The bottom of the vertical connector
in	<i>prefs</i>	The <code>Fl_Tree</code> prefs

12.153.3.16 drawbgcolor()

```
Fl_Color Fl_Tree_Item::drawbgcolor ( ) const [protected]
```

Returns the recommended background color used for drawing this item.

See also

[draw_item_content\(\)](#)

Version

1.3.3 ABI

12.153.3.17 drawfgcolor()

```
Fl_Color Fl_Tree_Item::drawfgcolor ( ) const [protected]
```

Returns the recommended foreground color used for drawing this item.

See also

[draw_item_content\(\)](#)

Version

1.3.3 ABI ABI

12.153.3.18 find_child() [1/2]

```
int Fl_Tree_Item::find_child (
    const char * name )
```

Return the index of the immediate child of this item that has the label 'name'.

Returns

index of found item, or -1 if not found.

Version

1.3.0 release

12.153.3.19 find_child() [2/2]

```
int Fl_Tree_Item::find_child (
    Fl_Tree_Item * item )
```

Find the index number for the specified 'item' in the current item's list of children.

Returns

the index, or -1 if not found.

12.153.3.20 find_child_item() [1/2]

```
const Fl_Tree_Item * Fl_Tree_Item::find_child_item (
    char ** arr ) const
```

Find child item by descending array 'arr' of names.

Does not include self in search. Only [Fl_Tree](#) should need this method.

Returns

item, or 0 if not found

Version

1.3.0 release

12.153.3.21 find_child_item() [2/2]

```
const Fl_Tree_Item * Fl_Tree_Item::find_child_item (
    const char * name ) const
```

Return the /immediate/ child of current item that has the label 'name'.

Returns

const found item, or 0 if not found.

Version

1.3.3

12.153.3.22 find_clicked()

```
const Fl_Tree_Item * Fl_Tree_Item::find_clicked (
    const Fl_Tree_Prefs & prefs,
    int yonly = 0 ) const
```

Find the item that the last event was over.

If 'yonly' is 1, only check event's y value, don't care about x.

Parameters

in	<i>prefs</i>	The parent tree's Fl_Tree_Prefs
in	<i>yonly</i>	- 0: check both event's X and Y values. - 1: only check event's Y value, don't care about X.

Returns

pointer to clicked item, or NULL if none found

Version

1.3.3 ABI feature

12.153.3.23 find_item()

```
const Fl_Tree_Item * Fl_Tree_Item::find_item (
    char ** names ) const
```

Find item by descending array of 'names'.

Includes self in search. Only [Fl_Tree](#) should need this method. Use [Fl_Tree::find_item\(\)](#) instead.

Returns

const item, or 0 if not found

12.153.3.24 hide_widgets()

```
void Fl_Tree_Item::hide_widgets ( ) [protected]
```

Internal: Hide the FLTK [widget\(\)](#) for this item and all children.

Used by [close\(\)](#) to hide widgets.

12.153.3.25 insert()

```
Fl_Tree_Item * Fl_Tree_Item::insert (
    const Fl_Tree_Prefs & prefs,
    const char * new_label,
    int pos = 0 )
```

Insert a new item named 'new_label' into current item's children at a specified position 'pos'.

If pos is out of range the new item is

- prepended if `pos < 0` or
- appended if `pos > item->children()`.

Returns

the new item inserted

See also

[Fl_Tree::insert\(\)](#)

12.153.3.26 insert_above()

```
Fl_Tree_Item * Fl_Tree_Item::insert_above (
    const Fl_Tree_Prefs & prefs,
    const char * new_label )
```

Insert a new item named 'new_label' above this item.

Returns

the new item inserted, or 0 if an error occurred.

12.153.3.27 label()

```
void Fl_Tree_Item::label (
    const char * name )
```

Set the label to 'name'.

Makes and manages an internal copy of 'name'.

12.153.3.28 label_h()

```
int Fl_Tree_Item::label_h ( ) const [inline]
```

The item's label height.

Version

1.3.3

12.153.3.29 label_w()

```
int Fl_Tree_Item::label_w ( ) const [inline]
```

The item's maximum label width to right edge of [Fl_Tree](#)'s inner width within scrollbars.

Version

1.3.3

12.153.3.30 label_x()

```
int Fl_Tree_Item::label_x ( ) const [inline]
```

The item's label x position relative to the window.

Version

1.3.3

12.153.3.31 label_y()

```
int Fl_Tree_Item::label_y ( ) const [inline]
```

The item's label y position relative to the window.

Version

1.3.3

12.153.3.32 labelbgcolor() [1/2]

```
Fl_Color Fl_Tree_Item::labelbgcolor ( ) const [inline]
```

Return item's label background text color.

If the color is 0xffffffff, the default behavior is the parent tree's bg color will be used. (An overloaded [draw_item_content\(\)](#) can override this behavior.)

12.153.3.33 labelbgcolor() [2/2]

```
void Fl_Tree_Item::labelbgcolor (
    Fl_Color val ) [inline]
```

Set item's label background color.

A special case is made for color 0xffffffff which uses the parent tree's bg color.

12.153.3.34 move() [1/2]

```
int Fl_Tree_Item::move (
    Fl_Tree_Item * item,
    int op = 0,
    int pos = 0 )
```

Move the current item above/below/into the specified 'item', where 'op' determines the type of move:

- 0: move above 'item' ('pos' ignored)
- 1: move below 'item' ('pos' ignored)
- 2: move into 'item' as a child (at optional position 'pos')

..and 'pos' determines an optional index position after the move.

Returns

0 on success. a negative number on error:

- -1: one of the items has no parent
- -2: item's index could not be determined
- -3: bad 'op'
- -4: index range error
- -5: could not deparent
- -6: could not reparent at 'pos'
- (Other return values reserved for future use.)

See also

[move_above\(\)](#), [move_below\(\)](#), [move_into\(\)](#), [move\(int,int\)](#)

12.153.3.35 move() [2/2]

```
int Fl_Tree_Item::move (
    int to,
    int from )
```

Move an item within its parent using index numbers.
Item is moved 'to' its new position 'from' its old position.

Returns

- 0: Success
- -1: range error (e.g. if 'to' or 'from' out of range).
- (Other return values reserved for future use)

See also

[move_above\(\)](#), [move_below\(\)](#), [move_into\(\)](#), [move\(Fl_Tree_Item*,int,int\)](#)

12.153.3.36 move_above()

```
int Fl_Tree_Item::move_above (
    Fl_Tree_Item * item )
```

Move the current item above the specified 'item'.
This is the equivalent of calling `move(item,0,0)`.

Returns

0 on success.
On error returns a negative value; see [move\(Fl_Tree_Item*,int,int\)](#) for possible error codes.

See also

[move_below\(\)](#), [move_into\(\)](#), [move\(int,int\)](#), [move\(Fl_Tree_Item*,int,int\)](#)

12.153.3.37 move_below()

```
int Fl_Tree_Item::move_below (
    Fl_Tree_Item * item )
```

Move the current item below the specified 'item'.
This is the equivalent of calling `move(item,1,0)`.

Returns

0 on success.
On error returns a negative value; see [move\(Fl_Tree_Item*,int,int\)](#) for possible error codes.

See also

[move_above\(\)](#), [move_into\(\)](#), [move\(int,int\)](#), [move\(Fl_Tree_Item*,int,int\)](#)

12.153.3.38 move_into()

```
int Fl_Tree_Item::move_into (
    Fl_Tree_Item * item,
    int pos = 0 )
```

Parent the current item as a child of the specified 'item'.
This is the equivalent of calling `move(item,2,pos)`.

Returns

0 on success.
On error returns a negative value; see [move\(Fl_Tree_Item*,int,int\)](#) for possible error codes.

See also

[move_above\(\)](#), [move_below\(\)](#), [move\(int,int\)](#), [move\(Fl_Tree_Item*,int,int\)](#)

12.153.3.39 next()

```
Fl_Tree_Item * Fl_Tree_Item::next ( )
```

Return the next item in the tree.

This method can be used to walk the tree forward. For an example of how to use this method, see [Fl_Tree::first\(\)](#).

Returns

the next item in the tree, or 0 if there's no more items.

12.153.3.40 next_displayed()

```
Fl_Tree_Item * Fl_Tree_Item::next_displayed (
    Fl_Tree_Prefs & prefs )
```

Same as [next_visible\(\)](#).

Deprecated in 1.3.3 for confusing name, use [next_visible\(\)](#) instead

12.153.3.41 next_sibling()

```
Fl_Tree_Item * Fl_Tree_Item::next_sibling ( )
```

Return this item's next sibling.

Moves to the next item below us at the same level (sibling). Use this to move down the tree without changing [depth\(\)](#). effectively skipping over this item's children/descendents.

Returns

item's next sibling, or 0 if none.

12.153.3.42 next_visible()

```
Fl_Tree_Item * Fl_Tree_Item::next_visible (
    Fl_Tree_Prefs & prefs )
```

Return the next [open\(\)](#), [visible\(\)](#) item.

(If this item has children and is closed, children are skipped)

This method can be used to walk the tree forward, skipping items that are not currently open/visible to the user.

Returns

the next [open\(\)](#) [visible\(\)](#) item below us, or 0 if there's no more items.

Version

1.3.3

12.153.3.43 parent()

```
void Fl_Tree_Item::parent (
    Fl_Tree_Item * val ) [inline]
```

Set the parent for this item.

Should only be used by [Fl_Tree](#)'s internals.

12.153.3.44 prefs()

```
const Fl_Tree_Prefs & Fl_Tree_Item::prefs ( ) const
```

Return the parent tree's prefs.

Returns

a reference to the parent tree's [Fl_Tree_Prefs](#)

Version

1.3.3 ABI feature

12.153.3.45 prev()

```
Fl_Tree_Item * Fl_Tree_Item::prev ( )
```

Return the previous item in the tree.

This method can be used to walk the tree backwards. For an example of how to use this method, see [Fl_Tree::last\(\)](#).

Returns

the previous item in the tree, or 0 if there's no item above this one (hit the root).

12.153.3.46 prev_displayed()

```
Fl_Tree_Item * Fl_Tree_Item::prev_displayed (
    Fl_Tree_Prefs & prefs )
```

Same as [prev_visible\(\)](#).

Deprecated in 1.3.3 for confusing name, use [prev_visible\(\)](#)

12.153.3.47 prev_sibling()

```
Fl_Tree_Item * Fl_Tree_Item::prev_sibling ( )
```

Return this item's previous sibling.

Moves to the previous item above us at the same level (sibling). Use this to move up the tree without changing [depth\(\)](#).

Returns

This item's previous sibling, or 0 if none.

12.153.3.48 prev_visible()

```
Fl_Tree_Item * Fl_Tree_Item::prev_visible (
    Fl_Tree_Prefs & prefs )
```

Return the previous [open\(\)](#), [visible\(\)](#) item.

(If this item above us has children and is closed, its children are skipped)

This method can be used to walk the tree backward, skipping items that are not currently open/visible to the user.

Returns

the previous [open\(\)](#) [visible\(\)](#) item above us, or 0 if there's no more items.

12.153.3.49 recalc_tree()

```
void Fl_Tree_Item::recalc_tree ( ) [protected]
```

Call this when our geometry is changed.

(Font size, label contents, etc) Schedules tree to recalculate itself, as changes to us may affect tree widget's scrollbar visibility and tab sizes.

Version

1.3.3 ABI

12.153.3.50 remove_child() [1/2]

```
int Fl_Tree_Item::remove_child (
    const char * name )
```

Remove immediate child (and its children) by its label 'name'.
If more than one item matches 'name', only the first matching item is removed.

Parameters

in	<i>name</i>	The label name of the immediate child to remove
----	-------------	---

Returns

0 if removed, -1 if not found.

Version

1.3.3

12.153.3.51 remove_child() [2/2]

```
int Fl_Tree_Item::remove_child (
    Fl_Tree_Item * item )
```

Remove 'item' from the current item's children.

Returns

0 if removed, -1 if item not an immediate child.

12.153.3.52 reparent()

```
int Fl_Tree_Item::reparent (
    Fl_Tree_Item * newchild,
    int pos )
```

Reparent specified item as a child of ourself at position 'pos'.
Typically 'newchild' was recently orphaned with [deparent\(\)](#).

Returns

- 0: on success
- -1: on error (e.g. if 'pos' out of range) with no changes made.

See also

[deparent\(\)](#)

12.153.3.53 replace()

```
Fl_Tree_Item * Fl_Tree_Item::replace (
    Fl_Tree_Item * newitem )
```

Replace the current item with a new item.

The current item is destroyed if successful. No checks are made to see if an item with the same name exists.

This method can be used to, for example, install 'custom' items into the tree derived from [Fl_Tree_Item](#); see [draw_item_content\(\)](#).

Parameters

in	<i>newitem</i>	The new item to replace the current item
----	----------------	--

Returns

newitem on success, NULL if could not be replaced.

See also

[Fl_Tree_Item::draw_item_content\(\)](#), [Fl_Tree::root\(Fl_Tree_Item*\)](#)

Version

1.3.3 ABI feature

12.153.3.54 replace_child()

```
Fl_Tree_Item * Fl_Tree_Item::replace_child (
    Fl_Tree_Item * olditem,
    Fl_Tree_Item * newitem )
```

Replace existing child 'olditem' with 'newitem'.

The 'olditem' is destroyed if successful. Can be used to put custom items (derived from [Fl_Tree_Item](#)) into the tree. No checks are made to see if an item with the same name exists.

Parameters

in	<i>olditem</i>	The item to be found and replaced
in	<i>newitem</i>	The new item to take the place of 'olditem'

Returns

newitem on success and 'olditem' is destroyed. NULL on error if 'olditem' was not found as an immediate child.

See also

[replace\(\)](#), [Fl_Tree_Item::draw\(\)](#)

Version

1.3.3 ABI feature

12.153.3.55 select()

```
void Fl_Tree_Item::select (
    int val = 1 ) [inline]
```

Change the item's selection state to the optionally specified 'val'.

If 'val' is not specified, the item will be selected.

12.153.3.56 select_all()

```
int Fl_Tree_Item::select_all ( ) [inline]
```

Select item and all its children.

Returns count of how many items were in the 'deselected' state, ie. how many items were "changed".

12.153.3.57 show_self()

```
void Fl_Tree_Item::show_self (
    const char * indent = "" ) const
```

Print the tree as 'ascii art' to stdout.

Used mainly for debugging.

12.153.3.58 show_widgets()

```
void Fl_Tree_Item::show_widgets ( ) [protected]
```

Internal: Show the FLTK [widget\(\)](#) for this item and all children.

Used by [open\(\)](#) to re-show widgets that were hidden by a previous [close\(\)](#)

12.153.3.59 swap_children() [1/2]

```
int Fl_Tree_Item::swap_children (
    Fl_Tree_Item * a,
    Fl_Tree_Item * b )
```

Swap two of our immediate children, given item pointers.

Use e.g. for sorting.

This method is SLOW because it involves linear lookups.

For speed, use [swap_children\(int,int\)](#) instead.

Parameters

in	<i>a,b</i>	The item ptrs of the two items to swap. Both must be immediate children of the current item.
----	------------	--

Returns

- 0 : OK
- -1 : failed: item 'a' or 'b' is not our child.

12.153.3.60 swap_children() [2/2]

```
void Fl_Tree_Item::swap_children (
    int ax,
    int bx )
```

Swap two of our children, given two child index values 'ax' and 'bx'.

Use e.g. for sorting.

This method is FAST, and does not involve lookups.

No range checking is done on either index value.

Parameters

in	<i>ax,bx</i>	the index of the items to swap
----	--------------	--------------------------------

12.153.3.61 tree() [1/2]

```
Fl_Tree * Fl_Tree_Item::tree ( ) [inline]
```

Return the tree for this item.

Version

1.3.4

12.153.3.62 tree() [2/2]

```
const Fl_Tree * Fl_Tree_Item::tree ( ) const [inline]
```

Return the tree for this item.

Version

1.3.3

12.153.3.63 update_prev_next()

```
void Fl_Tree_Item::update_prev_next (
    int index )
```

Update our `_prev_sibling` and `_next_sibling` pointers to point to neighbors given `index` as being our current position in the parent's item array.

Call this whenever items in the array are added/removed/moved/swapped/etc.

Parameters

<code>in</code>	<code>index</code>	Our index# in the parent. Special case if <code>index=-1</code> : become an orphan; null out all parent/sibling associations.
-----------------	--------------------	--

12.153.3.64 userdeicon() [1/2]

```
Fl_Image * Fl_Tree_Item::userdeicon ( ) const [inline]
```

Return the deactivated version of the user icon, if any.

Returns 0 if none.

12.153.3.65 userdeicon() [2/2]

```
void Fl_Tree_Item::userdeicon (
    Fl_Image * val ) [inline]
```

Set the usericon to draw when the item is deactivated.

Use '0' to disable. No internal copy is made; caller must manage icon's memory.

To create a typical 'grayed out' version of your usericon image, you can do the following:

```
// Create tree + usericon for items
Fl_Tree *tree = new Fl_Tree(..);
Fl_Image *usr_icon = new Fl_Pixmap(..); // your usericon
Fl_Image *de_icon = usr_icon->copy(); // make a copy, and..
de_icon->inactive(); // make it 'grayed out'
...
for ( .. ) { // item loop..
    item = tree->add("..."); // create new item
    item->usericon(usr_icon); // assign usericon to items
    item->userdeicon(de_icon); // assign userdeicon to items
    ..
}
```

In the above example, the app should 'delete' the two icons when they're no longer needed (e.g. after the tree is destroyed)

Version

1.3.4

12.153.3.66 usericon()

```
void Fl_Tree_Item::usericon (
    Fl_Image * val ) [inline]
```

Set the item's user icon to an [Fl_Image](#).

Use '0' to disable. No internal copy is made, caller must manage icon's memory.

Note, if you expect your items to be deactivated(), use [userdeicon\(Fl_Image*\)](#) to set up a 'grayed out' version of your icon to be used for display.

See also

[userdeicon\(Fl_Image*\)](#)

12.153.3.67 visible_r()

```
int Fl_Tree_Item::visible_r ( ) const
```

See if item and all its parents are [open\(\)](#) and [visible\(\)](#).

Returns

1 – item and its parents are [open\(\)](#) and [visible\(\)](#) 0 – item (or one of its parents) are invisible or [close\(\)](#)ed.

The documentation for this class was generated from the following files:

- [FI_Tree_Item.H](#)
- [FI_Tree_Item.cxx](#)

12.154 FI_Tree_Item_Array Class Reference

Manages an array of [FI_Tree_Item](#) pointers.

```
#include <FI_Tree_Item_Array.H>
```

Public Member Functions

- void [add](#) ([FI_Tree_Item](#) *val)
Add an item to the end of the array.*
- void [clear](#) ()
Clear the entire array.
- int [deparent](#) (int pos)
Deparent item at 'pos' from our list of children.
- [FI_Tree_Item_Array](#) (const [FI_Tree_Item_Array](#) *o)
Copy constructor. Makes new copy of array, with new instances of each item.
- [FI_Tree_Item_Array](#) (int new_chunksize=10)
Constructor; creates an empty array.
- void [insert](#) (int pos, [FI_Tree_Item](#) *new_item)
Insert an item at index position pos.
- int [manage_item_destroy](#) () const
- void [manage_item_destroy](#) (int val)
Option to control if FI_Tree_Item_Array's destructor will also destroy the FI_Tree_Item's.
- int [move](#) (int to, int from)
Move item at 'from' to new position 'to' in the array.
- [FI_Tree_Item](#) * [operator\[\]](#) (int i)
Return the item and index i.
- const [FI_Tree_Item](#) * [operator\[\]](#) (int i) const
Const version of operator[](int i)
- int [remove](#) ([FI_Tree_Item](#) *item)
Remove the item from the array.
- void [remove](#) (int index)
Remove the item at.
- int [reparent](#) ([FI_Tree_Item](#) *item, [FI_Tree_Item](#) *newparent, int pos)
Reparent specified item as a child of ourself.
- void [replace](#) (int pos, [FI_Tree_Item](#) *new_item)
Replace the item at index with newitem.
- void [swap](#) (int ax, int bx)
Swap the two items at index positions ax and bx.
- int [total](#) () const
Return the total items in the array, or 0 if empty.
- [~FI_Tree_Item_Array](#) ()
Destructor. Calls each item's destructor, destroys internal _items array.

12.154.1 Detailed Description

Manages an array of [Fl_Tree_Item](#) pointers.

Because FLTK 1.x.x. has mandated that templates and STL not be used, we use this class to dynamically manage the arrays.

None of the methods do range checking on index values; the caller must be sure that index values are within the range $0 < \text{index} < \text{total}()$ (unless otherwise noted).

12.154.2 Constructor & Destructor Documentation

12.154.2.1 Fl_Tree_Item_Array()

```
Fl_Tree_Item_Array::Fl_Tree_Item_Array (
    int new_chunksize = 10 )
```

Constructor; creates an empty array.

The optional 'chunksize' can be specified to optimize memory allocation for potentially large arrays. Default chunksize is 10.

12.154.3 Member Function Documentation

12.154.3.1 add()

```
void Fl_Tree_Item_Array::add (
    Fl_Tree_Item * val )
```

Add an item* to the end of the array.

Assumes the item was created with 'new', and will remain allocated.. Fl_Tree_Item_Array will handle calling the item's destructor when the array is cleared or the item remove()'ed.

12.154.3.2 clear()

```
void Fl_Tree_Item_Array::clear ( )
```

Clear the entire array.

Each item will be deleted (destructors will be called), and the array will be cleared. total() will return 0.

12.154.3.3 deparent()

```
int Fl_Tree_Item_Array::deparent (
    int pos )
```

Deparent item at 'pos' from our list of children.

Similar to a [remove\(\)](#) without the destruction of the item. This creates an orphaned item (still allocated, has no parent) which soon after is typically reparented elsewhere.

\returns 0 on success, -1 on error (e.g. if \p 'pos' out of range)

12.154.3.4 insert()

```
void Fl_Tree_Item_Array::insert (
    int pos,
    Fl_Tree_Item * new_item )
```

Insert an item at index position pos.

Handles enlarging array if needed, total increased by 1.

If \p pos \geq total(), the item is appended to the array.

If \p pos $<$ 0, the item is prepended (works like pos == 0).

12.154.3.5 manage_item_destroy()

```
void Fl_Tree_Item_Array::manage_item_destroy (
    int val ) [inline]
```

Option to control if [Fl_Tree_Item_Array](#)'s destructor will also destroy the [Fl_Tree_Item](#)'s.

If set: items and item array is destroyed. If clear: only the item array is destroyed, not items themselves.

12.154.3.6 move()

```
int Fl_Tree_Item_Array::move (
    int to,
    int from )
```

Move item at 'from' to new position 'to' in the array.

Due to how the moving an item shuffles the array around, a positional 'move' implies things that may not be obvious:

- When 'from' moved lower in tree, appears BELOW item that was at 'to'.
- When 'from' moved higher in tree, appears ABOVE item that was at 'to'.

Returns

0 on success, -1 on range error (e.g. if 'to' or 'from' out of range)

12.154.3.7 remove() [1/2]

```
int Fl_Tree_Item_Array::remove (
    Fl_Tree_Item * item )
```

Remove the item from the array.

\returns 0 if removed, or -1 if the item was not in the array.

12.154.3.8 remove() [2/2]

```
void Fl_Tree_Item_Array::remove (
    int index )
```

Remove the item at.

Parameters

in	<i>index</i>	from the array. The item will be delete'd (if non-NULL), so its destructor will be called.
----	--------------	---

12.154.3.9 reparent()

```
int Fl_Tree_Item_Array::reparent (
    Fl_Tree_Item * item,
    Fl_Tree_Item * newparent,
    int pos )
```

Reparent specified item as a child of ourself.

Typically 'newchild' was recently orphaned with [deparent\(\)](#).

\returns 0 on success, -1 on error (e.g. if \p 'pos' out of range)

12.154.3.10 replace()

```
void Fl_Tree_Item_Array::replace (
```

```
    int index,
    Fl_Tree_Item * newitem )
```

Replace the item at `index` with `newitem`.

Old item at `index` position will be destroyed, and the new item will take its place, and stitched into the linked list.

The documentation for this class was generated from the following files:

- [Fl_Tree_Item_Array.H](#)
- [Fl_Tree_Item_Array.cxx](#)

12.155 Fl_Tree_Prefs Class Reference

Tree widget's preferences.

```
#include <Fl_Tree_Prefs.H>
```

Public Member Functions

- [Fl_Image](#) * **closedeicon** () const
Return the deactivated version of the close icon, if any.
- [Fl_Image](#) * **closeicon** () const
Gets the default 'close' icon Returns the Fl_Image of the icon, or 0 if none.*
- void **closeicon** ([Fl_Image](#) *val)
Sets the icon to be used as the 'close' icon.
- [Fl_Color](#) **connectorcolor** () const
Get the connector color used for tree connection lines.
- void **connectorcolor** ([Fl_Color](#) val)
Set the connector color used for tree connection lines.
- [Fl_Tree_Connector](#) **connectorstyle** () const
Get the connector style.
- void **connectorstyle** ([Fl_Tree_Connector](#) val)
Set the connector style.
- void **connectorstyle** (int val)
Set the connector style [integer].
- int **connectorwidth** () const
Get the tree connection line's width.
- void **connectorwidth** (int val)
Set the tree connection line's width.
- void **do_item_draw_callback** ([Fl_Tree_Item](#) *o) const
- [Fl_Tree_Prefs](#) ()
Fl_Tree_Prefs constructor.
- [Fl_Tree_Item_Draw_Callback](#) * **item_draw_callback** () const
- void **item_draw_callback** ([Fl_Tree_Item_Draw_Callback](#) *cb, void *data=0)
- [Fl_Tree_Item_Draw_Mode](#) **item_draw_mode** () const
Get the 'item draw mode' used for the tree.
- void **item_draw_mode** ([Fl_Tree_Item_Draw_Mode](#) val)
Set the 'item draw mode' used for the tree to val.
- void * **item_draw_user_data** () const
- [Fl_Color](#) **item_labelbgcolor** () const
Get the default label background color.
- void **item_labelbgcolor** ([Fl_Color](#) val)
Set the default label background color.
- [Fl_Color](#) **item_labelfgcolor** () const
Get the default label foreground color.
- void **item_labelfgcolor** ([Fl_Color](#) val)

- Set the default label foreground color.*

 - **FI_Font item_labelfont** () const
 - Return the label's font.*
 - void **item_labelfont** (FI_Font val)
 - Set the label's font to val.*
 - **FI_Fontsize item_labelsize** () const
 - Return the label's size in pixels.*
 - void **item_labelsize** (FI_Fontsize val)
 - Set the label's size in pixels to val.*
 - **FI_Tree_Item_Reselect_Mode item_reselect_mode** () const
 - Returns the current item re/selection mode.*
 - void **item_reselect_mode** (FI_Tree_Item_Reselect_Mode mode)
 - Sets the item re/selection mode.*
 - **FI_Color labelbgcolor** () const
 - Obsolete: Get the default label background color. Please use [item_labelbgcolor\(\)](#) instead.*
 - void **labelbgcolor** (FI_Color val)
 - Obsolete: Set the default label background color. Please use [item_labelbgcolor\(FI_Color\)](#) instead.*
 - **FI_Color labelfgcolor** () const
 - Obsolete: Get the default label foreground color. Please use [item_labelfgcolor\(\)](#) instead.*
 - void **labelfgcolor** (FI_Color val)
 - Obsolete: Set the default label foreground color. Please use [item_labelfgcolor\(FI_Color\)](#) instead.*
 - **FI_Font labelfont** () const
 - Obsolete: Return the label's font. Please use [item_labelfont\(\)](#) instead.*
 - void **labelfont** (FI_Font val)
 - Obsolete: Set the label's font to val. Please use [item_labelfont\(FI_Font\)](#) instead.*
 - int **labelmarginleft** () const
 - Get the label's left margin value in pixels.*
 - void **labelmarginleft** (int val)
 - Set the label's left margin value in pixels.*
 - **FI_Fontsize labelsiz** () const
 - Obsolete: Return the label's size in pixels. Please use [item_labelsize\(\)](#) instead.*
 - void **labelsiz** (FI_Fontsize val)
 - Obsolete: Set the label's size in pixels to val. Please use [item_labelsize\(FI_Fontsize\)](#) instead.*
 - int **linespacing** () const
 - Get the line spacing value in pixels.*
 - void **linespacing** (int val)
 - Set the line spacing value in pixels.*
 - int **marginbottom** () const
 - Get the bottom margin's value in pixels.*
 - void **marginbottom** (int val)
 - Set the bottom margin's value in pixels This is the extra distance the vertical scroller lets you travel.*
 - int **marginleft** () const
 - Get the left margin's value in pixels.*
 - void **marginleft** (int val)
 - Set the left margin's value in pixels.*
 - int **margintop** () const
 - Get the top margin's value in pixels.*
 - void **margintop** (int val)
 - Set the top margin's value in pixels.*
 - int **openchild_marginbottom** () const
 - Get the margin below an open child in pixels.*

- void **openchild_marginbottom** (int val)
Set the margin below an open child in pixels.
- [FI_Image](#) * **opendeicon** () const
Return the deactivated version of the open icon, if any.
- [FI_Image](#) * **openicon** () const
Get the current default 'open' icon.
- void **openicon** ([FI_Image](#) *val)
Sets the default icon to be used as the 'open' icon when items are add()ed to the tree.
- [FI_Boxtype](#) **selectbox** () const
Get the default selection box's box drawing style as an FI_Boxtype.
- void **selectbox** ([FI_Boxtype](#) val)
Set the default selection box's box drawing style to val.
- [FI_Tree_Select](#) **selectmode** () const
Get the selection mode used for the tree.
- void **selectmode** ([FI_Tree_Select](#) val)
Set the selection mode used for the tree to val.
- char **showcollapse** () const
Returns 1 if the collapse icon is enabled, 0 if not.
- void **showcollapse** (int val)
Set if we should show the collapse icon or not.
- int **showroot** () const
Returns 1 if the root item is to be shown, or 0 if not.
- void **showroot** (int val)
Set if the root item should be shown or not.
- [FI_Tree_Sort](#) **sortorder** () const
Get the default sort order value.
- void **sortorder** ([FI_Tree_Sort](#) val)
Set the default sort order value.
- [FI_Image](#) * **userdeicon** () const
Return the deactivated version of the user icon, if any.
- [FI_Image](#) * **usericon** () const
Gets the default 'user icon' (default is 0)
- void **usericon** ([FI_Image](#) *val)
Sets the default 'user icon' Returns the FI_Image of the icon, or 0 if none (default).*
- int **usericonmarginleft** () const
Get the user icon's left margin value in pixels.
- void **usericonmarginleft** (int val)
Set the user icon's left margin value in pixels.
- int **widgetmarginleft** () const
Get the widget()'s left margin value in pixels.
- void **widgetmarginleft** (int val)
Set the widget's left margin value in pixels.
- [~FI_Tree_Prefs](#) ()
[FI_Tree_Prefs](#) destructor.

12.155.1 Detailed Description

Tree widget's preferences.

[FI_Tree](#)'s Preferences class.

This class manages the [FI_Tree](#)'s defaults. You should probably be using the methods in [FI_Tree](#) instead of trying to accessing tree's preferences settings directly.

12.155.2 Member Function Documentation

12.155.2.1 closedeicon()

`Fl_Image * Fl_Tree_Prefs::closedeicon () const [inline]`

Return the deactivated version of the close icon, if any.

Returns 0 if none.

12.155.2.2 closeicon()

```
void Fl_Tree_Prefs::closeicon (
    Fl_Image * val )
```

Sets the icon to be used as the 'close' icon.

This overrides the built in default '[-]' icon.

Parameters

in	<i>val</i>	– The new image, or zero to use the default '[-]' icon.
----	------------	---

12.155.2.3 item_draw_mode()

```
void Fl_Tree_Prefs::item_draw_mode (
    Fl_Tree_Item_Draw_Mode val ) [inline]
```

Set the 'item draw mode' used for the tree to *val*.

This affects how items in the tree are drawn, such as when a `widget()` is defined. See `Fl_Tree_Item_Draw_Mode` for possible values.

12.155.2.4 item_labelbgcolor() [1/2]

`Fl_Color Fl_Tree_Prefs::item_labelbgcolor () const [inline]`

Get the default label background color.

This returns the `Fl_Tree::color()` unless `item_labelbgcolor()` has been set explicitly.

12.155.2.5 item_labelbgcolor() [2/2]

```
void Fl_Tree_Prefs::item_labelbgcolor (
    Fl_Color val ) [inline]
```

Set the default label background color.

Once set, overrides the default behavior of using `Fl_Tree::color()`.

12.155.2.6 marginbottom()

`int Fl_Tree_Prefs::marginbottom () const [inline]`

Get the bottom margin's value in pixels.

This is the extra distance the vertical scroller lets you travel.

12.155.2.7 opendeicon()

`Fl_Image * Fl_Tree_Prefs::opendeicon () const [inline]`

Return the deactivated version of the open icon, if any.

Returns 0 if none.

12.155.2.8 openicon() [1/2]

`Fl_Image * Fl_Tree_Prefs::openicon () const [inline]`

Get the current default 'open' icon.

Returns the `Fl_Image*` of the icon, or 0 if none.

12.155.2.9 openicon() [2/2]

```
void Fl_Tree_Prefs::openicon (
    Fl_Image * val )
```

Sets the default icon to be used as the 'open' icon when items are add()ed to the tree. This overrides the built in default '+' icon.

Parameters

in	val	– The new image, or zero to use the default '+' icon.
----	-----	---

12.155.2.10 selectmode()

```
void Fl_Tree_Prefs::selectmode (
    Fl_Tree_Select val ) [inline]
```

Set the selection mode used for the tree to val.

This affects how items in the tree are selected when clicked on and dragged over by the mouse. See Fl_Tree_Select for possible values.

12.155.2.11 showcollapse()

```
void Fl_Tree_Prefs::showcollapse (
    int val ) [inline]
```

Set if we should show the collapse icon or not.

If collapse icons are disabled, the user will not be able to interactively collapse items in the tree, unless the application provides some other means via open() and close().

Parameters

in	val	1: shows collapse icons (default), 0: hides collapse icons.
----	-----	--

12.155.2.12 showroot()

```
void Fl_Tree_Prefs::showroot (
    int val ) [inline]
```

Set if the root item should be shown or not.

Parameters

in	val	1 – show the root item (default) 0 – hide the root item.
----	-----	---

12.155.2.13 sortorder()

```
void Fl_Tree_Prefs::sortorder (
    Fl_Tree_Sort val ) [inline]
```

Set the default sort order value.

Defines the order new items appear when add()ed to the tree. See Fl_Tree_Sort for possible values.

12.155.2.14 userdeicon()

```
Fl_Image * Fl_Tree_Prefs::userdeicon ( ) const [inline]
```

Return the deactivated version of the user icon, if any.

Returns 0 if none.

The documentation for this class was generated from the following files:

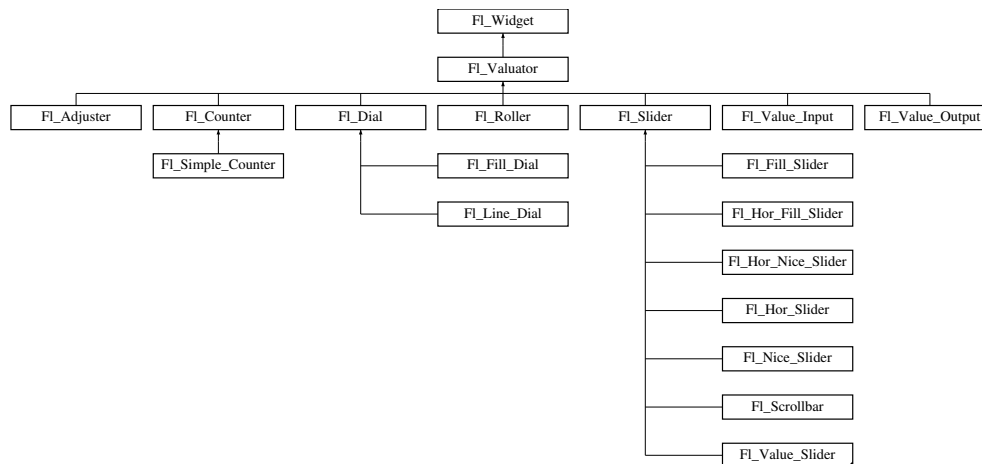
- [Fl_Tree_Prefs.H](#)
- [Fl_Tree_Prefs.cxx](#)

12.156 Fl_Valuator Class Reference

The [Fl_Valuator](#) class controls a single floating-point value and provides a consistent interface to set the value, range, and step, and insures that callbacks are done the same for every object.

```
#include <Fl_Valuator.H>
```

Inheritance diagram for [Fl_Valuator](#):



Public Member Functions

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.
- double **step** () const
Gets or sets the step value.
- void **step** (double a, int b)

See double [FI_Valuator::step\(\)](#) const

- void **step** (double s)

See double [FI_Valuator::step\(\)](#) const.
- void **step** (int a)

See double [FI_Valuator::step\(\)](#) const
- double **value** () const

Gets the floating point(double) value.
- int **value** (double)

Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()

Activates the widget.
- unsigned int **active** () const

Returns whether the widget is active.
- int **active_r** () const

Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const

Gets the label alignment.
- void **align** ([FI_Align](#) alignment)

Sets the label alignment.
- long **argument** () const

Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)

Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()

Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()

Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()

Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.
- void **bind_deimage** (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void **bind_image** ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.
- void **bind_image** (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) **box** () const

Gets the box type of the widget.
- void **box** ([FI_Boxtype](#) new_box)

Sets the box type for the widget.
- [FI_Callback_p](#) **callback** () const

- Gets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
- Sets the current callback function and managed user data for the widget.*

 - void `callback` (`FI_Callback` *cb, void *p)
- Sets the current callback function and data for the widget.*

 - void `callback` (`FI_Callback0` *cb)
- Sets the current callback function for the widget.*

 - void `callback` (`FI_Callback1` *cb, long p=0)
- Sets the current callback function for the widget.*

 - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

 - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

 - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

 - void `clear_damage` (`uchar` c=0)
- Clears or sets the damage flags.*

 - void `clear_output` ()
- Sets a widget to accept input.*

 - void `clear_visible` ()
- Hides the widget.*

 - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

 - `FI_Color` `color` () const
- Gets the background color of the widget.*

 - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

 - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

 - `FI_Color` `color2` () const
- For back compatibility only.*

 - void `color2` (unsigned a)
- For back compatibility only.*

 - int `contains` (const `FI_Widget` *w) const
- Checks if w is a child of this widget.*

 - void `copy_label` (const char *new_label)
- Sets the current label.*

 - void `copy_tooltip` (const char *text)
- Sets the current tooltip text.*

 - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

 - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

 - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

 - int `damage_resize` (int, int, int, int)
- Internal use only.*

 - void `deactivate` ()
- Deactivates the widget.*

- [FI_Image](#) * [deimage](#) ()
Gets the image that is used as part of the widget label when in the inactive state.
- const [FI_Image](#) * [deimage](#) () const
Gets the image that is used as part of the widget label when in the inactive state.
- void [deimage](#) ([FI_Image](#) &img)
Sets the image to use as part of the widget label when in the inactive state.
- void [deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- int [deimage_bound](#) () const
Returns whether the inactive image is managed by the widget.
- void [do_callback](#) ([FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with default arguments.
- void [do_callback](#) ([FI_Widget](#) *widget, long arg, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- void [do_callback](#) ([FI_Widget](#) *widget, void *arg=0, [FI_Callback_Reason](#) reason=[FL_REASON_UNKNOWN](#))
Calls the widget callback function with arbitrary arguments.
- virtual void [draw](#) ()=0
Draws the widget.
- void [draw_label](#) (int, int, int, int, [FI_Align](#)) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int [h](#) () const
Gets the widget height.
- virtual int [handle](#) (int event)
Handles the specified event.
- virtual void [hide](#) ()
Makes a widget invisible.
- [FI_Image](#) * [image](#) ()
Gets the image that is used as part of the widget label when in the active state.
- const [FI_Image](#) * [image](#) () const
Gets the image that is used as part of the widget label when in the active state.
- void [image](#) ([FI_Image](#) &img)
Sets the image to use as part of the widget label when in the active state.
- void [image](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- int [image_bound](#) () const
Returns whether the image is managed by the widget.
- int [inside](#) (const [FI_Widget](#) *wgt) const
Checks if this widget is a child of wgt.
- int [is_label_copied](#) () const
Returns whether the current label was assigned with [copy_label\(\)](#).
- const char * [label](#) () const
Gets the current label text.
- void [label](#) (const char *text)
Sets the current label pointer.
- void [label](#) ([FI_Labeltype](#) a, const char *b)
Shortcut to set the label text and type in one call.
- [FI_Color](#) [labelcolor](#) () const
Gets the label color.
- void [labelcolor](#) ([FI_Color](#) c)
Sets the label color.
- [FI_Font](#) [labelfont](#) () const

- Gets the font to use.*
- void [labelfont](#) ([FI_Font](#) f)
Sets the font to use.
- [FI_Fontsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) ([FI_Fontsize](#) pix)
Sets the font size in pixels.
- [FI_Labeltype](#) [labeltype](#) () const
Gets the label type.
- void [labeltype](#) ([FI_Labeltype](#) a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) ([FI_Group](#) *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- virtual void [resize](#) (int x, int y, int w, int h)
Changes the size or position of the widget.
- [FI_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) ([FI_Color](#) a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void [show](#) ()
Makes a widget visible.

- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)
Modifies keyboard focus navigation.
- int `visible_r` () const
Returns whether a widget and all its parents are visible.
- int `w` () const
Gets the widget width.
- `FI_When` `when` () const
Returns the conditions under which the callback is called.
- void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
- `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int `x` () const
Gets the widget position in its window.
- int `y` () const
Gets the widget position in its window.
- virtual `~FI_Widget` ()
Destroys the widget.

Protected Member Functions

- [FL_Valuator](#) (int X, int Y, int W, int H, const char *L)
Creates a new [FL_Valuator](#) widget using the given position, size, and label string.
- void **handle_drag** (double newvalue)
Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.
- void **handle_push** ()
Stores the current value in the previous value.
- void **handle_release** ()
Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.
- int **horizontal** () const
Tells if the valuator is an [FL_HORIZONTAL](#) one.
- double **previous_value** () const
Gets the previous floating point value before an event changed it.
- void **set_value** (double v)
Sets the current floating point value.
- double **softclamp** (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void **value_damage** ()
Asks for partial redraw.

Protected Member Functions inherited from [FL_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FL_Boxtype](#) t, [FL_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FL_Boxtype](#) t, int x, int y, int w, int h, [FL_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FL_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FL_Boxtype](#) t, int x, int y, int w, int h, [FL_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FL_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.

- void `x` (int `v`)

Internal use only.

- void `y` (int `v`)

Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Widget](#)

- static void `default_callback` ([FI_Widget](#) *`widget`, void *`data`)

The default callback for all widgets that don't set a callback.

- static unsigned int `label_shortcut` (const char *`t`)

Returns the Unicode value of the '&x' shortcut in a given text.

- static int `test_shortcut` (const char *`s`, const bool `require_alt=false`)

Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from [FI_Widget](#)

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
 ,
[OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
 ,
[MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
 ,
[GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
 = 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }

flags possible values enumeration.

12.156.1 Detailed Description

The [FI_Valuator](#) class controls a single floating-point value and provides a consistent interface to set the value, range, and step, and insures that callbacks are done the same for every object.

There are probably more of these classes in FLTK than any others:

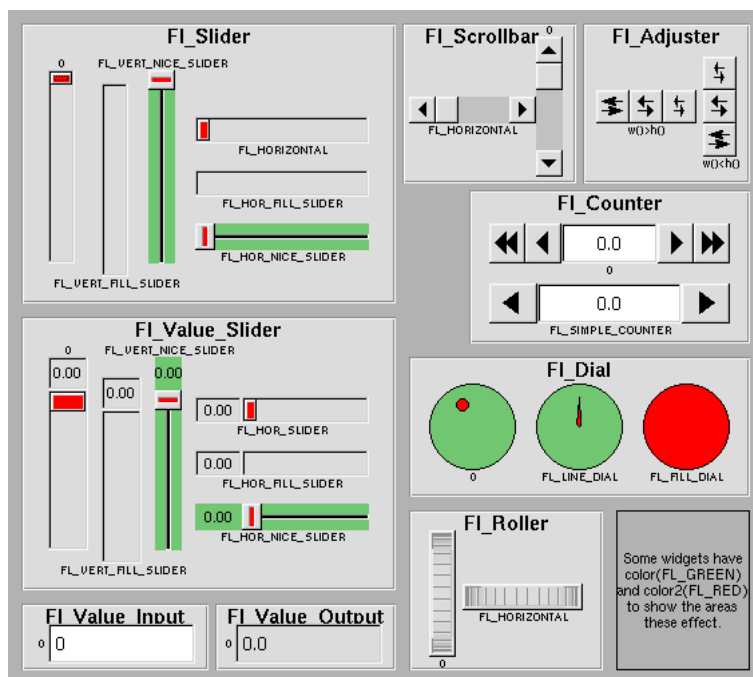


Figure 12.66 Valuators derived from Fl_Valuators

In the above diagram each box surrounds an actual subclass. These are further differentiated by setting the `type()` of the widget to the symbolic value labeling the widget. The ones labelled "0" are the default versions with a `type(0)`. For consistency the symbol `FL_VERTICAL` is defined as zero.

12.156.2 Constructor & Destructor Documentation

12.156.2.1 Fl_Valuator()

```
Fl_Valuator::Fl_Valuator (
    int X,
    int Y,
    int W,
    int H,
    const char * L ) [protected]
```

Creates a new `Fl_Valuator` widget using the given position, size, and label string. The default `boxtype` is `FL_NO_BOX`.

12.156.3 Member Function Documentation

12.156.3.1 format()

```
int Fl_Valuator::format (
    char * buffer ) [virtual]
```

Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter. The actual format used depends on the current step value. If the step value has been set to zero then a `%g` format is used. If the step value is non-zero, then a `%.*f` format is used, where the precision is calculated to show sufficient digits for the current step value. An integer step value, such as 1 or 1.0, gives a precision of 0, so the formatted value will appear as an integer.

This method is used by the `Fl_Valuator_...` group of widgets to format the current value into a text string. The return value is the length of the formatted text. The formatted value is written into `buffer`. `buffer` should have space for at least 128 bytes.

You may override this function to create your own text formatting.

12.156.3.2 increment()

```
double Fl_Valuator::increment (
```

```
double v,
int n )
```

Adds n times the step value to the passed value.

If step was set to zero it uses $\text{fabs}(\text{maximum}() - \text{minimum}()) / 100$.

12.156.3.3 maximum() [1/2]

```
double Fl_Valuator::maximum ( ) const [inline]
```

Gets the maximum value for the valuator.

12.156.3.4 maximum() [2/2]

```
void Fl_Valuator::maximum (
double a ) [inline]
```

Sets the maximum value for the valuator.

12.156.3.5 minimum() [1/2]

```
double Fl_Valuator::minimum ( ) const [inline]
```

Gets the minimum value for the valuator.

12.156.3.6 minimum() [2/2]

```
void Fl_Valuator::minimum (
double a ) [inline]
```

Sets the minimum value for the valuator.

12.156.3.7 precision()

```
void Fl_Valuator::precision (
int digits )
```

Sets the step value to $1.0 / 10^{\text{digits}}$.

Precision `digits` is limited to 0...9 to avoid internal overflow errors. Values outside this range are clamped.

Note

For negative values of `digits` the step value is set to $A = 1.0$ and $B = 1$, i.e. $1.0/1 = 1$.

12.156.3.8 range()

```
void Fl_Valuator::range (
double a,
double b ) [inline]
```

Sets the minimum and maximum values for the valuator.

When the user manipulates the widget, the value is limited to this range. This clamping is done *after* rounding to the step value (this makes a difference if the range is not a multiple of the step).

The minimum may be greater than the maximum. This has the effect of "reversing" the object so the larger values are in the opposite direction. This also switches which end of the filled sliders is filled.

Some widgets consider this a "soft" range. This means they will stop at the range, but if the user releases and grabs the control again and tries to move it further, it is allowed.

The range may affect the display. You must `redraw()` the widget after changing the range.

12.156.3.9 round()

```
double Fl_Valuator::round (
    double v )
```

Round the passed value to the nearest step increment.
Does nothing if step is zero.

12.156.3.10 step()

```
double Fl_Valuator::step ( ) const [inline]
```

Gets or sets the step value.

As the user moves the mouse the value is rounded to the nearest multiple of the step value. This is done *before* clamping it to the range. For most widgets the default step is zero.

For precision the step is stored as the ratio of a double *A* and an integer *B* = *A*/*B*. You can set these values directly. Currently setting a floating point value sets the nearest *A*/*1* or *1*/*B* value possible.

12.156.3.11 value() [1/2]

```
double Fl_Valuator::value ( ) const [inline]
```

Gets the floating point(double) value.

See int [value\(double\)](#)

12.156.3.12 value() [2/2]

```
int Fl_Valuator::value (
    double v )
```

Sets the current value.

The new value is *not* clamped or otherwise changed before storing it. Use [clamp\(\)](#) or [round\(\)](#) to modify the value before calling [value\(\)](#). The widget is redrawn if the new value is different than the current one. The initial value is zero.

[changed\(\)](#) will return true if the user has moved the slider, but it will be turned off by [value\(x\)](#) and just before doing a callback (the callback can turn it back on if desired).

12.156.3.13 value_damage()

```
void Fl_Valuator::value_damage ( ) [protected], [virtual]
```

Asks for partial redraw.

Reimplemented in [Fl_Adjuster](#).

The documentation for this class was generated from the following files:

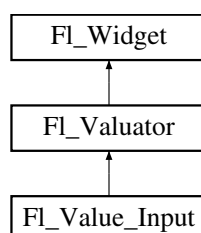
- [Fl_Valuator.H](#)
- [Fl_Valuator.cxx](#)

12.157 Fl_Value_Input Class Reference

The [Fl_Value_Input](#) widget displays a numeric value.

```
#include <Fl_Value_Input.H>
```

Inheritance diagram for [Fl_Value_Input](#):



Public Member Functions

- [FI_Color cursor_color](#) () const
Gets the color of the text cursor.
- void [cursor_color](#) ([FI_Color](#) n)
Sets the color of the text cursor.
- [FI_Value_Input](#) (int x, int y, int w, int h, const char *l=0)
Creates a new [FI_Value_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- void [resize](#) (int, int, int, int) [FL_OVERRIDE](#)
Changes the size or position of the widget.
- int [shortcut](#) () const
Returns the current shortcut key for the Input.
- void [shortcut](#) (int s)
Sets the shortcut key to s.
- char [soft](#) () const
If "soft" is turned on, the user is allowed to drag the value outside the range.
- void [soft](#) (char s)
See void [FI_Value_Input::soft\(char s\)](#)
- [FI_Color textcolor](#) () const
Gets the color of the text in the value box.
- void [textcolor](#) ([FI_Color](#) n)
Sets the color of the text in the value box.
- [FI_Font textfont](#) () const
Gets the typeface of the text in the value box.
- void [textfont](#) ([FI_Font](#) s)
Sets the typeface of the text in the value box.
- [FI_Fontsize textsize](#) () const
Gets the size of the text in the value box.
- void [textsize](#) ([FI_Fontsize](#) s)
Sets the size of the text in the value box.

Public Member Functions inherited from [FI_Valuator](#)

- void [bounds](#) (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double [clamp](#) (double)
Clamps the passed value to the valuator range.
- virtual int [format](#) (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double [increment](#) (double, int)
Adds n times the step value to the passed value.
- double [maximum](#) () const
Gets the maximum value for the valuator.
- void [maximum](#) (double a)
Sets the maximum value for the valuator.
- double [minimum](#) () const
Gets the minimum value for the valuator.
- void [minimum](#) (double a)
Sets the minimum value for the valuator.
- void [precision](#) (int digits)

- Sets the step value to $1.0 / 10^{\text{digits}}$.*
- void **range** (double a, double b)
 - Sets the minimum and maximum values for the valuator.*
- double **round** (double)
 - Round the passed value to the nearest step increment.*
- double **step** () const
 - Gets or sets the step value.*
- void **step** (double a, int b)
 - See double [FI_Valuator::step\(\)](#) const*
- void **step** (double s)
 - See double [FI_Valuator::step\(\)](#) const.*
- void **step** (int a)
 - See double [FI_Valuator::step\(\)](#) const*
- double **value** () const
 - Gets the floating point(double) value.*
- int **value** (double)
 - Sets the current value.*

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
 - Activates the widget.*
- unsigned int **active** () const
 - Returns whether the widget is active.*
- int **active_r** () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align](#) **align** () const
 - Gets the label alignment.*
- void **align** ([FI_Align](#) alignment)
 - Sets the label alignment.*
- long **argument** () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void **argument** (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_GI_Window](#) * **as_gl_window** ()
 - Returns an [FI_GI_Window](#) pointer if this widget is an [FI_GI_Window](#).*
- virtual class [FI_GI_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
 - Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
 - Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
 - Sets the image to use as part of the widget label when in the inactive state.*
- void **bind_deimage** (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void **bind_image** ([FI_Image](#) *img)

- Sets the image to use as part of the widget label when in the active state.*

 - void `bind_image` (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
 - `FI_Boxtype` `box` () const
 - Gets the box type of the widget.*
 - void `box` (`FI_Boxtype` new_box)
 - Sets the box type for the widget.*
 - `FI_Callback_p` `callback` () const
 - Gets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback` *cb, `FI_Callback_User_Data` *p, bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
 - void `callback` (`FI_Callback` *cb, void *p)
 - Sets the current callback function and data for the widget.*
 - void `callback` (`FI_Callback0` *cb)
 - Sets the current callback function for the widget.*
 - void `callback` (`FI_Callback1` *cb, long p=0)
 - Sets the current callback function for the widget.*
 - unsigned int `changed` () const
 - Checks if the widget value changed since the last callback.*
 - void `clear_active` ()
 - Marks the widget as inactive without sending events or changing focus.*
 - void `clear_changed` ()
 - Marks the value of the widget as unchanged.*
 - void `clear_damage` (`uchar` c=0)
 - Clears or sets the damage flags.*
 - void `clear_output` ()
 - Sets a widget to accept input.*
 - void `clear_visible` ()
 - Hides the widget.*
 - void `clear_visible_focus` ()
 - Disables keyboard focus navigation with this widget.*
 - `FI_Color` `color` () const
 - Gets the background color of the widget.*
 - void `color` (`FI_Color` bg)
 - Sets the background color of the widget.*
 - void `color` (`FI_Color` bg, `FI_Color` sel)
 - Sets the background and selection color of the widget.*
 - `FI_Color` `color2` () const
 - For back compatibility only.*
 - void `color2` (unsigned a)
 - For back compatibility only.*
 - int `contains` (const `FI_Widget` *w) const
 - Checks if w is a child of this widget.*
 - void `copy_label` (const char *new_label)
 - Sets the current label.*
 - void `copy_tooltip` (const char *text)
 - Sets the current tooltip text.*
 - `uchar` `damage` () const
 - Returns non-zero if `draw()` needs to be called.*

- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FL_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FL_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FL_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FL_Widget *widget`, `long arg`, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FL_Widget *widget`, `void *arg=0`, `FL_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FL_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual void `hide` ()
Makes a widget invisible.
- `FL_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `FL_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FL_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`FL_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const
Returns whether the image is managed by the widget.
- int `inside` (const `FL_Widget *wgt`) const
Checks if this widget is a child of wgt.
- int `is_label_copied` () const
Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const
Gets the current label text.
- void `label` (const char *`text`)
Sets the current label pointer.
- void `label` (`FL_Labeltype a`, const char *`b`)
Shortcut to set the label text and type in one call.
- `FL_Color labelcolor` () const

- Gets the label color.*
- void [labelcolor](#) (FI_Color c)
Sets the label color.
- [FI_Font](#) [labelfont](#) () const
Gets the font to use.
- void [labelfont](#) (FI_Font f)
Sets the font to use.
- [FI_Fontsize](#) [labelsize](#) () const
Gets the font size in pixels.
- void [labelsize](#) (FI_Fontsize pix)
Sets the font size in pixels.
- [FI_Labeltype](#) [labeltype](#) () const
Gets the label type.
- void [labeltype](#) (FI_Labeltype a)
Sets the label type.
- void [measure_label](#) (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool [needs_keyboard](#) () const
Returns whether this widget needs a keyboard.
- void [needs_keyboard](#) (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int [output](#) () const
Returns if a widget is used for output only.
- [FI_Group](#) * [parent](#) () const
Returns a pointer to the parent widget.
- void [parent](#) (FI_Group *p)
Internal use only - "for hacks only".
- void [position](#) (int X, int Y)
Repositions the window or widget.
- void [redraw](#) ()
Schedules the drawing of the widget.
- void [redraw_label](#) ()
Schedules the drawing of the label.
- [FI_Color](#) [selection_color](#) () const
Gets the selection color.
- void [selection_color](#) (FI_Color a)
Sets the selection color.
- void [set_active](#) ()
Marks the widget as active without sending events or changing focus.
- void [set_changed](#) ()
Marks the value of the widget as changed.
- void [set_output](#) ()
Sets a widget to output only.
- void [set_visible](#) ()
Makes the widget visible.
- void [set_visible_focus](#) ()
Enables keyboard focus navigation with this widget.
- int [shortcut_label](#) () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void [shortcut_label](#) (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.

- virtual void [show](#) ()
Makes a widget visible.
- void [size](#) (int W, int H)
Changes the size of the widget.
- int [take_focus](#) ()
Gives the widget the keyboard focus.
- unsigned int [takeevents](#) () const
Returns if the widget is able to take events.
- int [test_shortcut](#) ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * [tooltip](#) () const
Gets the current tooltip text.
- void [tooltip](#) (const char *text)
Sets the current tooltip text.
- [Fl_Window](#) * [top_window](#) () const
Returns a pointer to the top-level window for the widget.
- [Fl_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
Gets the widget type.
- void [type](#) ([uchar](#) t)
Sets the widget type.
- int [use_accents_menu](#) ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * [user_data](#) () const
Gets the user data for this widget.
- void [user_data](#) ([Fl_Callback_User_Data](#) *v, bool auto_free)
Sets the user data for this widget.
- void [user_data](#) (void *v)
Sets the user data for this widget.
- unsigned int [visible](#) () const
Returns whether a widget is visible.
- unsigned int [visible_focus](#) () const
Checks whether this widget has a visible focus.
- void [visible_focus](#) (int v)
Modifies keyboard focus navigation.
- int [visible_r](#) () const
Returns whether a widget and all its parents are visible.
- int [w](#) () const
Gets the widget width.
- [Fl_When](#) [when](#) () const
Returns the conditions under which the callback is called.
- void [when](#) ([uchar](#) i)
Sets the flags used to decide when a callback is called.
- [Fl_Window](#) * [window](#) () const
Returns a pointer to the nearest parent window up the widget hierarchy.
- int [x](#) () const
Gets the widget position in its window.
- int [y](#) () const
Gets the widget position in its window.
- virtual [~Fl_Widget](#) ()
Destroys the widget.

Public Attributes

- [FI_Input](#) input

Protected Member Functions

- void [draw](#) () [FL_OVERRIDE](#)

Draws the widget.

Protected Member Functions inherited from [FI_Valuator](#)

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
Creates a new [FI_Valuator](#) widget using the given position, size, and label string.
- void [handle_drag](#) (double newvalue)
Called during a drag operation, after an [FL_WHEN_CHANGED](#) event is received and before the callback.
- void [handle_push](#) ()
Stores the current value in the previous value.
- void [handle_release](#) ()
Called after an [FL_WHEN_RELEASE](#) event is received and before the callback.
- int [horizontal](#) () const
Tells if the valuator is an [FL_HORIZONTAL](#) one.
- double [previous_value](#) () const
Gets the previous floating point value before an event changed it.
- void [set_value](#) (double v)
Sets the current floating point value.
- double [softclamp](#) (double)
Clamps the value, but accepts v if the previous value is not already out of range.

Protected Member Functions inherited from [FI_Widget](#)

- void [clear_flag](#) (unsigned int c)
Clears a flag in the flags mask.
- void [draw_backdrop](#) () const
If [FL_ALIGN_IMAGE_BACKDROP](#) is set, the image or deimage will be drawn.
- void [draw_box](#) () const
Draws the widget box according its box style.
- void [draw_box](#) ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void [draw_box](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void [draw_focus](#) () const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void [draw_focus](#) ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void [draw_label](#) () const
Draws the widget's label at the defined label position.
- void [draw_label](#) (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int [flags](#) () const

- *Gets the widget flags mask.*
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from **FI_Widget**

- static void **default_callback** (**FI_Widget** *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int **label_shortcut** (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int **test_shortcut** (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from **FI_Widget**

- enum {
INACTIVE = 1<<0 , **INVISIBLE** = 1<<1 , **OUTPUT** = 1<<2 , **NOBORDER** = 1<<3 ,
FORCE_POSITION = 1<<4 , **NON_MODAL** = 1<<5 , **SHORTCUT_LABEL** = 1<<6 , **CHANGED** = 1<<7
, **OVERRIDE** = 1<<8 , **VISIBLE_FOCUS** = 1<<9 , **COPIED_LABEL** = 1<<10 , **CLIP_CHILDREN** = 1<<11
, **MENU_WINDOW** = 1<<12 , **TOOLTIP_WINDOW** = 1<<13 , **MODAL** = 1<<14 , **NO_OVERLAY** = 1<<15
, **GROUP_RELATIVE** = 1<<16 , **COPIED_TOOLTIP** = 1<<17 , **FULLSCREEN** = 1<<18 , **MAC_USE_ACCENTS_MENU**
= 1<<19 ,
NEEDS_KEYBOARD = 1<<20 , **IMAGE_BOUND** = 1<<21 , **DEIMAGE_BOUND** = 1<<22 ,
AUTO_DELETE_USER_DATA = 1<<23 ,
MAXIMIZED = 1<<24 , **POPUP** = 1<<25 , **USERFLAG3** = 1<<29 , **USERFLAG2** = 1<<30 ,
USERFLAG1 = 1<<31 }
flags possible values enumeration.

12.157.1 Detailed Description

The **FI_Value_Input** widget displays a numeric value.

The user can click in the text field and edit it - there is in fact a hidden **FI_Input** widget with type(**FL_FLOAT_INPUT**) or type(**FL_INT_INPUT**) in there - and when they hit return or tab the value updates to what they typed and the callback is done.

If **step()** is non-zero and integral, then the range of numbers is limited to integers instead of floating point numbers. As well as displaying the value as an integer, typed input is also limited to integer values, even if the hidden **FI_Input** widget is of type(**FL_FLOAT_INPUT**).

If **step()** is non-zero, the user can also drag the mouse across the object and thus slide the value. The left button moves one **step()** per pixel, the middle by 10 **step()**, and the right button by 100 * **step()**. It is therefore impossible to select text by dragging across it, although clicking can still move the insertion cursor.

If **step()** is non-zero and integral, then the range of numbers are limited to integers instead of floating point values.



Figure 12.67 Fl_Value_Input

See also

[Fl_Widget::shortcut_label\(int\)](#)

12.157.2 Constructor & Destructor Documentation

12.157.2.1 Fl_Value_Input()

```
Fl_Value_Input::Fl_Value_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Value_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

12.157.3 Member Function Documentation

12.157.3.1 cursor_color() [1/2]

```
Fl_Color Fl_Value_Input::cursor_color ( ) const [inline]
```

Gets the color of the text cursor.

The text cursor is black by default.

12.157.3.2 cursor_color() [2/2]

```
void Fl_Value_Input::cursor_color (
    Fl_Color n ) [inline]
```

Sets the color of the text cursor.

The text cursor is black by default.

12.157.3.3 draw()

```
void Fl_Value_Input::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.157.3.4 handle()

```
int Fl_Value_Input::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your `handle()` method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the `handle()` method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

12.157.3.5 `resize()`

```
void Fl_Value_Input::resize (
    int x,
    int y,
    int w,
    int h ) [virtual]
```

Changes the size or position of the widget.

This is a virtual function so that the widget may implement its own handling of resizing. The default version does *not* call the `redraw()` method, but instead relies on the parent widget to do so because the parent may know a faster way to update the display, such as scrolling from the old position.

Some window managers under X11 call `resize()` a lot more often than needed. Please verify that the position or size of a widget did actually change before doing any extensive calculations.

`position(X, Y)` is a shortcut for `resize(X, Y, w(), h())`, and `size(W, H)` is a shortcut for `resize(x(), y(), W, H)`.

Parameters

in	<i>x,y</i>	new position relative to the parent window
in	<i>w,h</i>	new size

See also

[position\(int,int\)](#), [size\(int,int\)](#)

Reimplemented from [FI_Widget](#).

12.157.3.6 `shortcut()` [1/2]

```
int Fl_Value_Input::shortcut ( ) const [inline]
```

Returns the current shortcut key for the Input.

See also

[Fl_Value_Input::shortcut\(int\)](#)

12.157.3.7 shortcut() [2/2]

```
void Fl_Value_Input::shortcut (
    int s ) [inline]
```

Sets the shortcut key to *s*.

Setting this overrides the use of '&' in the [label\(\)](#). The value is a bitwise OR of a key and a set of shift flags, for example `FL_ALT | 'a'`, `FL_ALT | (FL_F + 10)`, or just `'a'`. A value of 0 disables the shortcut.

The key can be any value returned by [Fl::event_key\(\)](#), but will usually be an ASCII letter. Use a lower-case letter unless you require the shift key to be held down.

The shift flags can be any set of values accepted by [Fl::event_state\(\)](#). If the bit is on that shift key must be pushed. Meta, Alt, Ctrl, and Shift must be off if they are not in the shift flags (zero for the other bits indicates a "don't care" setting).

12.157.3.8 soft()

```
char Fl_Value_Input::soft ( ) const [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. The default is true.

12.157.3.9 textcolor()

```
Fl_Color Fl_Value_Input::textcolor ( ) const [inline]
```

Gets the color of the text in the value box.

12.157.3.10 textfont() [1/2]

```
Fl_Font Fl_Value_Input::textfont ( ) const [inline]
```

Gets the typeface of the text in the value box.

12.157.3.11 textfont() [2/2]

```
void Fl_Value_Input::textfont (
    Fl_Font s ) [inline]
```

Sets the typeface of the text in the value box.

12.157.3.12 textsize() [1/2]

```
Fl_Fontsize Fl_Value_Input::textsize ( ) const [inline]
```

Gets the size of the text in the value box.

12.157.3.13 textsize() [2/2]

```
void Fl_Value_Input::textsize (
    Fl_Fontsize s ) [inline]
```

Sets the size of the text in the value box.

The documentation for this class was generated from the following files:

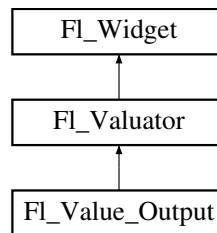
- `Fl_Value_Input.H`
- `Fl_Value_Input.cxx`

12.158 FI_Value_Output Class Reference

The [FI_Value_Output](#) widget displays a floating point value.

```
#include <FI_Value_Output.H>
```

Inheritance diagram for [FI_Value_Output](#):



Public Member Functions

- [FI_Value_Output](#) (int x, int y, int w, int h, const char *l=0)
Creates a new [FI_Value_Output](#) widget using the given position, size, and label string.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- [uchar soft](#) () const
If "soft" is turned on, the user is allowed to drag the value outside the range.
- void [soft](#) (uchar s)
If "soft" is turned on, the user is allowed to drag the value outside the range.
- [FI_Color textcolor](#) () const
Sets the color of the text in the value box.
- void [textcolor](#) ([FI_Color](#) s)
Gets the color of the text in the value box.
- [FI_Font textfont](#) () const
Gets the typeface of the text in the value box.
- void [textfont](#) ([FI_Font](#) s)
Sets the typeface of the text in the value box.
- [FI_Fontsize textsize](#) () const
Gets the size of the text in the value box.
- void [textsize](#) ([FI_Fontsize](#) s)

Public Member Functions inherited from [FI_Valuator](#)

- void [bounds](#) (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double [clamp](#) (double)
Clamps the passed value to the valuator range.
- virtual int [format](#) (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double [increment](#) (double, int)
Adds n times the step value to the passed value.
- double [maximum](#) () const
Gets the maximum value for the valuator.
- void [maximum](#) (double a)
Sets the maximum value for the valuator.
- double [minimum](#) () const
Gets the minimum value for the valuator.

- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.
- double **step** () const
Gets or sets the step value.
- void **step** (double a, int b)
See double [FI_Valuator::step\(\)](#) const

- void **step** (double s)
See double [FI_Valuator::step\(\)](#) const.
- void **step** (int a)
See double [FI_Valuator::step\(\)](#) const

- double **value** () const
Gets the floating point(double) value.
- int **value** (double)
Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) **align** () const
Gets the label alignment.
- void **align** ([FI_Align](#) alignment)
Sets the label alignment.
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * **as_gl_window** ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * **as_gl_window** () const
- virtual [FI_Group](#) * **as_group** ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * **as_group** () const
- virtual [FI_Window](#) * **as_window** ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * **as_window** () const
- void **bind_deimage** ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.

- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` (FI_Image *img)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- FI_Boxtype `box` () const
Gets the box type of the widget.
- void `box` (FI_Boxtype new_box)
Sets the box type for the widget.
- FI_Callback_p `callback` () const
Gets the current callback function for the widget.
- void `callback` (FI_Callback *cb)
Sets the current callback function for the widget.
- void `callback` (FI_Callback *cb, FI_Callback_User_Data *p, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void `callback` (FI_Callback *cb, void *p)
Sets the current callback function and data for the widget.
- void `callback` (FI_Callback0 *cb)
Sets the current callback function for the widget.
- void `callback` (FI_Callback1 *cb, long p=0)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (uchar c=0)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- FI_Color `color` () const
Gets the background color of the widget.
- void `color` (FI_Color bg)
Sets the background color of the widget.
- void `color` (FI_Color bg, FI_Color sel)
Sets the background and selection color of the widget.
- FI_Color `color2` () const
For back compatibility only.
- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const FI_Widget *w) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)

- Sets the current tooltip text.*

 - `uchar damage () const`

Returns non-zero if `draw()` needs to be called.
 - `void damage (uchar c)`

Sets the damage bits for the widget.
 - `void damage (uchar c, int x, int y, int w, int h)`

Sets the damage bits for an area inside the widget.
 - `int damage_resize (int, int, int, int)`

Internal use only.
 - `void deactivate ()`

Deactivates the widget.
 - `FI_Image * deimage ()`

Gets the image that is used as part of the widget label when in the inactive state.
 - `const FI_Image * deimage () const`

Gets the image that is used as part of the widget label when in the inactive state.
 - `void deimage (FI_Image &img)`

Sets the image to use as part of the widget label when in the inactive state.
 - `void deimage (FI_Image *img)`

Sets the image to use as part of the widget label when in the inactive state.
 - `int deimage_bound () const`

Returns whether the inactive image is managed by the widget.
 - `void do_callback (FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with default arguments.
 - `void do_callback (FI_Widget *widget, long arg, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
 - `void do_callback (FI_Widget *widget, void *arg=0, FI_Callback_Reason reason=FL_REASON_UNKNOWN)`

Calls the widget callback function with arbitrary arguments.
 - `void draw_label (int, int, int, int, FI_Align) const`

Draws the label in an arbitrary bounding box with an arbitrary alignment.
 - `int h () const`

Gets the widget height.
 - `virtual void hide ()`

Makes a widget invisible.
 - `FI_Image * image ()`

Gets the image that is used as part of the widget label when in the active state.
 - `const FI_Image * image () const`

Gets the image that is used as part of the widget label when in the active state.
 - `void image (FI_Image &img)`

Sets the image to use as part of the widget label when in the active state.
 - `void image (FI_Image *img)`

Sets the image to use as part of the widget label when in the active state.
 - `int image_bound () const`

Returns whether the image is managed by the widget.
 - `int inside (const FI_Widget *wgt) const`

Checks if this widget is a child of `wgt`.
 - `int is_label_copied () const`

Returns whether the current label was assigned with `copy_label()`.
 - `const char * label () const`

Gets the current label text.
 - `void label (const char *text)`

Sets the current label pointer.

- void `label` (`FI_Labeltype` a, const char *b)
Shortcut to set the label text and type in one call.
- `FI_Color` `labelcolor` () const
Gets the label color.
- void `labelcolor` (`FI_Color` c)
Sets the label color.
- `FI_Font` `labelfont` () const
Gets the font to use.
- void `labelfont` (`FI_Font` f)
Sets the font to use.
- `FI_Fontsize` `labelsize` () const
Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)
Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const
Gets the label type.
- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()

- Enables keyboard focus navigation with this widget.*

 - int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
 - void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
 - virtual void `show` ()
Makes a widget visible.
 - void `size` (int W, int H)
Changes the size of the widget.
 - int `take_focus` ()
Gives the widget the keyboard focus.
 - unsigned int `takeevents` () const
Returns if the widget is able to take events.
 - int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
 - const char * `tooltip` () const
Gets the current tooltip text.
 - void `tooltip` (const char *text)
Sets the current tooltip text.
 - `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
 - `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
 - `uchar` `type` () const
Gets the widget type.
 - void `type` (`uchar` t)
Sets the widget type.
 - int `use_accents_menu` ()
Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
 - void * `user_data` () const
Gets the user data for this widget.
 - void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
 - void `user_data` (void *v)
Sets the user data for this widget.
 - unsigned int `visible` () const
Returns whether a widget is visible.
 - unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
 - void `visible_focus` (int v)
Modifies keyboard focus navigation.
 - int `visible_r` () const
Returns whether a widget and all its parents are visible.
 - int `w` () const
Gets the widget width.
 - `FI_When` `when` () const
Returns the conditions under which the callback is called.
 - void `when` (`uchar` i)
Sets the flags used to decide when a callback is called.
 - `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.

- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- virtual **~FL_Widget** ()
Destroys the widget.

Protected Member Functions

- void **draw** () **FL_OVERRIDE**
Draws the widget.

Protected Member Functions inherited from **FL_Valuator**

- **FL_Valuator** (int X, int Y, int W, int H, const char *L)
*Creates a new **FL_Valuator** widget using the given position, size, and label string.*
- void **handle_drag** (double newvalue)
*Called during a drag operation, after an **FL_WHEN_CHANGED** event is received and before the callback.*
- void **handle_push** ()
Stores the current value in the previous value.
- void **handle_release** ()
*Called after an **FL_WHEN_RELEASE** event is received and before the callback.*
- int **horizontal** () const
*Tells if the valuator is an **FL_HORIZONTAL** one.*
- double **previous_value** () const
Gets the previous floating point value before an event changed it.
- void **set_value** (double v)
Sets the current floating point value.
- double **softclamp** (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void **value_damage** ()
Asks for partial redraw.

Protected Member Functions inherited from **FL_Widget**

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
*If **FL_ALIGN_IMAGE_BACKDROP** is set, the image or deimage will be drawn.*
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** (**FL_Boxtype** t, **FL_Color** c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** (**FL_Boxtype** t, int x, int y, int w, int h, **FL_Color** c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FL_Boxtype** t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** (**FL_Boxtype** t, int x, int y, int w, int h, **FL_Color** bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

- Draws the widget's label at the defined label position.*

 - void `draw_label` (int, int, int, int) const

Draws the label in an arbitrary bounding box.

 - `FI_Widget` (int `x`, int `y`, int `w`, int `h`, const char *`label=0L`)

Creates a widget at the given position and size.

 - unsigned int `flags` () const

Gets the widget flags mask.

 - void `h` (int `v`)

Internal use only.

 - void `set_flag` (unsigned int `c`)

Sets a flag in the flags mask.

 - void `w` (int `v`)

Internal use only.

 - void `x` (int `v`)

Internal use only.

 - void `y` (int `v`)

Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `FI_Widget`

- static void `default_callback` (`FI_Widget` *`widget`, void *`data`)
- The default callback for all widgets that don't set a callback.*
- static unsigned int `label_shortcut` (const char *`t`)
- Returns the Unicode value of the '&x' shortcut in a given text.*
- static int `test_shortcut` (const char *`t`, const bool `require_alt=false`)
- Returns true if the given text `t` contains the entered '&x' shortcut.*

Protected Types inherited from `FI_Widget`

- enum {
 - `INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
 - `FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 - ,
 - `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 - ,
 - `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 - ,
 - `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU` = 1<<19 ,
 - `NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
 - `AUTO_DELETE_USER_DATA` = 1<<23 ,
 - `MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
 - `USERFLAG1` = 1<<31 }

flags possible values enumeration.

12.158.1 Detailed Description

The `FI_Value_Output` widget displays a floating point value.

If `step()` is not zero, the user can adjust the value by dragging the mouse left and right. The left button moves one `step()` per pixel, the middle by `10 * step()`, and the right button by `100 * step()`.

This is much lighter-weight than `FI_Value_Input` because it contains no text editing code or character buffer.

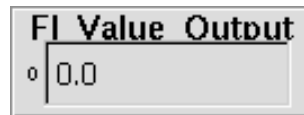


Figure 12.68 Fl_Value_Output

12.158.2 Constructor & Destructor Documentation

12.158.2.1 Fl_Value_Output()

```
Fl_Value_Output::Fl_Value_Output (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Value_Output](#) widget using the given position, size, and label string.

The default boxtype is FL_NO_BOX.

Inherited destructor destroys the Valuator.

12.158.3 Member Function Documentation

12.158.3.1 draw()

```
void Fl_Value_Output::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

12.158.3.2 handle()

```
int Fl_Value_Output::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
---	---

Return values

1	if the event was used and can be deleted
---	--

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

12.158.3.3 soft() [1/2]

```
uchar Fl_Value_Output::soft ( ) const [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value.

Default is one.

12.158.3.4 soft() [2/2]

```
void Fl_Value_Output::soft (
    uchar s ) [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value.

Default is one.

12.158.3.5 textcolor() [1/2]

```
Fl_Color Fl_Value_Output::textcolor ( ) const [inline]
```

Sets the color of the text in the value box.

12.158.3.6 textcolor() [2/2]

```
void Fl_Value_Output::textcolor (
    Fl_Color s ) [inline]
```

Gets the color of the text in the value box.

12.158.3.7 textfont() [1/2]

```
Fl_Font Fl_Value_Output::textfont ( ) const [inline]
```

Gets the typeface of the text in the value box.

12.158.3.8 textfont() [2/2]

```
void Fl_Value_Output::textfont (
    Fl_Font s ) [inline]
```

Sets the typeface of the text in the value box.

12.158.3.9 textsize()

```
Fl_Fontsize Fl_Value_Output::textsize ( ) const [inline]
```

Gets the size of the text in the value box.

The documentation for this class was generated from the following files:

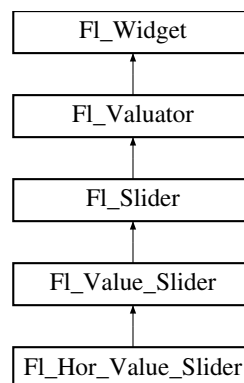
- `Fl_Value_Output.H`
- `Fl_Value_Output.cxx`

12.159 Fl_Value_Slider Class Reference

The `Fl_Value_Slider` widget is a `Fl_Slider` widget with a box displaying the current value.

```
#include <Fl_Value_Slider.H>
```

Inheritance diagram for `Fl_Value_Slider`:



Public Member Functions

- `Fl_Value_Slider` (int *x*, int *y*, int *w*, int *h*, const char **l*=0)
Creates a new Fl_Value_Slider widget using the given position, size, and label string.
- int `handle` (int) `FL_OVERRIDE`
Handles the specified event.
- `Fl_Color` `textcolor` () const
Gets the color of the text in the value box.
- void `textcolor` (`Fl_Color` *s*)
Sets the color of the text in the value box.
- `Fl_Font` `textfont` () const
Gets the typeface of the text in the value box.
- void `textfont` (`Fl_Font` *s*)
Sets the typeface of the text in the value box.
- `Fl_Fontsize` `textsize` () const
Gets the size of the text in the value box.
- void `textsize` (`Fl_Fontsize` *s*)
Sets the size of the text in the value box.
- int `value_height` () const
Gets the height of the value box in pixels (vertical mode only).
- void `value_height` (int *s*)
Sets the height of the value box in pixels (vertical mode only).
- int `value_width` () const
Gets the width of the value box in pixels (horizontal mode only).
- void `value_width` (int *s*)
Sets the width of the value box in pixels (horizontal mode only).

Public Member Functions inherited from FI_Slider

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- **FI_Slider** (int X, int Y, int W, int H, const char *L=0)
Creates a new FI_Slider widget using the given position, size, and label string.
- **FI_Slider** (uchar t, int X, int Y, int W, int H, const char *L)
Creates a new FI_Slider widget using the given type, position, size, and label string.
- int **scrollvalue** (int pos, int size, int first, int total)
Sets the size and position of the sliding knob in the box.
- **FI_Boxtype slider** () const
Gets the slider box type.
- void **slider** (FI_Boxtype c)
Sets the slider box type.
- float **slider_size** () const
Get the dimensions of the moving piece of slider.
- void **slider_size** (double v)
Set the dimensions of the moving piece of slider.

Public Member Functions inherited from FI_Valuator

- void **bounds** (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- double **clamp** (double)
Clamps the passed value to the valuator range.
- virtual int **format** (char *)
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- double **increment** (double, int)
Adds n times the step value to the passed value.
- double **maximum** () const
Gets the maximum value for the valuator.
- void **maximum** (double a)
Sets the maximum value for the valuator.
- double **minimum** () const
Gets the minimum value for the valuator.
- void **minimum** (double a)
Sets the minimum value for the valuator.
- void **precision** (int digits)
Sets the step value to $1.0 / 10^{\text{digits}}$.
- void **range** (double a, double b)
Sets the minimum and maximum values for the valuator.
- double **round** (double)
Round the passed value to the nearest step increment.
- double **step** () const
Gets or sets the step value.
- void **step** (double a, int b)
See double FI_Valuator::step() const
- void **step** (double s)
See double FI_Valuator::step() const.
- void **step** (int a)

See double [FI_Valuator::step\(\)](#) const

- double [value](#) () const
Gets the floating point(double) value.
- int [value](#) (double)
Sets the current value.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
Activates the widget.
- unsigned int [active](#) () const
Returns whether the widget is active.
- int [active_r](#) () const
Returns whether the widget and all of its parents are active.
- [FI_Align](#) [align](#) () const
Gets the label alignment.
- void [align](#) ([FI_Align](#) alignment)
Sets the label alignment.
- long [argument](#) () const
Gets the current user data (long) argument that is passed to the callback function.
- void [argument](#) (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- virtual [FI_Group](#) * [as_group](#) ()
Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).
- virtual [FI_Group](#) const * [as_group](#) () const
- virtual [FI_Window](#) * [as_window](#) ()
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- virtual [FI_Window](#) const * [as_window](#) () const
- void [bind_deimage](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the inactive state.
- void [bind_deimage](#) (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void [bind_image](#) ([FI_Image](#) *img)
Sets the image to use as part of the widget label when in the active state.
- void [bind_image](#) (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) [box](#) () const
Gets the box type of the widget.
- void [box](#) ([FI_Boxtype](#) new_box)
Sets the box type for the widget.
- [FI_Callback_p](#) [callback](#) () const
Gets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb)
Sets the current callback function for the widget.
- void [callback](#) ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)
Sets the current callback function and managed user data for the widget.

- void `callback` (`FI_Callback *cb`, `void *p`)
Sets the current callback function and data for the widget.
- void `callback` (`FI_Callback0 *cb`)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback1 *cb`, `long p=0`)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar c=0`)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color color` () const
Gets the background color of the widget.
- void `color` (`FI_Color bg`)
Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)
Sets the background and selection color of the widget.
- `FI_Color color2` () const
For back compatibility only.
- void `color2` (`unsigned a`)
For back compatibility only.
- int `contains` (`const FI_Widget *w`) const
Checks if w is a child of this widget.
- void `copy_label` (`const char *new_label`)
Sets the current label.
- void `copy_tooltip` (`const char *text`)
Sets the current tooltip text.
- `uchar damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)

- Sets the image to use as part of the widget label when in the inactive state.*

 - void `deimage` (`FI_Image *img`)

Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
 - Returns whether the inactive image is managed by the widget.*
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with default arguments.*
- void `do_callback` (`FI_Widget *widget`, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `do_callback` (`FI_Widget *widget`, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
 - Calls the widget callback function with arbitrary arguments.*
- void `draw_label` (int, int, int, int, `FI_Align`) const
 - Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int `h` () const
 - Gets the widget height.*
- virtual void `hide` ()
 - Makes a widget invisible.*
- `FI_Image * image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
- const `FI_Image * image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
- void `image` (`FI_Image &img`)
 - Sets the image to use as part of the widget label when in the active state.*
- void `image` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
- int `image_bound` () const
 - Returns whether the image is managed by the widget.*
- int `inside` (const `FI_Widget *wgt`) const
 - Checks if this widget is a child of wgt.*
- int `is_label_copied` () const
 - Returns whether the current label was assigned with `copy_label()`.*
- const char * `label` () const
 - Gets the current label text.*
- void `label` (const char *text)
 - Sets the current label pointer.*
- void `label` (`FI_Labeltype` a, const char *b)
 - Shortcut to set the label text and type in one call.*
- `FI_Color labelcolor` () const
 - Gets the label color.*
- void `labelcolor` (`FI_Color` c)
 - Sets the label color.*
- `FI_Font labelfont` () const
 - Gets the font to use.*
- void `labelfont` (`FI_Font` f)
 - Sets the font to use.*
- `FI_Fontsize labelsize` () const
 - Gets the font size in pixels.*
- void `labelsize` (`FI_Fontsize` pix)
 - Sets the font size in pixels.*
- `FI_Labeltype labeltype` () const
 - Gets the label type.*

- void `labeltype` (`FI_Labeltype` a)
Sets the label type.
- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group` * `parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group` *p)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- virtual void `resize` (int x, int y, int w, int h)
Changes the size or position of the widget.
- `FI_Color` `selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const

- Gets the current tooltip text.*

 - void **tooltip** (const char *text)

Sets the current tooltip text.
- **Fl_Window** * **top_window** () const

Returns a pointer to the top-level window for the widget.
- **Fl_Window** * **top_window_offset** (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- **uchar** **type** () const

Gets the widget type.
- void **type** (uchar t)

Sets the widget type.
- int **use_accents_menu** ()

Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.
- void * **user_data** () const

Gets the user data for this widget.
- void **user_data** (**Fl_Callback_User_Data** *v, bool auto_free)

Sets the user data for this widget.
- void **user_data** (void *v)

Sets the user data for this widget.
- unsigned int **visible** () const

Returns whether a widget is visible.
- unsigned int **visible_focus** () const

Checks whether this widget has a visible focus.
- void **visible_focus** (int v)

Modifies keyboard focus navigation.
- int **visible_r** () const

Returns whether a widget and all its parents are visible.
- int **w** () const

Gets the widget width.
- **Fl_When** **when** () const

Returns the conditions under which the callback is called.
- void **when** (uchar i)

Sets the flags used to decide when a callback is called.
- **Fl_Window** * **window** () const

Returns a pointer to the nearest parent window up the widget hierarchy.
- int **x** () const

Gets the widget position in its window.
- int **y** () const

Gets the widget position in its window.
- virtual **~Fl_Widget** ()

Destroys the widget.

Protected Member Functions

- void **draw** () **FL_OVERRIDE**

Draws the widget.

Protected Member Functions inherited from **Fl_Slider**

- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int, int)

Protected Member Functions inherited from FI_Valuator

- [FI_Valuator](#) (int X, int Y, int W, int H, const char *L)
Creates a new [FI_Valuator](#) widget using the given position, size, and label string.
- void **handle_drag** (double newvalue)
Called during a drag operation, after an `FL_WHEN_CHANGED` event is received and before the callback.
- void **handle_push** ()
Stores the current value in the previous value.
- void **handle_release** ()
Called after an `FL_WHEN_RELEASE` event is received and before the callback.
- int **horizontal** () const
Tells if the valuator is an `FL_HORIZONTAL` one.
- double **previous_value** () const
Gets the previous floating point value before an event changed it.
- void **set_value** (double v)
Sets the current floating point value.
- double **softclamp** (double)
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void **value_damage** ()
Asks for partial redraw.

Protected Member Functions inherited from FI_Widget

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.

- void `x` (int `v`)

Internal use only.

- void `y` (int `v`)

Internal use only.

Additional Inherited Members

Static Public Member Functions inherited from `Fl_Widget`

- static void `default_callback` (`Fl_Widget` *`widget`, void *`data`)

The default callback for all widgets that don't set a callback.

- static unsigned int `label_shortcut` (const char *`t`)

Returns the Unicode value of the '&x' shortcut in a given text.

- static int `test_shortcut` (const char *`s`, const bool `require_alt=false`)

Returns true if the given text `t` contains the entered '&x' shortcut.

Protected Types inherited from `Fl_Widget`

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
 ,
`OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
 ,
`MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
 ,
`GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
 = 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }

flags possible values enumeration.

12.159.1 Detailed Description

The `Fl_Value_Slider` widget is a `Fl_Slider` widget with a box displaying the current value.

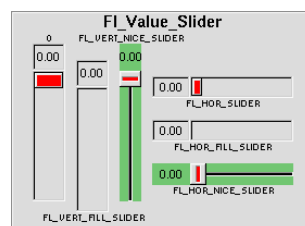


Figure 12.69 `Fl_Value_Slider`

12.159.2 Constructor & Destructor Documentation

12.159.2.1 `Fl_Value_Slider()`

```
Fl_Value_Slider::Fl_Value_Slider (
    int X,
    int Y,
    int W,
```

```
int H,
const char * l = 0 )
```

Creates a new [Fl_Value_Slider](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

12.159.3 Member Function Documentation

12.159.3.1 draw()

```
void Fl_Value_Slider::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Slider](#).

12.159.3.2 handle()

```
int Fl_Value_Slider::handle (
int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Slider](#).

12.159.3.3 value_height() [1/2]

```
int Fl_Value_Slider::value_height ( ) const [inline]
```

Gets the height of the value box in pixels (vertical mode only).

Since

1.4.0

12.159.3.4 value_height() [2/2]

```
void Fl_Value_Slider::value_height (
    int s ) [inline]
```

Sets the height of the value box in pixels (vertical mode only).

Limited range checking is applied but drawing errors may occur if the size `s` is set too high or too low, particularly if the widget is resized (later).

The programmer is responsible for setting sensible values and widget sizes.

The default value set by the constructor is 25.

Parameters

in	s	new height of the value box
----	---	-----------------------------

Since

1.4.0

12.159.3.5 value_width() [1/2]

```
int Fl_Value_Slider::value_width ( ) const [inline]
```

Gets the width of the value box in pixels (horizontal mode only).

Since

1.4.0

12.159.3.6 value_width() [2/2]

```
void Fl_Value_Slider::value_width (
    int s ) [inline]
```

Sets the width of the value box in pixels (horizontal mode only).

Limited range checking is applied but drawing errors may occur if the size `s` is set too high or too low, particularly if the widget is resized (later).

The programmer is responsible for setting sensible values and widget sizes.

The default value set by the constructor is 35.

Parameters

in	s	new width of the value box
----	---	----------------------------

Since

1.4.0

The documentation for this class was generated from the following files:

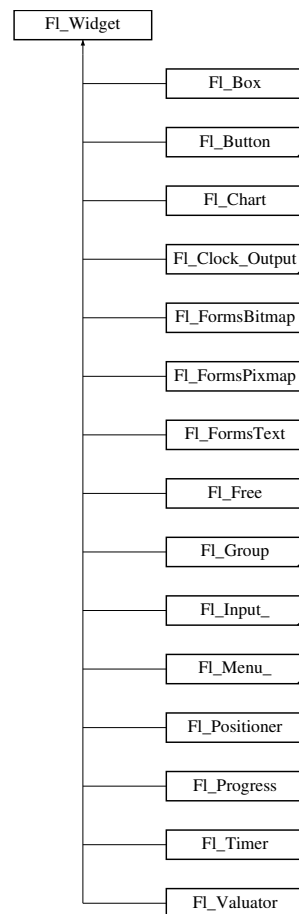
- `Fl_Value_Slider.H`
- `Fl_Value_Slider.cxx`

12.160 FI_Widget Class Reference

[FI_Widget](#) is the base class for all widgets in FLTK.

```
#include <Fl_Widget.H>
```

Inheritance diagram for Fl_Widget:



Public Member Functions

- void **_clear_fullscreen** ()
- void **_set_fullscreen** ()
- void **activate** ()
Activates the widget.
- unsigned int **active** () const
Returns whether the widget is active.
- int **active_r** () const
Returns whether the widget and all of its parents are active.
- **Fl_Align align** () const
Gets the label alignment.
- void **align** (**Fl_Align** alignment)
- long **argument** () const
Gets the current user data (long) argument that is passed to the callback function.
- void **argument** (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class **Fl_Gl_Window** * **as_gl_window** ()
Returns an Fl_Gl_Window pointer if this widget is an Fl_Gl_Window.
- virtual class **Fl_Gl_Window** const * **as_gl_window** () const
- virtual **Fl_Group** * **as_group** ()

- Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).*

 - virtual [FI_Group](#) const * **as_group** () const
 - virtual [FI_Window](#) * **as_window** ()
- Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).*

 - virtual [FI_Window](#) const * **as_window** () const
 - void **bind_deimage** ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the inactive state.

 - void **bind_deimage** (int f)

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

 - void **bind_image** ([FI_Image](#) *img)

Sets the image to use as part of the widget label when in the active state.

 - void **bind_image** (int f)

Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- [FI_Boxtype](#) **box** () const
- Gets the box type of the widget.*

 - void **box** ([FI_Boxtype](#) new_box)

Sets the box type for the widget.
- [FI_Callback_p](#) **callback** () const
- Gets the current callback function for the widget.*

 - void **callback** ([FI_Callback](#) *cb)

Sets the current callback function for the widget.

 - void **callback** ([FI_Callback](#) *cb, [FI_Callback_User_Data](#) *p, bool auto_free)

Sets the current callback function and managed user data for the widget.

 - void **callback** ([FI_Callback](#) *cb, void *p)

Sets the current callback function and data for the widget.

 - void **callback** ([FI_Callback0](#) *cb)

Sets the current callback function for the widget.

 - void **callback** ([FI_Callback1](#) *cb, long p=0)

Sets the current callback function for the widget.
- unsigned int **changed** () const
- Checks if the widget value changed since the last callback.*

 - void **clear_active** ()

Marks the widget as inactive without sending events or changing focus.
- void **clear_changed** ()
- Marks the value of the widget as unchanged.*

 - void **clear_damage** (uchar c=0)

Clears or sets the damage flags.
- void **clear_output** ()
- Sets a widget to accept input.*

 - void **clear_visible** ()

Hides the widget.
- void **clear_visible_focus** ()
- Disables keyboard focus navigation with this widget.*
- [FI_Color](#) **color** () const
- Gets the background color of the widget.*

 - void **color** ([FI_Color](#) bg)

Sets the background color of the widget.

 - void **color** ([FI_Color](#) bg, [FI_Color](#) sel)

Sets the background and selection color of the widget.
- [FI_Color](#) **color2** () const
- For back compatibility only.*

- void `color2` (unsigned a)
For back compatibility only.
- int `contains` (const `Fl_Widget *w`) const
Checks if w is a child of this widget.
- void `copy_label` (const char *new_label)
Sets the current label.
- void `copy_tooltip` (const char *text)
Sets the current tooltip text.
- `uchar damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (uchar c)
Sets the damage bits for the widget.
- void `damage` (uchar c, int x, int y, int w, int h)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `Fl_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `Fl_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`Fl_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`Fl_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`Fl_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`Fl_Widget *widget`, long arg, `Fl_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`Fl_Widget *widget`, void *arg=0, `Fl_Callback_Reason` reason=`FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- virtual void `draw` ()=0
Draws the widget.
- void `draw_label` (int, int, int, int, `Fl_Align`) const
Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const
Gets the widget height.
- virtual int `handle` (int event)
Handles the specified event.
- virtual void `hide` ()
Makes a widget invisible.
- `Fl_Image * image` ()
Gets the image that is used as part of the widget label when in the active state.
- const `Fl_Image * image` () const
Gets the image that is used as part of the widget label when in the active state.
- void `image` (`Fl_Image &img`)
Sets the image to use as part of the widget label when in the active state.
- void `image` (`Fl_Image *img`)

- Sets the image to use as part of the widget label when in the active state.*
- int `image_bound` () const
 - Returns whether the image is managed by the widget.*
- int `inside` (const `FI_Widget` *wgt) const
 - Checks if this widget is a child of wgt.*
- int `is_label_copied` () const
 - Returns whether the current label was assigned with `copy_label()`.*
- const char * `label` () const
 - Gets the current label text.*
- void `label` (const char *text)
 - Sets the current label pointer.*
- void `label` (`FI_Labeltype` a, const char *b)
 - Shortcut to set the label text and type in one call.*
- `FI_Color` `labelcolor` () const
 - Gets the label color.*
- void `labelcolor` (`FI_Color` c)
 - Sets the label color.*
- `FI_Font` `labelfont` () const
 - Gets the font to use.*
- void `labelfont` (`FI_Font` f)
 - Sets the font to use.*
- `FI_Fontsize` `labelsize` () const
 - Gets the font size in pixels.*
- void `labelsize` (`FI_Fontsize` pix)
 - Sets the font size in pixels.*
- `FI_Labeltype` `labeltype` () const
 - Gets the label type.*
- void `labeltype` (`FI_Labeltype` a)
 - Sets the label type.*
- void `measure_label` (int &ww, int &hh) const
 - Sets width ww and height hh accordingly with the label size.*
- bool `needs_keyboard` () const
 - Returns whether this widget needs a keyboard.*
- void `needs_keyboard` (bool needs)
 - Sets whether this widget needs a keyboard.*
- unsigned int `output` () const
 - Returns if a widget is used for output only.*
- `FI_Group` * `parent` () const
 - Returns a pointer to the parent widget.*
- void `parent` (`FI_Group` *p)
 - Internal use only - "for hacks only".*
- void `position` (int X, int Y)
 - Repositions the window or widget.*
- void `redraw` ()
 - Schedules the drawing of the widget.*
- void `redraw_label` ()
 - Schedules the drawing of the label.*
- virtual void `resize` (int x, int y, int w, int h)
 - Changes the size or position of the widget.*
- `FI_Color` `selection_color` () const
 - Gets the selection color.*

- void `selection_color` (`FI_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window` * `top_window` () const
Returns a pointer to the top-level window for the widget.
- `FI_Window` * `top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar` `type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`FI_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)
Sets the user data for this widget.
- unsigned int `visible` () const
Returns whether a widget is visible.
- unsigned int `visible_focus` () const
Checks whether this widget has a visible focus.
- void `visible_focus` (int v)

- Modifies keyboard focus navigation.*

 - int `visible_r` () const
Returns whether a widget and all its parents are visible.
 - int `w` () const
Gets the widget width.
 - `FI_When` `when` () const
Returns the conditions under which the callback is called.
 - void `when` (uchar i)
Sets the flags used to decide when a callback is called.
 - `FI_Window` * `window` () const
Returns a pointer to the nearest parent window up the widget hierarchy.
 - int `x` () const
Gets the widget position in its window.
 - int `y` () const
Gets the widget position in its window.
 - virtual `~FI_Widget` ()
Destroys the widget.

Static Public Member Functions

- static void `default_callback` (`FI_Widget` *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types

- enum {
`INACTIVE` = 1<<0 , `INVISIBLE` = 1<<1 , `OUTPUT` = 1<<2 , `NOBORDER` = 1<<3 ,
`FORCE_POSITION` = 1<<4 , `NON_MODAL` = 1<<5 , `SHORTCUT_LABEL` = 1<<6 , `CHANGED` = 1<<7
, `OVERRIDE` = 1<<8 , `VISIBLE_FOCUS` = 1<<9 , `COPIED_LABEL` = 1<<10 , `CLIP_CHILDREN` = 1<<11
, `MENU_WINDOW` = 1<<12 , `TOOLTIP_WINDOW` = 1<<13 , `MODAL` = 1<<14 , `NO_OVERLAY` = 1<<15
, `GROUP_RELATIVE` = 1<<16 , `COPIED_TOOLTIP` = 1<<17 , `FULLSCREEN` = 1<<18 , `MAC_USE_ACCENTS_MENU`
= 1<<19 ,
`NEEDS_KEYBOARD` = 1<<20 , `IMAGE_BOUND` = 1<<21 , `DEIMAGE_BOUND` = 1<<22 ,
`AUTO_DELETE_USER_DATA` = 1<<23 ,
`MAXIMIZED` = 1<<24 , `POPUP` = 1<<25 , `USERFLAG3` = 1<<29 , `USERFLAG2` = 1<<30 ,
`USERFLAG1` = 1<<31 }
flags possible values enumeration.

Protected Member Functions

- void `clear_flag` (unsigned int c)
Clears a flag in the flags mask.
- void `draw_backdrop` () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void `draw_box` () const
Draws the widget box according its box style.
- void `draw_box` (`FI_Boxtype` t, `FI_Color` c) const

- Draws a box of type t, of color c at the widget's position and size.*

 - void **draw_box** (FI_Boxtype t, int x, int y, int w, int h, FI_Color c) const

Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int X, int Y, int W, int H) const

Draws a focus rectangle around the widget.
- void **draw_focus** (FI_Boxtype t, int x, int y, int w, int h, FI_Color bg) const

Draws a focus box for the widget at the given position and size.
- void **draw_label** () const

Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const

Draws the label in an arbitrary bounding box.
- **FI_Widget** (int x, int y, int w, int h, const char *label=0L)

Creates a widget at the given position and size.
- unsigned int **flags** () const

Gets the widget flags mask.
- void **h** (int v)

Internal use only.
- void **set_flag** (unsigned int c)

Sets a flag in the flags mask.
- void **w** (int v)

Internal use only.
- void **x** (int v)

Internal use only.
- void **y** (int v)

Internal use only.

Friends

- class **FI_Group**

12.160.1 Detailed Description

FI_Widget is the base class for all widgets in FLTK.

You can't create one of these because the constructor is not public. However you can subclass it.

All "property" accessing methods, such as [color\(\)](#), [parent\(\)](#), or [argument\(\)](#) are implemented as trivial inline functions and thus are as fast and small as accessing fields in a structure. Unless otherwise noted, the property setting methods such as [color\(n\)](#) or [label\(s\)](#) are also trivial inline functions, even if they change the widget's appearance. It is up to the user code to call [redraw\(\)](#) after these.

12.160.2 Member Enumeration Documentation

12.160.2.1 anonymous enum

```
anonymous enum [protected]
```

flags possible values enumeration.

See [activate\(\)](#), [output\(\)](#), [visible\(\)](#), [changed\(\)](#), [set_visible_focus\(\)](#)

Enumerator

INACTIVE	the widget can't receive focus, and is disabled but potentially visible
INVISIBLE	the widget is not drawn, but can receive a few special events
OUTPUT	for output only

Enumerator

NOBORDER	don't draw a decoration (Fl_Window)
FORCE_POSITION	don't let the window manager position the window (Fl_Window)
NON_MODAL	this is a hovering toolbar window (Fl_Window)
SHORTCUT_LABEL	the label contains a shortcut we need to draw
CHANGED	the widget value changed
OVERRIDE	position window on top (Fl_Window)
VISIBLE_FOCUS	accepts keyboard focus navigation if the widget can have the focus
COPIED_LABEL	the widget label is internally copied, its destruction is handled by the widget
CLIP_CHILDREN	all drawing within this widget will be clipped (Fl_Group)
MENU_WINDOW	a temporary popup window, dismissed by clicking outside (Fl_Window)
TOOLTIP_WINDOW	a temporary popup, transparent to events, and dismissed easily (Fl_Window)
MODAL	a window blocking input to all other windows (Fl_Window)
NO_OVERLAY	window not using a hardware overlay plane (Fl_Menu_Window)
GROUP_RELATIVE	Reserved, not implemented. DO NOT USE.
COPIED_TOOLTIP	the widget tooltip is internally copied, its destruction is handled by the widget
FULLSCREEN	a fullscreen window (Fl_Window)
MAC_USE_ACCENTS_MENU	On the macOS platform, pressing and holding a key on the keyboard opens an accented-character menu window (Fl_Input , Fl_Text_Editor)
NEEDS_KEYBOARD	set on touch screen devices if a widget needs a keyboard when it gets the focus. Reserved, not yet used in 1.4.0. See also Fl_Widget::needs_keyboard()
IMAGE_BOUND	binding the image to the widget will transfer ownership, so that the widget will delete the image when it is no longer needed
DEIMAGE_BOUND	bind the inactive image to the widget, so the widget deletes the image when it is no longer needed
AUTO_DELETE_USER_DATA	automatically call <code>delete</code> on the <code>user_data</code> pointer when destroying this widget; if set, <code>user_data</code> must point to a class derived from the class Fl_Callback_User_Data
MAXIMIZED	a maximized Fl_Window
POPUP	popup window (i.e., positioned relatively to another mapped window)
USERFLAG3	reserved for 3rd party extensions
USERFLAG2	reserved for 3rd party extensions
USERFLAG1	reserved for 3rd party extensions

12.160.3 Constructor & Destructor Documentation

12.160.3.1 Fl_Widget()

```
Fl_Widget::Fl_Widget (
    int x,
    int y,
    int w,
    int h,
    const char * label = 0L ) [protected]
```

Creates a widget at the given position and size.

The [Fl_Widget](#) is a protected constructor, but all derived widgets have a matching public constructor. It takes a value for `x()`, `y()`, `w()`, `h()`, and an optional value for `label()`.

Parameters

in	<i>x,y</i>	the position of the widget relative to the enclosing window
in	<i>w,h</i>	size of the widget in pixels
in	<i>label</i>	optional text for the widget label

12.160.3.2 ~Fl_Widget()

```
Fl_Widget::~~Fl_Widget ( ) [virtual]
```

Destroys the widget.

Destroys the widget, taking care of throwing focus before if any.

Destroying single widgets is not very common. You almost always want to destroy the parent group instead, which will destroy all of the child widgets and groups in that group.

Since

FLTK 1.3, the widget's destructor removes the widget from its parent group, if it is member of a group.

Destruction removes the widget from any parent group! And groups when destroyed destroy all their children. This is convenient and fast.

12.160.4 Member Function Documentation**12.160.4.1 activate()**

```
void Fl_Widget::activate ( )
```

Activates the widget.

Changing this value will send FL_ACTIVATE to the widget if [active_r\(\)](#) is true.

See also

[active\(\)](#), [active_r\(\)](#), [deactivate\(\)](#)

12.160.4.2 active()

```
unsigned int Fl_Widget::active ( ) const [inline]
```

Returns whether the widget is active.

Return values

0	if the widget is inactive
---	---------------------------

See also

[active_r\(\)](#), [activate\(\)](#), [deactivate\(\)](#)

12.160.4.3 active_r()

```
int Fl_Widget::active_r ( ) const
```

Returns whether the widget and all of its parents are active.

Return values

0	if this or any of the parent widgets are inactive
---	---

See also

[active\(\)](#), [activate\(\)](#), [deactivate\(\)](#)

12.160.4.4 `align()` [1/2]

```
Fl_Align Fl_Widget::align ( ) const [inline]
```

Gets the label alignment.

Returns

label alignment

See also

[label\(\)](#), [align\(Fl_Align\)](#), [Fl_Align](#)

12.160.4.5 `align()` [2/2]

```
void Fl_Widget::align (
    Fl_Align alignment ) [inline]
```

Sets the label alignment.

This controls how the label is displayed next to or inside the widget. The default value is `FL_ALIGN_CENTER`, which centers the label inside the widget.

Parameters

in	<i>alignment</i>	new label alignment
----	------------------	---------------------

See also

[align\(\)](#), [Fl_Align](#)

12.160.4.6 `argument()` [1/2]

```
long Fl_Widget::argument ( ) const [inline]
```

Gets the current user data (long) argument that is passed to the callback function.

Note

On platforms with `sizeof(long) < sizeof(void*)`, particularly on Windows 64-bit platforms, this method can truncate stored addresses (`void*`) to the size of a `long` value. Use with care and only if you are sure that the stored `user_data` value fits in a `long` value because it was stored with [argument\(long\)](#) or another method using only `long` values. You may want to use [user_data\(\)](#) instead.

See also

[user_data\(\)](#)

12.160.4.7 `argument()` [2/2]

```
void Fl_Widget::argument (
    long v ) [inline]
```

Sets the current user data (long) argument that is passed to the callback function.

See also

[argument\(\)](#)

12.160.4.8 as_gl_window()

```
virtual class FI_Gl_Window * FI_Widget::as_gl_window ( ) [inline], [virtual]
```

Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [FI_Gl_Window](#). If it returns non-NULL, then the widget in question is derived from [FI_Gl_Window](#).

Return values

<i>NULL</i>	if this widget is not derived from FI_Gl_Window .
-------------	---

Note

This method is provided to avoid `dynamic_cast`.

See also

[FI_Widget::as_group\(\)](#), [FI_Widget::as_window\(\)](#)

Reimplemented in [FI_Gl_Window](#).

12.160.4.9 as_group()

```
virtual FI_Group * FI_Widget::as_group ( ) [inline], [virtual]
```

Returns an [FI_Group](#) pointer if this widget is an [FI_Group](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [FI_Group](#). If it returns non-NULL, then the widget in question is derived from [FI_Group](#), and you can use the returned pointer to access its children or other [FI_Group](#)-specific methods.

Example:

```
void my_callback (FI_Widget *w, void *) {  
    FI_Group *g = w->as_group();  
    if (g)  
        printf ("This group has %d children\n", g->children());  
    else  
        printf ("This widget is not a group!\n");  
}
```

Return values

<i>NULL</i>	if this widget is not derived from FI_Group .
-------------	---

Note

This method is provided to avoid `dynamic_cast`.

See also

[FI_Widget::as_window\(\)](#), [FI_Widget::as_gl_window\(\)](#)

Reimplemented in [FI_Group](#).

12.160.4.10 as_window()

```
virtual FI_Window * FI_Widget::as_window ( ) [inline], [virtual]
```

Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [FI_Window](#). If it returns non-NULL, then the widget in question is derived from [FI_Window](#), and you can use the returned pointer to access its children or other [FI_Window](#)-specific methods.

Return values

<i>NULL</i>	if this widget is not derived from FI_Window .
-------------	--

Note

This method is provided to avoid `dynamic_cast`.

See also

[Fl_Widget::as_group\(\)](#), [Fl_Widget::as_gl_window\(\)](#)

Reimplemented in [Fl_Window](#).

12.160.4.11 bind_deimage() [1/2]

```
void Fl_Widget::bind_deimage (
    Fl_Image * img )
```

Sets the image to use as part of the widget label when in the inactive state.

Parameters

in	<i>img</i>	the new image for the deactivated widget
----	------------	--

Note

The image will be bound to the widget. When the widget is deleted, the image will be deleted as well.

See also

void [deimage\(Fl_Image* img\)](#)

12.160.4.12 bind_deimage() [2/2]

```
void Fl_Widget::bind_deimage (
    int f ) [inline]
```

Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.

Parameters

<i>f</i>	1: mark the image as bound, 0: mark the image as managed by the user
----------	--

See also

[deimage_bound\(\)](#), [bind_image\(\)](#)

12.160.4.13 bind_image() [1/2]

```
void Fl_Widget::bind_image (
    Fl_Image * img )
```

Sets the image to use as part of the widget label when in the active state.

The image will be bound to the widget. When the widget is deleted, the image will be deleted as well.

Calling [bind_image\(\)](#) with a new image will delete the old image if it was bound, and then set the new image, and bind that. If old and new image are the same, nothing happens.

Calling [bind_image\(\)](#) with NULL will delete the old image if it was bound and not set a new image.

Parameters

in	<i>img</i>	the new image for the label
----	------------	-----------------------------

See also

[void image\(Fl_Image* img\)](#)

12.160.4.14 bind_image() [2/2]

```
void Fl_Widget::bind_image (
    int f ) [inline]
```

Bind the image to the widget, so the widget will delete the image when it is no longer needed.

Parameters

<i>f</i>	1: mark the image as bound, 0: mark the image as managed by the user
----------	--

See also

[image_bound\(\)](#), [bind_deimage\(\)](#)

12.160.4.15 box() [1/2]

```
Fl_Boxtype Fl_Widget::box (
    void ) const [inline]
```

Gets the box type of the widget.

Returns

the current box type

See also

[box\(Fl_Boxtype\)](#), [Fl_Boxtype](#)

12.160.4.16 box() [2/2]

```
void Fl_Widget::box (
    Fl_Boxtype new_box ) [inline]
```

Sets the box type for the widget.

This identifies a routine that draws the background of the widget. See [Fl_Boxtype](#) for the available types. The default depends on the widget, but is usually [FL_NO_BOX](#) or [FL_UP_BOX](#).

Parameters

<i>in</i>	<i>new_box</i>	the new box type
-----------	----------------	------------------

See also

[box\(\)](#), [Fl_Boxtype](#)

12.160.4.17 callback() [1/6]

```
Fl_Callback_p Fl_Widget::callback ( ) const [inline]
```

Gets the current callback function for the widget.

Each widget has a single callback.

Returns

current callback

12.160.4.18 callback() [2/6]

```
void Fl_Widget::callback (
    Fl_Callback * cb ) [inline]
```

Sets the current callback function for the widget.
Each widget has a single callback.

Parameters

in	<i>cb</i>	new callback
----	-----------	--------------

12.160.4.19 callback() [3/6]

```
void Fl_Widget::callback (
    Fl_Callback * cb,
    Fl_Callback_User_Data * p,
    bool auto_free ) [inline]
```

Sets the current callback function and managed user data for the widget.
Setting `auto_free` will transfer ownership of the callback user data to the widget. Deleting the widget will then also delete the user data.

Parameters

in	<i>cb</i>	new callback
in	<i>p</i>	user data
in	<i>auto_free</i>	if set, the widget will free user data when destroyed

12.160.4.20 callback() [4/6]

```
void Fl_Widget::callback (
    Fl_Callback * cb,
    void * p ) [inline]
```

Sets the current callback function and data for the widget.
Each widget has a single callback.

Parameters

in	<i>cb</i>	new callback
in	<i>p</i>	user data

12.160.4.21 callback() [5/6]

```
void Fl_Widget::callback (
    Fl_Callback0 * cb ) [inline]
```

Sets the current callback function for the widget.
Each widget has a single callback.

Parameters

in	<i>cb</i>	new callback
----	-----------	--------------

12.160.4.22 callback() [6/6]

```
void Fl_Widget::callback (
```

```
Fl_Callback1 * cb,
long p = 0 ) [inline]
```

Sets the current callback function for the widget.
Each widget has a single callback.

Parameters

in	<i>cb</i>	new callback
in	<i>p</i>	user data

12.160.4.23 changed()

```
unsigned int Fl_Widget::changed ( ) const [inline]
```

Checks if the widget value changed since the last callback.

"Changed" is a flag that is turned on when the user changes the value stored in the widget. This is only used by subclasses of [Fl_Widget](#) that store values, but is in the base class so it is easier to scan all the widgets in a panel and [do_callback\(\)](#) on the changed ones in response to an "OK" button.

Most widgets turn this flag off when they do the callback, and when the program sets the stored value.

Note

[do_callback\(\)](#) turns this flag off after the callback.

Return values

0	if the value did not change
---	-----------------------------

See also

[set_changed\(\)](#), [clear_changed\(\)](#)

[do_callback\(Fl_Widget *widget, void *data\)](#)

12.160.4.24 clear_active()

```
void Fl_Widget::clear_active ( ) [inline]
```

Marks the widget as inactive without sending events or changing focus.

This is mainly for specialized use, for normal cases you want [deactivate\(\)](#).

See also

[deactivate\(\)](#)

12.160.4.25 clear_changed()

```
void Fl_Widget::clear_changed ( ) [inline]
```

Marks the value of the widget as unchanged.

See also

[changed\(\)](#), [set_changed\(\)](#)

12.160.4.26 clear_damage()

```
void Fl_Widget::clear_damage (
    uchar c = 0 ) [inline]
```

Clears or sets the damage flags.

Damage flags are cleared when parts of the widget drawing is repaired.

The optional argument *c* specifies the bits that **are set** after the call (default: 0) and **not** the bits that are cleared!

Note

Therefore it is possible to set damage bits with this method, but this should be avoided. Use [damage\(uchar\)](#) instead.

Parameters

<code>in</code>	<code>c</code>	new bitmask of damage flags (default: 0)
-----------------	----------------	--

See also

[damage\(uchar\)](#), [damage\(\)](#)

12.160.4.27 clear_output()

```
void Fl_Widget::clear_output ( ) [inline]
```

Sets a widget to accept input.

See also

[set_output\(\)](#), [output\(\)](#)

12.160.4.28 clear_visible()

```
void Fl_Widget::clear_visible ( ) [inline]
```

Hides the widget.

You must still redraw the parent to see a change in the window. Normally you want to use the [hide\(\)](#) method instead.

12.160.4.29 clear_visible_focus()

```
void Fl_Widget::clear_visible_focus ( ) [inline]
```

Disables keyboard focus navigation with this widget.

Normally, all widgets participate in keyboard focus navigation.

See also

[set_visible_focus\(\)](#), [visible_focus\(\)](#), [visible_focus\(int\)](#)

12.160.4.30 color() [1/3]

```
Fl_Color Fl_Widget::color (
    void ) const [inline]
```

Gets the background color of the widget.

Returns

current background color

See also

[color\(Fl_Color\)](#), [color\(Fl_Color, Fl_Color\)](#)

12.160.4.31 color() [2/3]

```
void Fl_Widget::color (
    Fl_Color bg ) [inline]
```

Sets the background color of the widget.

The color is passed to the box routine. The color is either an index into an internal table of RGB colors or an RGB color value generated using [fl_rgb_color\(\)](#).

The default for most widgets is FL_BACKGROUND_COLOR. Use [Fl::set_color\(\)](#) to redefine colors in the color map.

Parameters

in	<i>bg</i>	background color
----	-----------	------------------

See also

[color\(\)](#), [color\(Fl_Color, Fl_Color\)](#), [selection_color\(Fl_Color\)](#)

12.160.4.32 color() [3/3]

```
void Fl_Widget::color (
    Fl_Color bg,
    Fl_Color sel ) [inline]
```

Sets the background and selection color of the widget.
The two color form sets both the background and selection colors.

Parameters

in	<i>bg</i>	background color
in	<i>sel</i>	selection color

See also

[color\(unsigned\)](#), [selection_color\(unsigned\)](#)

12.160.4.33 color2() [1/2]

```
Fl_Color Fl_Widget::color2 ( ) const [inline]
```

For back compatibility only.

Deprecated Use [selection_color\(\)](#) instead.

12.160.4.34 color2() [2/2]

```
void Fl_Widget::color2 (
    unsigned a ) [inline]
```

For back compatibility only.

Deprecated Use [selection_color\(unsigned\)](#) instead.

12.160.4.35 contains()

```
int Fl_Widget::contains (
    const Fl_Widget * w ) const
```

Checks if *w* is a child of this widget.

Parameters

in	<i>w</i>	potential child widget
----	----------	------------------------

Returns

Returns 1 if *w* is a child of this widget, or is equal to this widget. Returns 0 if *w* is NULL.

12.160.4.36 copy_label()

```
void Fl_Widget::copy_label (
    const char * new_label )
```

Sets the current label.

Unlike [label\(\)](#), this method allocates a copy of the label string instead of using the original string pointer. The internal copy will automatically be freed whenever you assign a new label or when the widget is destroyed.

Parameters

in	<i>new_label</i>	the new label text
----	------------------	--------------------

See also

[label\(\)](#)

12.160.4.37 copy_tooltip()

```
void Fl_Widget::copy_tooltip (
    const char * text )
```

Sets the current tooltip text.

Unlike [tooltip\(\)](#), this method allocates a copy of the tooltip string instead of using the original string pointer. The internal copy will automatically be freed whenever you assign a new tooltip or when the widget is destroyed. If no tooltip is set, the tooltip of the parent is inherited. Setting a tooltip for a group and setting no tooltip for a child will show the group's tooltip instead. To avoid this behavior, you can set the child's tooltip to an empty string ("").

Parameters

in	<i>text</i>	New tooltip text (an internal copy is made and managed)
----	-------------	---

See also

[tooltip\(const char*\)](#), [tooltip\(\)](#)

12.160.4.38 damage() [1/3]

```
uchar Fl_Widget::damage ( ) const [inline]
```

Returns non-zero if [draw\(\)](#) needs to be called.

The damage value is actually a bit field that the widget subclass can use to figure out what parts to draw.

Returns

a bitmap of flags describing the kind of damage to the widget

See also

[damage\(uchar\)](#), [clear_damage\(uchar\)](#)

12.160.4.39 damage() [2/3]

```
void Fl_Widget::damage (
    uchar c )
```

Sets the damage bits for the widget.

Setting damage bits will schedule the widget for the next redraw.

Parameters

in	<i>c</i>	bitmask of flags to set
----	----------	-------------------------

See also

[damage\(\)](#), [clear_damage\(uchar\)](#)

12.160.4.40 damage() [3/3]

```
void Fl_Widget::damage (
    uchar c,
    int x,
    int y,
    int w,
    int h )
```

Sets the damage bits for an area inside the widget.
Setting damage bits will schedule the widget for the next redraw.

Parameters

in	<i>c</i>	bitmask of flags to set
in	<i>x,y,w,h</i>	size of damaged area

See also

[damage\(\)](#), [clear_damage\(uchar\)](#)

12.160.4.41 deactivate()

```
void Fl_Widget::deactivate ( )
```

Deactivates the widget.

Inactive widgets will be drawn "grayed out", e.g. with less contrast than the active widget. Inactive widgets will not receive any keyboard or mouse button events. Other events (including `FL_ENTER`, `FL_MOVE`, `FL_LEAVE`, `FL_SHORTCUT`, and others) will still be sent. A widget is only active if [active\(\)](#) is true on it *and all of its parents*.

Changing this value will send `FL_DEACTIVATE` to the widget if [active_r\(\)](#) is true.

Currently you cannot deactivate `Fl_Window` widgets.

See also

[activate\(\)](#), [active\(\)](#), [active_r\(\)](#)

12.160.4.42 default_callback()

```
void Fl_Widget::default_callback (
    Fl_Widget * widget,
    void * data ) [static]
```

The default callback for all widgets that don't set a callback.

This callback function puts a pointer to the widget on the queue returned by [Fl::readqueue\(\)](#). This is the default for all widgets if you don't set a callback.

You can avoid the overhead of this default handling if you set the callback to `NULL` explicitly.

Relying on the default callback and reading the callback queue with [Fl::readqueue\(\)](#) is not recommended. If you need a callback, you should set one with [Fl_Widget::callback\(Fl_Callback *cb, void *data\)](#) or one of its variants.

Parameters

in	<i>widget</i>	the <code>Fl_Widget</code> given to the callback
in	<i>data</i>	user data associated with that callback

See also

[callback\(\)](#), [Fl::readqueue\(\)](#)
[do_callback\(Fl_Widget *widget, void *data\)](#)

12.160.4.43 deimage() [1/4]

```
Fl_Image * Fl_Widget::deimage ( ) [inline]
```

Gets the image that is used as part of the widget label when in the inactive state.

Returns

the current image for the deactivated widget

12.160.4.44 deimage() [2/4]

```
const Fl_Image * Fl_Widget::deimage ( ) const [inline]
```

Gets the image that is used as part of the widget label when in the inactive state.

Returns

the current image for the deactivated widget

12.160.4.45 deimage() [3/4]

```
void Fl_Widget::deimage (
    Fl_Image & img )
```

Sets the image to use as part of the widget label when in the inactive state.

Parameters

in	<i>img</i>	the new image for the deactivated widget
----	------------	--

See also

void [deimage\(Fl_Image* img\)](#)

12.160.4.46 deimage() [4/4]

```
void Fl_Widget::deimage (
    Fl_Image * img )
```

Sets the image to use as part of the widget label when in the inactive state.

Parameters

in	<i>img</i>	the new image for the deactivated widget
----	------------	--

Note

The caller is responsible for making sure *img* is not deleted while it's used by the widget, and, if appropriate, for deleting it after the widget's deletion.

See also

void [bind_deimage\(Fl_Image* img\)](#)

12.160.4.47 deimage_bound()

```
int Fl_Widget::deimage_bound ( ) const [inline]
```

Returns whether the inactive image is managed by the widget.

Return values

0	if the image is not bound to the widget
1	if the image will be deleted when the widget is deleted

See also

[image_bound\(\)](#), [bind_deimage\(\)](#)

12.160.4.48 do_callback() [1/3]

```
void Fl_Widget::do_callback (
    Fl_Callback_Reason reason = FL_REASON_UNKNOWN ) [inline]
```

Calls the widget callback function with default arguments.

This is the same as calling
`do_callback(this, user_data(), reason);`

Parameters

in	<i>reason</i>	give a reason to why this callback was called, defaults to FL_REASON_UNKNOWN
----	---------------	--

See also

[callback\(\)](#)
[do_callback\(Fl_Widget *widget, void *data, Fl_Callback_Reason reason\), Fl_Callback_Reason](#)

12.160.4.49 do_callback() [2/3]

```
void Fl_Widget::do_callback (
    Fl_Widget * widget,
    long arg,
    Fl_Callback_Reason reason = FL_REASON_UNKNOWN ) [inline]
```

Calls the widget callback function with arbitrary arguments.

Parameters

in	<i>widget</i>	call the callback with <i>widget</i> as the first argument
in	<i>arg</i>	call the callback with <i>arg</i> as the user data (second) argument
in	<i>reason</i>	give a reason to why this callback was called, defaults to FL_REASON_UNKNOWN

See also

[callback\(\)](#)
[do_callback\(Fl_Widget *widget, void *data\), Fl_Callback_Reason](#)

12.160.4.50 do_callback() [3/3]

```
void Fl_Widget::do_callback (
    Fl_Widget * widget,
    void * arg = 0,
    Fl_Callback_Reason reason = FL_REASON_UNKNOWN )
```

Calls the widget callback function with arbitrary arguments.

All overloads of `do_callback()` call this method. It does nothing if the widget's `callback()` is NULL. It clears the widget's `changed` flag **after** the callback was called unless the callback is the default callback. Hence it is not necessary to call `clear_changed()` after calling `do_callback()` in your own widget's `handle()` method.

A `reason` must be set for widgets if different actions can trigger the same callback.

Note

It is legal to delete the widget in the callback (i.e. in user code), but you must not access the widget in the `handle()` method after calling `do_callback()` if the widget was deleted in the callback. We recommend to use `Fl_Widget_Tracker` to check whether the widget was deleted in the callback.

Parameters

in	<i>widget</i>	call the callback with <code>widget</code> as the first argument
in	<i>arg</i>	use <code>arg</code> as the user data (second) argument
in	<i>reason</i>	give a reason to why this callback was called, defaults to <code>FL_REASON_UNKNOWN</code>

See also

[default_callback\(\)](#)

[callback\(\)](#)

[class Fl_Widget_Tracker](#)

[Fl::callback_reason\(\)](#)

12.160.4.51 draw()

```
virtual void Fl_Widget::draw ( ) [pure virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                 // calls Fl_Scrollbar::draw()
```

Implemented in [Fl_Adjuster](#), [Fl_Box](#), [Fl_Browser_](#), [Fl_Button](#), [Fl_Cairo_Window](#), [Fl_Chart](#), [Fl_Choice](#), [Fl_Clock_Output](#), [Fl_Counter](#), [Fl_Dial](#), [Fl_File_Input](#), [Fl_Flex](#), [Fl_FormsBitmap](#), [Fl_FormsPixmap](#), [Fl_Free](#), [Fl_Gl_Window](#), [Fl_Grid](#), [Fl_Group](#), [Fl_Help_View](#), [Fl_Input](#), [Fl_Light_Button](#), [Fl_Menu_Bar](#), [Fl_Menu_Button](#), [Fl_Pack](#), [Fl_Positioner](#), [Fl_Progress](#), [Fl_Return_Button](#), [Fl_Roller](#), [Fl_Scroll](#), [Fl_Scrollbar](#), [Fl_Shortcut_Button](#), [Fl_Slider](#), [Fl_Spinner](#), [Fl_Sys_Menu_Bar](#), [Fl_Table](#), [Fl_Tabs](#), [Fl_Text_Display](#), [Fl_Timer](#), [Fl_Tree](#), [Fl_Value_Input](#), [Fl_Value_Output](#), [Fl_Value_Slider](#), [Fl_Window](#), [Fl_Wizard](#), [Fl_FormsText](#), [Fl_Glut_Window](#), and [Fl_Terminal](#).

12.160.4.52 draw_focus() [1/3]

```
void Fl_Widget::draw_focus ( ) const [inline], [protected]
```

Draws a focus rectangle around the widget.

This method uses the widget's boxtype and coordinates and its background color `color()`.

See also

[Fl_Widget::draw_focus\(Fl_Boxtype, int, int, int, int, Fl_Color\) const](#)

12.160.4.53 draw_focus() [2/3]

```
void Fl_Widget::draw_focus (
    Fl_Boxtype t,
```

```

    int X,
    int Y,
    int W,
    int H ) const [inline], [protected]

```

Draws a focus rectangle around the widget.

This method uses the given boxtype and coordinates and the widget's background color [color\(\)](#).

See also

[Fl_Widget::draw_focus\(Fl_Boxtype, int, int, int, int, Fl_Color\) const](#)

12.160.4.54 draw_focus() [3/3]

```

void Fl_Widget::draw_focus (
    Fl_Boxtype bt,
    int X,
    int Y,
    int W,
    int H,
    Fl_Color bg ) const [protected]

```

Draws a focus box for the widget at the given position and size.

This method does nothing if

- the global option [Fl::visible_focus\(\)](#) or
- the per-widget option [visible_focus\(\)](#) is false (off).

This means that [Fl_Widget::draw_focus\(\)](#) or one of the more specialized methods can be called without checking these visible focus options.

Note

This method must only be called if the widget has the focus. This is not tested internally.

The boxtype `bt` is used to calculate the inset so the focus box is drawn inside the box borders.

The default focus box drawing color is black. The background color `bg` is used to determine a better visible color if necessary by using [fl_contrast\(\)](#) with the given background color.

Parameters

in	<i>bt</i>	Boxtype that needs to be considered (frame width)
in	<i>X, Y, W, H</i>	Bounding box
in	<i>bg</i>	Background color

See also

[Fl_Widget::draw_focus\(\)](#)

[Fl_Widget::draw_focus\(Fl_Boxtype, int, int, int, int\) const](#)

12.160.4.55 draw_label() [1/3]

```

void Fl_Widget::draw_label ( ) const [protected]

```

Draws the widget's label at the defined label position.

This is the normal call for a widget's [draw\(\)](#) method.

12.160.4.56 draw_label() [2/3]

```

void Fl_Widget::draw_label (
    int X,

```

```

        int Y,
        int W,
        int H ) const [protected]

```

Draws the label in an arbitrary bounding box.

[draw\(\)](#) can use this instead of [draw_label\(void\)](#) to change the bounding box

12.160.4.57 draw_label() [3/3]

```

void Fl_Widget::draw_label (
    int X,
    int Y,
    int W,
    int H,
    Fl_Align a ) const

```

Draws the label in an arbitrary bounding box with an arbitrary alignment.

Anybody can call this to force the label to draw anywhere.

12.160.4.58 h() [1/2]

```

int Fl_Widget::h ( ) const [inline]

```

Gets the widget height.

Returns

the height of the widget in pixels.

12.160.4.59 h() [2/2]

```

void Fl_Widget::h (
    int v ) [inline], [protected]

```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

12.160.4.60 handle()

```

int Fl_Widget::handle (
    int event ) [virtual]

```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class.

This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented in [Fl_Color_Chooser](#), [Fl_Free](#), [Fl_Table](#), [Fl_Terminal](#), [Fl_Text_Display](#), [Fl_Text_Editor](#), [Fl_Tree](#), [Fl_Browser](#), [Fl_File_Input](#), [Fl_Scheme_Choice](#), [Fl_Spinner::Fl_Spinner_Input](#), [Fl_Spinner](#), [Fl_Table_Row](#), [Fl_Tile](#), [Fl_Adjuster](#), [Fl_Box](#), [Fl_Button](#), [Fl_Check_Browser](#), [Fl_Choice](#), [Fl_Clock](#), [Fl_Counter](#), [Fl_Dial](#), [Fl_Gl_Window](#), [Fl_Group](#), [Fl_Help_View](#), [Fl_Input](#), [Fl_Light_Button](#), [Fl_Menu_Bar](#), [Fl_Menu_Button](#), [Fl_Positioner](#), [Fl_Repeat_Button](#), [Fl_Return_Button](#), [Fl_Roller](#), [Fl_Scroll](#), [Fl_Scrollbar](#), [Fl_Secret_Input](#), [Fl_Shortcut_Button](#), [Fl_Slider](#), [Fl_Tabs](#), [Fl_Timer](#), [Fl_Value_Input](#), [Fl_Value_Output](#), [Fl_Value_Slider](#), [Fl_Window](#), and [Fl_Glut_Window](#).

12.160.4.61 hide()

```
void Fl_Widget::hide ( ) [virtual]
```

Makes a widget invisible.

See also

[show\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented in [Fl_Browser](#), [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Overlay_Window](#), and [Fl_Window](#).

12.160.4.62 image() [1/4]

```
Fl_Image * Fl_Widget::image ( ) [inline]
```

Gets the image that is used as part of the widget label when in the active state.

Returns

the current image

12.160.4.63 image() [2/4]

```
const Fl_Image * Fl_Widget::image ( ) const [inline]
```

Gets the image that is used as part of the widget label when in the active state.

Returns

the current image

12.160.4.64 image() [3/4]

```
void Fl_Widget::image (
    Fl_Image & img )
```

Sets the image to use as part of the widget label when in the active state.

Parameters

in	<i>img</i>	the new image for the label
----	------------	-----------------------------

See also

`void image(Fl_Image* img)`

12.160.4.65 image() [4/4]

```
void Fl_Widget::image (
    Fl_Image * img )
```

Sets the image to use as part of the widget label when in the active state.

The caller is responsible for making sure *img* is not deleted while it's used by the widget, and, if appropriate, for deleting it after the widget's deletion.

Calling `image()` with a new image will delete the old image if it was bound, and set the new image without binding it. If old and new are the same, the image will not be deleted, but it will be unbound. Calling `image()` with NULL will delete the old image if it was bound and not set a new image.

Parameters

in	<i>img</i>	the new image for the label
----	------------	-----------------------------

See also

[bind_image\(Fl_Image* img\)](#)

12.160.4.66 image_bound()

```
int Fl_Widget::image_bound ( ) const [inline]
```

Returns whether the image is managed by the widget.

Return values

0	if the image is not bound to the widget
1	if the image will be deleted when the widget is deleted

See also

[deimage_bound\(\)](#), [bind_image\(\)](#)

12.160.4.67 inside()

```
int Fl_Widget::inside (
    const Fl_Widget * wgt ) const [inline]
```

Checks if this widget is a child of `wgt`.

Returns 1 if this widget is a child of `wgt`, or is equal to `wgt`. Returns 0 if `wgt` is NULL.

Parameters

in	<i>wgt</i>	the possible parent widget.
----	------------	-----------------------------

See also

[contains\(\)](#)

12.160.4.68 is_label_copied()

```
int Fl_Widget::is_label_copied ( ) const [inline]
```

Returns whether the current label was assigned with [copy_label\(\)](#).

This can be useful for temporarily overwriting the widget's label and restoring it later.

Return values

0	current label was assigned with label() .
1	current label was assigned with copy_label() .

12.160.4.69 label() [1/3]

```
const char * Fl_Widget::label ( ) const [inline]
```

Gets the current label text.

Returns

a pointer to the current label text

See also

[label\(const char *\)](#), [copy_label\(const char *\)](#)

12.160.4.70 label() [2/3]

```
void Fl_Widget::label (
    const char * text )
```

Sets the current label pointer.

The label is shown somewhere on or next to the widget. See [Labels and Label Types](#) for details about what can be put in a label. The passed pointer is stored unchanged in the widget (the string is *not* copied), so if you need to set the label to a formatted value, make sure the buffer is static, global, or allocated. The [copy_label\(\)](#) method can be used to make a copy of the label string automatically.

Parameters

in	<i>text</i>	pointer to new label text
----	-------------	---------------------------

See also

[copy_label\(\)](#)

12.160.4.71 label() [3/3]

```
void Fl_Widget::label (
    Fl_Labeltype a,
    const char * b ) [inline]
```

Shortcut to set the label text and type in one call.

See also

[label\(const char *\)](#), [labeltype\(Fl_Labeltype\)](#)

12.160.4.72 label_shortcut()

```
unsigned int Fl_Widget::label_shortcut (
    const char * t ) [static]
```

Returns the Unicode value of the '&x' shortcut in a given text.

The given text *t* (usually a widget's label or a menu text) is searched for a '&x' shortcut label, and if found, the Unicode value (code point) of the '&x' shortcut is returned.

Parameters

<i>t</i>	text or label to search for '&x' shortcut.
----------	--

Returns

Unicode (UCS-4) value of shortcut in *t* or 0.

Note

Internal use only.

12.160.4.73 labelcolor() [1/2]

```
Fl_Color Fl_Widget::labelcolor ( ) const [inline]
```

Gets the label color.

The default color is FL_FOREGROUND_COLOR.

Returns

the current label color

12.160.4.74 labelcolor() [2/2]

```
void Fl_Widget::labelcolor (
    Fl_Color c ) [inline]
```

Sets the label color.

The default color is FL_FOREGROUND_COLOR.

Parameters

in	<i>c</i>	the new label color
----	----------	---------------------

12.160.4.75 labelfont() [1/2]

```
Fl_Font Fl_Widget::labelfont ( ) const [inline]
```

Gets the font to use.

Fonts are identified by indexes into a table. The default value uses a Helvetica typeface (Arial for Microsoft® Windows®). The function [Fl::set_font\(\)](#) can define new typefaces.

Returns

current font used by the label

See also

[Fl_Font](#)

12.160.4.76 labelfont() [2/2]

```
void Fl_Widget::labelfont (
    Fl_Font f ) [inline]
```

Sets the font to use.

Fonts are identified by indexes into a table. The default value uses a Helvetica typeface (Arial for Microsoft® Windows®). The function [Fl::set_font\(\)](#) can define new typefaces.

Parameters

in	<i>f</i>	the new font for the label
----	----------	----------------------------

See also

[Fl_Font](#)

12.160.4.77 `labelsize()` [1/2]

```
Fl_Fontsize Fl_Widget::labelsize ( ) const [inline]
```

Gets the font size in pixels.
The default size is 14 pixels.

Returns

the current font size

12.160.4.78 `labelsize()` [2/2]

```
void Fl_Widget::labelsize (
    Fl_Fontsize pix ) [inline]
```

Sets the font size in pixels.

Parameters

<code>in</code>	<code>pix</code>	the new font size
-----------------	------------------	-------------------

See also

[Fl_Fontsize labelsize\(\)](#)

12.160.4.79 `labeltype()` [1/2]

```
Fl_Labeltype Fl_Widget::labeltype ( ) const [inline]
```

Gets the label type.

Returns

the current label type.

See also

[Fl_Labeltype](#)

12.160.4.80 `labeltype()` [2/2]

```
void Fl_Widget::labeltype (
    Fl_Labeltype a ) [inline]
```

Sets the label type.

The label type identifies the function that draws the label of the widget. This is generally used for special effects such as embossing or for using the `label()` pointer as another form of data such as an icon. The value `FL_NORMAL_LABEL` prints the label as plain text.

Parameters

<code>in</code>	<code>a</code>	new label type
-----------------	----------------	----------------

See also

[Fl_Labeltype](#)

12.160.4.81 measure_label()

```
void Fl_Widget::measure_label (
    int & ww,
    int & hh ) const [inline]
```

Sets width `ww` and height `hh` accordingly with the label size.

Labels with images will return `w()` and `h()` of the image.

This calls [fl_measure\(\)](#) internally. For more information about the arguments `ww` and `hh` and word wrapping

See also

[fl_measure\(const char*, int&, int&, int\)](#)

12.160.4.82 needs_keyboard() [1/2]

```
bool Fl_Widget::needs_keyboard ( ) const [inline]
```

Returns whether this widget needs a keyboard.

Returns

true or false

See also

[needs_keyboard\(bool\)](#)

12.160.4.83 needs_keyboard() [2/2]

```
void Fl_Widget::needs_keyboard (
    bool needs ) [inline]
```

Sets whether this widget needs a keyboard.

Set this on touch screen devices if a widget needs a keyboard when it gets the focus.

Note

This flag can be set but is not yet **used** in FLTK 1.4.0. It is intended to be used in the future on real touch devices.

Parameters

<code>in</code>	<code>needs</code>	Set this to true or false
-----------------	--------------------	---------------------------

12.160.4.84 output()

```
unsigned int Fl_Widget::output ( ) const [inline]
```

Returns if a widget is used for output only.

[output\(\)](#) means the same as [!active\(\)](#) except it does not change how the widget is drawn. The widget will not receive any events. This is useful for making scrollbars or buttons that work as displays rather than input devices.

Return values

<code>0</code>	if the widget is used for input and output
----------------	--

See also

[set_output\(\)](#), [clear_output\(\)](#)

12.160.4.85 parent() [1/2]

```
Fl_Group * Fl_Widget::parent ( ) const [inline]
```

Returns a pointer to the parent widget.

Usually this is a [Fl_Group](#) or [Fl_Window](#).

Return values

<code>NULL</code>	if the widget has no parent
-------------------	-----------------------------

See also

[Fl_Group::add\(Fl_Widget*\)](#)

12.160.4.86 parent() [2/2]

```
void Fl_Widget::parent (
    Fl_Group * p ) [inline]
```

Internal use only - "for hacks only".

It is **STRONGLY recommended** not to use this method, because it short-circuits [Fl_Group](#)'s normal widget adding and removing methods, if the widget is already a child widget of another [Fl_Group](#).

Use [Fl_Group::add\(Fl_Widget*\)](#) and/or [Fl_Group::remove\(Fl_Widget*\)](#) instead.

12.160.4.87 position()

```
void Fl_Widget::position (
    int X,
    int Y ) [inline]
```

Repositions the window or widget.

`position(X, Y)` is a shortcut for `resize(X, Y, w(), h())`.

Parameters

<code>in</code>	<code>X, Y</code>	new position relative to the parent window
-----------------	-------------------	--

See also

[resize\(int,int,int,int\)](#), [size\(int,int\)](#)

12.160.4.88 redraw()

```
void Fl_Widget::redraw ( )
```

Schedules the drawing of the widget.

Marks the widget as needing its [draw\(\)](#) routine called.

12.160.4.89 redraw_label()

```
void Fl_Widget::redraw_label ( )
```

Schedules the drawing of the label.

Marks the widget or the parent as needing a redraw for the label area of a widget.

12.160.4.90 resize()

```
void Fl_Widget::resize (
```

```

    int x,
    int y,
    int w,
    int h ) [virtual]

```

Changes the size or position of the widget.

This is a virtual function so that the widget may implement its own handling of resizing. The default version does *not* call the `redraw()` method, but instead relies on the parent widget to do so because the parent may know a faster way to update the display, such as scrolling from the old position.

Some window managers under X11 call `resize()` a lot more often than needed. Please verify that the position or size of a widget did actually change before doing any extensive calculations.

position(X, Y) is a shortcut for `resize(X, Y, w(), h())`, and `size(W, H)` is a shortcut for `resize(x(), y(), W, H)`.

Parameters

in	<i>x,y</i>	new position relative to the parent window
in	<i>w,h</i>	new size

See also

[position\(int,int\)](#), [size\(int,int\)](#)

Reimplemented in [Fl_Browser_](#), [Fl_Flex](#), [Fl_Grid](#), [Fl_Input_Choice](#), [Fl_Pack](#), [Fl_Scroll](#), [Fl_Spinner](#), [Fl_Table](#), [Fl_Terminal](#), [Fl_Text_Display](#), [Fl_Tile](#), [Fl_Window](#), [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Group](#), [Fl_Help_View](#), [Fl_Input_](#), [Fl_Overlay_Window](#), [Fl_Tabs](#), [Fl_Tree](#), and [Fl_Value_Input](#).

12.160.4.91 selection_color() [1/2]

```
Fl_Color Fl_Widget::selection_color ( ) const [inline]
```

Gets the selection color.

Returns

the current selection color

See also

[selection_color\(Fl_Color\)](#), [color\(Fl_Color, Fl_Color\)](#)

12.160.4.92 selection_color() [2/2]

```
void Fl_Widget::selection_color (
    Fl_Color a ) [inline]
```

Sets the selection color.

The selection color is defined for Forms compatibility and is usually used to color the widget when it is selected, although some widgets use this color for other purposes. You can set both colors at once with [color\(Fl_Color bg, Fl_Color sel\)](#).

Parameters

in	<i>a</i>	the new selection color
----	----------	-------------------------

See also

[selection_color\(\)](#), [color\(Fl_Color, Fl_Color\)](#)

12.160.4.93 set_active()

```
void Fl_Widget::set_active ( ) [inline]
```

Marks the widget as active without sending events or changing focus. This is mainly for specialized use, for normal cases you want [activate\(\)](#).

See also

[activate\(\)](#)

12.160.4.94 [set_changed\(\)](#)

```
void Fl_Widget::set_changed ( ) [inline]
```

Marks the value of the widget as changed.

See also

[changed\(\)](#), [clear_changed\(\)](#)

12.160.4.95 [set_output\(\)](#)

```
void Fl_Widget::set_output ( ) [inline]
```

Sets a widget to output only.

See also

[output\(\)](#), [clear_output\(\)](#)

12.160.4.96 [set_visible\(\)](#)

```
void Fl_Widget::set_visible ( ) [inline]
```

Makes the widget visible.

You must still redraw the parent widget to see a change in the window. Normally you want to use the [show\(\)](#) method instead.

12.160.4.97 [set_visible_focus\(\)](#)

```
void Fl_Widget::set_visible_focus ( ) [inline]
```

Enables keyboard focus navigation with this widget.

Note, however, that this will not necessarily mean that the widget will accept focus, but for widgets that can accept focus, this method enables it if it has been disabled.

See also

[visible_focus\(\)](#), [clear_visible_focus\(\)](#), [visible_focus\(int\)](#)

12.160.4.98 [shortcut_label\(\)](#) [1/2]

```
int Fl_Widget::shortcut_label ( ) const [inline]
```

Returns whether the widget's label uses '&' to indicate shortcuts.

See also

[void shortcut_label\(int value\)](#)

12.160.4.99 [shortcut_label\(\)](#) [2/2]

```
void Fl_Widget::shortcut_label (
    int value ) [inline]
```

Sets whether the widget's label uses '&' to indicate shortcuts.

By default, all objects of classes [Fl_Menu_](#) (and derivatives), [Fl_Button](#) (and derivatives), [Fl_Text_Display](#), [Fl_Value_Input](#), and [Fl_Input_](#) (and derivatives) use character '&' in their label, unless '&' is repeated, to indicate shortcuts: '&' does not appear in the drawn label, the next character after '&' in the label is drawn underlined, and typing this character triggers the corresponding menu window, button, or other widget. If the label contains 2 consecutive '&', only one is drawn and the next character is not underlined and not used as a shortcut. If `value` is set to 0, all these labels don't process character '&' as indicating a shortcut: '&' is drawn in the label, the next character is not underlined and does not define a shortcut.

12.160.4.100 show()

```
void Fl_Widget::show ( ) [virtual]
```

Makes a widget visible.

An invisible widget never gets redrawn and does not get keyboard or mouse events, but can receive a few other events like FL_SHOW.

The [visible\(\)](#) method returns true if the widget is set to be visible. The [visible_r\(\)](#) method returns true if the widget and all of its parents are visible. A widget is only visible if [visible\(\)](#) is true on it *and all of its parents*.

Changing it will send FL_SHOW or FL_HIDE events to the widget. *Do not change it if the parent is not visible, as this will send false FL_SHOW or FL_HIDE events to the widget.* [redraw\(\)](#) is called if necessary on this or the parent.

See also

[hide\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented in [Fl_Browser](#), [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Overlay_Window](#), [Fl_Single_Window](#), and [Fl_Window](#).

12.160.4.101 size()

```
void Fl_Widget::size (
    int W,
    int H ) [inline]
```

Changes the size of the widget.

size(W, H) is a shortcut for [resize\(x\(\), y\(\), W, H\)](#).

Parameters

in	<i>W,H</i>	new size
----	------------	----------

See also

[position\(int,int\)](#), [resize\(int,int,int,int\)](#)

12.160.4.102 take_focus()

```
int Fl_Widget::take_focus ( )
```

Gives the widget the keyboard focus.

Tries to make this widget be the [Fl::focus\(\)](#) widget, by first sending it an FL_FOCUS event, and if it returns non-zero, setting [Fl::focus\(\)](#) to this widget. You should use this method to assign the focus to a widget.

Returns

true if the widget accepted the focus.

12.160.4.103 takeevents()

```
unsigned int Fl_Widget::takeevents ( ) const [inline]
```

Returns if the widget is able to take events.

This is the same as ([active\(\)](#) && ![output\(\)](#) && [visible\(\)](#)) but is faster.

Return values

0	if the widget takes no events
---	-------------------------------

12.160.4.104 test_shortcut() [1/2]

```
int Fl_Widget::test_shortcut ( )
```

Returns true if the widget's label contains the entered '&x' shortcut.

This method must only be called in [handle\(\)](#) methods or callbacks after a keypress event (usually FL_KEYDOWN or FL_SHORTCUT). The widget's label is searched for a '&x' shortcut, and if found, this is compared with the entered key value.

[Fl::event_text\(\)](#) is used to get the entered key value.

Returns

true, if the entered text matches the widget's '&x' shortcut, false (0) otherwise.

Note

Useful when a widget's [handle\(int\)](#) method needs dedicated processing of FL_SHORTCUT.

12.160.4.105 test_shortcut() [2/2]

```
int Fl_Widget::test_shortcut (
    const char * t,
    const bool require_alt = false ) [static]
```

Returns true if the given text *t* contains the entered '&x' shortcut.

This method must only be called in [handle\(\)](#) methods or callbacks after a keypress event (usually FL_KEYDOWN or FL_SHORTCUT). The given text *t* (usually a widget's label or menu text) is searched for a '&x' shortcut, and if found, this is compared with the entered key value.

[Fl::event_text\(\)](#) is used to get the entered key value. [Fl::event_state\(\)](#) is used to get the Alt modifier, if *require_alt* is true.

Parameters

<i>t</i>	text or label to search for '&x' shortcut.
<i>require_alt</i>	if true: match only if Alt key is pressed.

Returns

true, if the entered text matches the '&x' shortcut in *t* false (0) otherwise.

Note

Useful when a widget's [handle\(int\)](#) method needs dedicated processing of FL_SHORTCUT.

12.160.4.106 tooltip() [1/2]

```
const char * Fl_Widget::tooltip ( ) const [inline]
```

Gets the current tooltip text.

Returns

a pointer to the tooltip text or NULL

See also

[tooltip\(const char*\)](#), [copy_tooltip\(const char*\)](#)

12.160.4.107 tooltip() [2/2]

```
void Fl_Widget::tooltip (
    const char * text )
```

Sets the current tooltip text.

Sets a string of text to display in a popup tooltip window when the user hovers the mouse over the widget. The string is *not* copied, so make sure any formatted string is stored in a static, global, or allocated buffer. If you want a copy made and managed for you, use the [copy_tooltip\(\)](#) method, which will manage the tooltip string automatically. If no tooltip is set, the tooltip of the parent is inherited. Setting a tooltip for a group and setting no tooltip for a child will show the group's tooltip instead. To avoid this behavior, you can set the child's tooltip to an empty string ("").

Parameters

in	<i>text</i>	New tooltip text (no copy is made)
----	-------------	------------------------------------

See also

[copy_tooltip\(const char*\)](#), [tooltip\(\)](#)

12.160.4.108 top_window()

```
Fl_Window * Fl_Widget::top_window ( ) const
```

Returns a pointer to the top-level window for the widget.

In other words, the 'window manager window' that contains this widget. This method differs from [window\(\)](#) in that it won't return sub-windows (if there are any).

Returns

the top-level window, or NULL if no top-level window is associated with this widget.

See also

[window\(\)](#)

12.160.4.109 top_window_offset()

```
Fl_Window * Fl_Widget::top_window_offset (
    int & xoff,
    int & yoff ) const
```

Finds the x/y offset of the current widget relative to the top-level window.

Parameters

out	<i>xoff,yoff</i>	Returns the x/y offset
-----	------------------	------------------------

Returns

the top-level window (or NULL for a widget that's not in any window)

12.160.4.110 type() [1/2]

```
uchar Fl_Widget::type ( ) const [inline]
```

Gets the widget type.

Returns the widget type value, which gives some information about the derived widget class to which the object belongs. Noticeably, the condition `type() >= FL_WINDOW` indicates a widget is an [Fl_Window](#) or derived object.

12.160.4.111 type() [2/2]

```
void Fl_Widget::type (
    uchar t ) [inline]
```

Sets the widget type.

See also

[type\(\)](#)

12.160.4.112 user_data()

```
void * Fl_Widget::user_data ( ) const [inline]
```

Gets the user data for this widget.

Gets the current user data (void *) argument that is passed to the callback function.

Returns

user data as a pointer

12.160.4.113 visible()

```
unsigned int Fl_Widget::visible ( ) const [inline]
```

Returns whether a widget is visible.

Return values

0	if the widget is not drawn and hence invisible.
---	---

See also

[show\(\)](#), [hide\(\)](#), [visible_r\(\)](#)

12.160.4.114 visible_focus() [1/2]

```
unsigned int Fl_Widget::visible_focus ( ) const [inline]
```

Checks whether this widget has a visible focus.

Return values

0	if this widget has no visible focus.
---	--------------------------------------

See also

[visible_focus\(int\)](#), [set_visible_focus\(\)](#), [clear_visible_focus\(\)](#)

12.160.4.115 visible_focus() [2/2]

```
void Fl_Widget::visible_focus (
    int v ) [inline]
```

Modifies keyboard focus navigation.

Parameters

in	v	set or clear visible focus
----	---	----------------------------

See also

[set_visible_focus\(\)](#), [clear_visible_focus\(\)](#), [visible_focus\(\)](#)

12.160.4.116 visible_r()

```
int Fl_Widget::visible_r ( ) const
```

Returns whether a widget and all its parents are visible.

Return values

0	if the widget or any of its parents are invisible.
---	--

See also

[show\(\)](#), [hide\(\)](#), [visible\(\)](#)

12.160.4.117 w() [1/2]

```
int Fl_Widget::w ( ) const [inline]
```

Gets the widget width.

Returns

the width of the widget in pixels.

12.160.4.118 w() [2/2]

```
void Fl_Widget::w (
    int v ) [inline], [protected]
```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

12.160.4.119 when() [1/2]

```
Fl_When Fl_Widget::when ( ) const [inline]
```

Returns the conditions under which the callback is called.

You can set the flags with [when\(uchar\)](#), the default value is FL_WHEN_RELEASE.

Returns

set of flags

See also

[when\(uchar\)](#), [Fl_When](#), [do_callback\(\)](#), [Fl::callback_reason\(\)](#)

12.160.4.120 when() [2/2]

```
void Fl_Widget::when (
    uchar i ) [inline]
```

Sets the flags used to decide when a callback is called.

This controls when callbacks are done. The following values are useful, the default value is FL_WHEN_RELEASE:

- 0: The callback is not done, but [changed\(\)](#) is turned on.
- FL_WHEN_CHANGED: The callback is done each time the text is changed by the user.
- FL_WHEN_RELEASE: The callback will be done when this widget loses the focus, including when the window is unmapped. This is a useful value for text fields in a panel where doing the callback on every change is wasteful. However the callback will also happen if the mouse is moved out of the window, which means it should not do anything visible (like pop up an error message). You might do better setting this to zero, and scanning all the items for [changed\(\)](#) when the OK button on a panel is pressed.
- FL_WHEN_ENTER_KEY: If the user types the Enter key, the entire text is selected, and the callback is done if the text has changed. Normally the Enter key will navigate to the next field (or insert a newline for a [Fl_Multiline_Input](#)) - this changes the behavior.

- `FL_WHEN_ENTER_KEY|FL_WHEN_NOT_CHANGED`: The Enter key will do the callback even if the text has not changed. Useful for command fields.
- `FL_WHEN_CLOSED` : If the user requests that the widget is closed, the callback is called with `FL_REASON_CLOSED`. The `Fl_Tabs` widget checks this flag on its children to determine whether to display a close button on the tab of that widget.

`Fl_Widget::when()` is a set of bitflags used by subclasses of `Fl_Widget` to decide when to do the callback. If the value is zero then the callback is never done. Other values are described in the individual widgets. This field is in the base class so that you can scan a panel and `do_callback()` on all the ones that don't do their own callbacks in response to an "OK" button.

Parameters

in	<i>i</i>	set of flags
----	----------	--------------

See also

[Fl_When](#), [do_callback\(\)](#), [Fl::callback_reason\(\)](#)

12.160.4.121 window()

```
Fl_Window * Fl_Widget::window ( ) const
```

Returns a pointer to the nearest parent window up the widget hierarchy.

This will return sub-windows if there are any, or the parent window if there's no sub-windows. If this widget IS the top-level window, NULL is returned.

Return values

NULL	if no window is associated with this widget.
------	--

Note

for an `Fl_Window` widget, this returns its *parent* window (if any), not *this* window.

See also

[top_window\(\)](#)

12.160.4.122 x() [1/2]

```
int Fl_Widget::x ( ) const [inline]
```

Gets the widget position in its window.

Returns

the x position relative to the window

12.160.4.123 x() [2/2]

```
void Fl_Widget::x (
    int v ) [inline], [protected]
```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

12.160.4.124 `y()` [1/2]

```
int Fl_Widget::y ( ) const [inline]
```

Gets the widget position in its window.

Returns

the y position relative to the window

12.160.4.125 `y()` [2/2]

```
void Fl_Widget::y (
    int v ) [inline], [protected]
```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

The documentation for this class was generated from the following files:

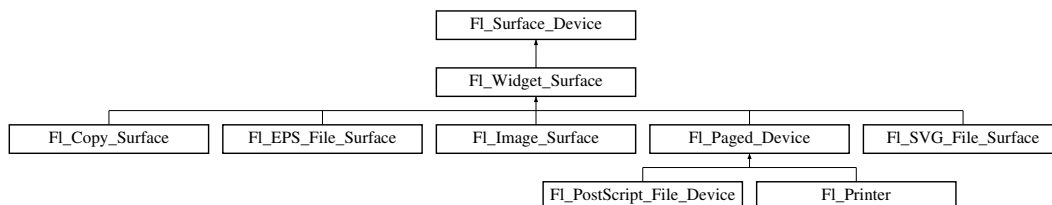
- [Fl_Widget.H](#)
- [Fl.cxx](#)
- [fl_boxtype.cxx](#)
- [fl_labeltype.cxx](#)
- [fl_shortcut.cxx](#)
- [Fl_Tooltip.cxx](#)
- [Fl_Widget.cxx](#)
- [Fl_Window.cxx](#)

12.161 `Fl_Widget_Surface` Class Reference

A surface on which any FLTK widget can be drawn.

```
#include <Fl_Widget_Surface.H>
```

Inheritance diagram for `Fl_Widget_Surface`:

**Public Member Functions**

- void [draw](#) ([Fl_Widget](#) *widget, int delta_x=0, int delta_y=0)

Draws the widget on the drawing surface.
- void [draw_decorated_window](#) ([Fl_Window](#) *win, int x_offset=0, int y_offset=0)

Draws a window with its title bar and frame if any.
- virtual void [origin](#) (int *x, int *y)

Computes the coordinates of the current origin of graphics functions.
- virtual void [origin](#) (int x, int y)

Sets the position of the origin of graphics in the drawable part of the drawing surface.
- void [print_window_part](#) ([Fl_Window](#) *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)

Draws a rectangular part of an on-screen window.
- virtual int [printable_rect](#) (int *w, int *h)

Computes the width and height of the drawable area of the drawing surface.
- virtual void [translate](#) (int x, int y)

Translates the current graphics origin accounting for the current rotation.
- virtual void [untranslate](#) ()

Undoes the effect of a previous [translate\(\)](#) call.

Public Member Functions inherited from [Fl_Surface_Device](#)

- `Fl_Graphics_Driver * driver ()`
Returns the graphics driver of this drawing surface.
- virtual `bool is_current ()`
Is this surface the current drawing surface?
- virtual `void set_current (void)`
Make this surface the current drawing surface.
- virtual `~Fl_Surface_Device ()`
The destructor.

Protected Member Functions

- `Fl_Widget_Surface (Fl_Graphics_Driver *d)`
The constructor.

Protected Member Functions inherited from [Fl_Surface_Device](#)

- `void driver (Fl_Graphics_Driver *graphics_driver)`
Sets the graphics driver of this drawing surface.
- virtual `void end_current ()`
FLTK calls this each time a surface ceases to be the current drawing surface.
- `Fl_Surface_Device (Fl_Graphics_Driver *graphics_driver)`
Constructor that sets the graphics driver to use for the created surface.

Protected Attributes

- `int x_offset`
horizontal offset to the origin of graphics coordinates
- `int y_offset`
vertical offset to the origin of graphics coordinates

Additional Inherited Members

Static Public Member Functions inherited from [Fl_Surface_Device](#)

- static `Fl_Surface_Device * pop_current ()`
Removes the top element from the current drawing surface stack, and makes the new top element current.
- static `void push_current (Fl_Surface_Device *new_current)`
Pushes new_current on top of the stack of current drawing surfaces, and makes it current.
- static `Fl_Surface_Device * surface ()`
The current drawing surface.

12.161.1 Detailed Description

A surface on which any FLTK widget can be drawn.

12.161.2 Constructor & Destructor Documentation

12.161.2.1 Fl_Widget_Surface()

```
Fl_Widget_Surface::Fl_Widget_Surface (
    Fl_Graphics_Driver * d ) [protected]
```

The constructor.

Parameters

<i>d</i>	can be nul.
----------	-------------

12.161.3 Member Function Documentation**12.161.3.1 draw()**

```
void Fl_Widget_Surface::draw (
    Fl_Widget * widget,
    int delta_x = 0,
    int delta_y = 0 )
```

Draws the widget on the drawing surface.

The widget's position on the surface is determined by the last call to [origin\(\)](#) and by the optional `delta_x` and `delta_y` arguments. Its dimensions are in points unless there was a previous call to [scale\(\)](#).

Parameters

in	<i>widget</i>	Any FLTK widget (e.g., standard, custom, window).
in	<i>delta_x, delta_y</i>	Optional horizontal and vertical offsets for positioning the widget top left relatively to the current origin of graphics.

12.161.3.2 draw_decorated_window()

```
void Fl_Widget_Surface::draw_decorated_window (
    Fl_Window * win,
    int win_offset_x = 0,
    int win_offset_y = 0 )
```

Draws a window with its title bar and frame if any.

`win_offset_x` and `win_offset_y` are optional coordinates of where to position the window top left. Equivalent to [draw\(\)](#) if `win` is a subwindow or has no border. Use [Fl_Window::decorated_w\(\)](#) and [Fl_Window::decorated_h\(\)](#) to get the size of the framed window.

12.161.3.3 origin() [1/2]

```
void Fl_Widget_Surface::origin (
    int * x,
    int * y ) [virtual]
```

Computes the coordinates of the current origin of graphics functions.

Parameters

out	<i>x,y</i>	If non-null, <code>*x</code> and <code>*y</code> are set to the horizontal and vertical coordinates of the graphics origin.
-----	------------	---

Reimplemented in [Fl_EPS_File_Surface](#), [Fl_Copy_Surface](#), [Fl_Image_Surface](#), [Fl_PostScript_File_Device](#), [Fl_Printer](#), and [Fl_SVG_File_Surface](#).

12.161.3.4 origin() [2/2]

```
void Fl_Widget_Surface::origin (
    int x,
    int y ) [virtual]
```

Sets the position of the origin of graphics in the drawable part of the drawing surface.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the drawable area. Successive [origin\(\)](#) calls don't combine their effects. [Origin\(\)](#) calls are not affected by [rotate\(\)](#) calls (for classes derived

from [Fl_Paged_Device](#)).

Parameters

<code>in</code>	<code>x,y</code>	Horizontal and vertical positions in the drawing surface of the desired origin of graphics.
-----------------	------------------	---

Reimplemented in [Fl_Copy_Surface](#), [Fl_Image_Surface](#), [Fl_PostScript_File_Device](#), [Fl_EPS_File_Surface](#), [Fl_Printer](#), and [Fl_SVG_File_Surface](#).

12.161.3.5 print_window_part()

```
void Fl_Widget_Surface::print_window_part (
    Fl_Window * win,
    int x,
    int y,
    int w,
    int h,
    int delta_x = 0,
    int delta_y = 0 )
```

Draws a rectangular part of an on-screen window.

Parameters

<i>win</i>	The window from where to capture. Can be an Fl_Gl_Window . Sub-windows that intersect the rectangle are also captured.
<i>x</i>	The rectangle left
<i>y</i>	The rectangle top
<i>w</i>	The rectangle width
<i>h</i>	The rectangle height
<i>delta_x, delta_y</i>	Optional horizontal and vertical offsets from current graphics origin where to draw the top left of the captured rectangle.

12.161.3.6 printable_rect()

```
int Fl_Widget_Surface::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the drawable area of the drawing surface.

Values are in the same unit as that used by FLTK drawing functions and are unchanged by calls to [origin\(\)](#). If the object is derived from class [Fl_Paged_Device](#), values account for the user-selected paper type and print orientation and are changed by [scale\(\)](#) calls.

Returns

0 if OK, non-zero if any error

Reimplemented in [Fl_Copy_Surface](#), [Fl_Image_Surface](#), [Fl_PostScript_File_Device](#), [Fl_EPS_File_Surface](#), [Fl_Printer](#), and [Fl_SVG_File_Surface](#).

12.161.3.7 translate()

```
void Fl_Widget_Surface::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call. Successive [translate\(\)](#) calls add up their effects.

Reimplemented in [Fl_Copy_Surface](#), [Fl_Image_Surface](#), [Fl_PostScript_File_Device](#), [Fl_EPS_File_Surface](#), [Fl_Printer](#), and [Fl_SVG_File_Surface](#).

12.161.3.8 untranslate()

```
void Fl_Widget_Surface::untranslate (
    void ) [virtual]
```

Undoes the effect of a previous [translate\(\)](#) call.

Reimplemented in [Fl_Copy_Surface](#), [Fl_Image_Surface](#), [Fl_EPS_File_Surface](#), [Fl_SVG_File_Surface](#), [Fl_PostScript_File_Device](#), and [Fl_Printer](#).

The documentation for this class was generated from the following files:

- [Fl_Widget_Surface.H](#)
- [Fl_Widget_Surface.cxx](#)

12.162 Fl_Widget_Tracker Class Reference

This class should be used to control safe widget deletion.

```
#include <Fl.H>
```

Public Member Functions

- [int deleted \(\)](#)
Returns 1, if the watched widget has been deleted.
- [int exists \(\)](#)
Returns 1, if the watched widget exists (has not been deleted).
- [Fl_Widget_Tracker \(Fl_Widget *wi\)](#)
The constructor adds a widget to the watch list.
- [Fl_Widget * widget \(\)](#)
Returns a pointer to the watched widget.
- [~Fl_Widget_Tracker \(\)](#)
The destructor removes a widget from the watch list.

12.162.1 Detailed Description

This class should be used to control safe widget deletion.

You can use an [Fl_Widget_Tracker](#) object to watch another widget, if you need to know whether this widget has been deleted during a callback.

This simplifies the use of the "safe widget deletion" methods [Fl::watch_widget_pointer\(\)](#) and [Fl::release_widget_pointer\(\)](#) and makes their use more reliable, because the destructor automatically releases the widget pointer from the widget watch list.

[Fl_Widget_Tracker](#) is intended to be used as an automatic (local/stack) variable, such that its destructor is called when the object's scope is left. This ensures that no stale widget pointers are left in the widget watch list (see example below).

You can also create [Fl_Widget_Tracker](#) objects with `new`, but then it is your responsibility to delete the object (and thus remove the widget pointer from the watch list) when it is no longer needed.

Example:

```
int MyClass::handle (int event) {

    if (...) {
        Fl_Widget_Tracker wp(this);           // watch myself
        do_callback();                         // call the callback

        if (wp.deleted()) return 1;           // exit, if deleted

        // Now we are sure that the widget has not been deleted,
        // and it is safe to access the widget:

        box(FL_FLAT_BOX);
        color(FL_WHITE);
        redraw();
    }
}
```


12.162.2 Member Function Documentation

12.162.2.1 deleted()

```
int Fl_Widget_Tracker::deleted ( ) [inline]
```

Returns 1, if the watched widget has been deleted.

This is a convenience method. You can also use something like

```
if (wp.widget() == 0) // ...
```

where `wp` is an [Fl_Widget_Tracker](#) object.

12.162.2.2 exists()

```
int Fl_Widget_Tracker::exists ( ) [inline]
```

Returns 1, if the watched widget exists (has not been deleted).

This is a convenience method. You can also use something like

```
if (wp.widget() != 0) // ...
```

where `wp` is an [Fl_Widget_Tracker](#) object.

12.162.2.3 widget()

```
Fl_Widget * Fl_Widget_Tracker::widget ( ) [inline]
```

Returns a pointer to the watched widget.

This pointer is NULL, if the widget has been deleted.

The documentation for this class was generated from the following files:

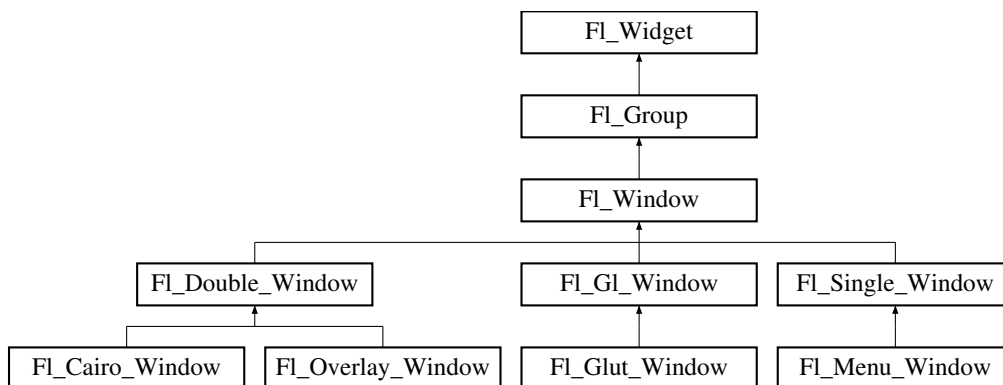
- [Fl.H](#)
- [Fl.cxx](#)

12.163 Fl_Window Class Reference

This widget produces an actual window.

```
#include <Fl_Window.H>
```

Inheritance diagram for `Fl_Window`:



Public Types

- typedef struct HICON__ * **HICON**

Public Member Functions

- virtual class [Fl_Double_Window](#) * [as_double_window](#) ()
Return non-null if this is an [Fl_Double_Window](#) object.
- virtual class [Fl_Overlay_Window](#) * [as_overlay_window](#) ()
Return non-null if this is an [Fl_Overlay_Window](#) object.
- [Fl_Window](#) const * [as_window](#) () const [FL_OVERRIDE](#)

- [FI_Window](#) * [as_window](#) () [FL_OVERRIDE](#)
Returns an [FI_Window](#) pointer if this widget is an [FI_Window](#).
- unsigned int **border** () const
Returns whether the window possesses a border.
- void [border](#) (int b)
Sets whether or not the window manager border is around the window.
- void [clear_border](#) ()
Fast inline function to turn the window manager border off.
- void [clear_modal_states](#) ()
Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.
- void **copy_label** (const char *a)
Sets the window titlebar label to a copy of a character string.
- void [cursor](#) (const [FI_RGB_Image](#) *, int, int)
Changes the cursor for this window using the provided image as cursor's shape.
- void [cursor](#) ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void [cursor](#) ([FI_Cursor](#))
Changes the cursor for this window.
- int [decorated_h](#) () const
Returns the window height including any window title bar and any frame added by the window manager.
- int [decorated_w](#) () const
Returns the window width including any frame added by the window manager.
- void [default_cursor](#) ([FI_Cursor](#) c, [FI_Color](#), [FI_Color](#)=[FL_WHITE](#))
For back compatibility only.
- void [default_cursor](#) ([FI_Cursor](#))
Sets the default window cursor.
- void **draw_backdrop** ()
Draw the background image if one is set and is aligned inside.
- [FI_Window](#) (int w, int h, const char *title=0)
Creates a window from the given width w, height h, and title.
- [FI_Window](#) (int x, int y, int w, int h, const char *title=0)
Creates a window from the given position (x, y), size (w, h) and title.
- void [free_position](#) ()
Undoes the effect of a previous [resize\(\)](#) or [show\(\)](#) so that the next time [show\(\)](#) is called the window manager is free to position the window.
- void [fullscreen](#) ()
Makes the window completely fill one or more screens, without any window manager border visible.
- unsigned int **fullscreen_active** () const
Returns non zero if [FULLSCREEN](#) flag is set, 0 otherwise.
- void **fullscreen_off** ()
Turns off any side effects of [fullscreen\(\)](#)
- void **fullscreen_off** (int X, int Y, int W, int H)
Turns off any side effects of [fullscreen\(\)](#) and does [resize\(x,y,w,h\)](#).
- void [fullscreen_screens](#) (int top, int bottom, int left, int right)
Sets which screens should be used when this window is in fullscreen mode.
- int [handle](#) (int) [FL_OVERRIDE](#)
Handles the specified event.
- void [hide](#) () [FL_OVERRIDE](#)
Removes the window from the screen.
- void **hotspot** (const [FI_Widget](#) &p, int offscreen=0)
See void [FI_Window::hotspot](#)(int x, int y, int offscreen = 0)

- void **hotspot** (const [FL_Widget](#) *, int offscreen=0)
See void [FL_Window::hotspot](#)(int x, int y, int offscreen = 0)
- void **hotspot** (int x, int y, int offscreen=0)
Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.
- const void * **icon** () const
Gets the current icon window target dependent data.
- void **icon** (const [FL_RGB_Image](#) *)
Sets or resets a single window icon.
- void **icon** (const void *ic)
Platform-specific method to set the window icon usable on Windows and X11 only.
- void **iconize** ()
Iconifies the window.
- const char * **iconlabel** () const
See void [FL_Window::iconlabel](#)(const char)*
- void **iconlabel** (const char *)
Sets the icon label.
- void **icons** (const [FL_RGB_Image](#) *[], int)
Sets the window icons.
- void **icons** (HICON big_icon, HICON small_icon)
Sets the window icons using HICON handles (Windows platform only).
- const char * **label** () const
See void [FL_Window::label](#)(const char)*
- void **label** (const char *)
Sets the window title bar label.
- void **label** (const char *label, const char *iconlabel)
Sets the icon label.
- void **make_current** ()
Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.
- void **maximize** ()
Maximizes a top-level window to its current screen.
- unsigned int **maximize_active** () const
Returns whether the window is currently maximized.
- unsigned int **menu_window** () const
Returns true if this window is a menu window.
- unsigned int **modal** () const
Returns true if this window is modal.
- unsigned int **non_modal** () const
Returns true if this window is modal or non-modal.
- [fl_uintptr_t](#) **os_id** ()
Returns a platform-specific identification of a shown window, or 0 if not shown.
- unsigned int **override** () const
Returns non zero if `OVERRIDE` flag is set, 0 otherwise.
- void **resize** (int X, int Y, int W, int H) [FL_OVERRIDE](#)
Changes the size and position of the window.
- int **screen_num** ()
The number of the screen containing the mapped window.
- void **screen_num** (int screen_num)
Set the number of the screen where to map the window.

- void [set_menu_window](#) ()
Marks the window as a menu window.
- void [set_modal](#) ()
A "modal" window, when [shown\(\)](#), will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).
- void [set_non_modal](#) ()
A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.
- void [set_override](#) ()
Activates the flags NOBORDER|OVERRIDE.
- void [set_tooltip_window](#) ()
Marks the window as a tooltip window.
- const [FI_Image](#) * [shape](#) ()
Returns the image controlling the window shape or NULL.
- void [shape](#) (const [FI_Image](#) &b)
Set the window's shape with an [FI_Image](#).
- void [shape](#) (const [FI_Image](#) *img)
Assigns a non-rectangular shape to the window.
- void [show](#) () [FL_OVERRIDE](#)
Puts the window on the screen.
- void [show](#) (int argc, char **argv)
Puts the window on the screen with [show\(\)](#) and parses command-line arguments.
- int [shown](#) ()
Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).
- void [size_range](#) (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)
Sets the allowable range the user can resize this window to.
- unsigned int [tooltip_window](#) () const
Returns true if this window is a tooltip window.
- void [un_maximize](#) ()
Returns a previously maximized top-level window to its previous size.
- void [wait_for_expose](#) ()
Waits for the window to be displayed after calling [show\(\)](#).
- int [x_root](#) () const
Gets the x position of the window on the screen.
- const char * [xclass](#) () const
Returns the xclass for this window, or a default.
- void [xclass](#) (const char *c)
Sets the xclass for this window.
- int [y_root](#) () const
Gets the y position of the window on the screen.
- virtual [~FI_Window](#) ()
The destructor also deletes all the children.

Public Member Functions inherited from [FI_Group](#)

- [FI_Widget](#) *& [_ddfdesign_kludge](#) ()
This is for forms compatibility only.
- void [add](#) ([FI_Widget](#) &)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add](#) ([FI_Widget](#) *o)
See void [FI_Group::add\(FI_Widget &w\)](#)

- void **add_resizable** (FL_Widget &o)
Adds a widget to the group and makes it the resizable widget.
- FL_Widget *const * **array** () const
Returns a pointer to the array of children.
- FL_Group const * **as_group** () const FL_OVERRIDE
- FL_Group * **as_group** () FL_OVERRIDE
Returns an FL_Group pointer if this widget is an FL_Group.
- void **begin** ()
Sets the current group so you can build the widget tree by just constructing the widgets.
- FL_Widget * **child** (int n) const
Returns array()[n].
- int **children** () const
Returns how many child widgets the group has.
- void **clear** ()
Deletes all child widgets from memory recursively.
- unsigned int **clip_children** ()
Returns the current clipping mode.
- void **clip_children** (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- virtual int **delete_child** (int n)
Removes the widget at index from the group and deletes it.
- void **end** ()
Exactly the same as current(this->parent()).
- int **find** (const FL_Widget &o) const
*See int FL_Group::find(const FL_Widget *w) const.*
- int **find** (const FL_Widget *) const
Searches the child array for the widget and returns the index.
- FL_Group (int, int, int, int, const char * =0)
Creates a new FL_Group widget using the given position, size, and label string.
- void **focus** (FL_Widget *W)
- void **forms_end** ()
This is for forms compatibility only.
- void **init_sizes** ()
Resets the internal array of widget sizes and positions.
- void **insert** (FL_Widget &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void **insert** (FL_Widget &o, FL_Widget *before)
This does insert(w, find(before)).
- void **remove** (FL_Widget &)
Removes a widget from the group but does not delete it.
- void **remove** (FL_Widget *o)
Removes the widget o from the group.
- void **remove** (int index)
Removes the widget at index from the group but does not delete it.
- FL_Widget * **resizable** () const
Returns the group's resizable widget.
- void **resizable** (FL_Widget &o)
Sets the group's resizable widget.
- void **resizable** (FL_Widget *o)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- virtual ~FL_Group ()
The destructor also deletes all the children.

Public Member Functions inherited from [FI_Widget](#)

- void [_clear_fullscreen](#) ()
- void [_set_fullscreen](#) ()
- void [activate](#) ()
 - Activates the widget.*
- unsigned int [active](#) () const
 - Returns whether the widget is active.*
- int [active_r](#) () const
 - Returns whether the widget and all of its parents are active.*
- [FI_Align align](#) () const
 - Gets the label alignment.*
- void [align](#) ([FI_Align alignment](#))
 - Sets the label alignment.*
- long [argument](#) () const
 - Gets the current user data (long) argument that is passed to the callback function.*
- void [argument](#) (long v)
 - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class [FI_Gl_Window](#) * [as_gl_window](#) ()
 - Returns an [FI_Gl_Window](#) pointer if this widget is an [FI_Gl_Window](#).*
- virtual class [FI_Gl_Window](#) const * [as_gl_window](#) () const
- void [bind_deimage](#) ([FI_Image *img](#))
 - Sets the image to use as part of the widget label when in the inactive state.*
- void [bind_deimage](#) (int f)
 - Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.*
- void [bind_image](#) ([FI_Image *img](#))
 - Sets the image to use as part of the widget label when in the active state.*
- void [bind_image](#) (int f)
 - Bind the image to the widget, so the widget will delete the image when it is no longer needed.*
- [FI_Boxtype box](#) () const
 - Gets the box type of the widget.*
- void [box](#) ([FI_Boxtype new_box](#))
 - Sets the box type for the widget.*
- [FI_Callback_p callback](#) () const
 - Gets the current callback function for the widget.*
- void [callback](#) ([FI_Callback *cb](#))
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback *cb](#), [FI_Callback_User_Data *p](#), bool auto_free)
 - Sets the current callback function and managed user data for the widget.*
- void [callback](#) ([FI_Callback *cb](#), void *p)
 - Sets the current callback function and data for the widget.*
- void [callback](#) ([FI_Callback0 *cb](#))
 - Sets the current callback function for the widget.*
- void [callback](#) ([FI_Callback1 *cb](#), long p=0)
 - Sets the current callback function for the widget.*
- unsigned int [changed](#) () const
 - Checks if the widget value changed since the last callback.*
- void [clear_active](#) ()
 - Marks the widget as inactive without sending events or changing focus.*
- void [clear_changed](#) ()
 - Marks the value of the widget as unchanged.*

- void `clear_damage` (`uchar c=0`)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color color` () const
Gets the background color of the widget.
- void `color` (`FI_Color bg`)
Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)
Sets the background and selection color of the widget.
- `FI_Color color2` () const
For back compatibility only.
- void `color2` (`unsigned a`)
For back compatibility only.
- int `contains` (`const FI_Widget *w`) const
Checks if w is a child of this widget.
- void `copy_label` (`const char *new_label`)
Sets the current label.
- void `copy_tooltip` (`const char *text`)
Sets the current tooltip text.
- `uchar damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, `int x`, `int y`, `int w`, `int h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (`int`, `int`, `int`, `int`)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- int `deimage_bound` () const
Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget *widget`, `long arg`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget *widget`, `void *arg=0`, `FI_Callback_Reason reason=FL_REASON_UNKNOWN`)
Calls the widget callback function with arbitrary arguments.
- void `draw_label` (`int`, `int`, `int`, `int`, `FI_Align`) const

- Draws the label in an arbitrary bounding box with an arbitrary alignment.*

 - int `h` () const
 - Gets the widget height.*
 - `FI_Image * image` ()
 - Gets the image that is used as part of the widget label when in the active state.*
 - const `FI_Image * image` () const
 - Gets the image that is used as part of the widget label when in the active state.*
 - void `image` (`FI_Image &img`)
 - Sets the image to use as part of the widget label when in the active state.*
 - void `image` (`FI_Image *img`)
 - Sets the image to use as part of the widget label when in the active state.*
 - int `image_bound` () const
 - Returns whether the image is managed by the widget.*
 - int `inside` (const `FI_Widget *wgt`) const
 - Checks if this widget is a child of `wgt`.*
 - int `is_label_copied` () const
 - Returns whether the current label was assigned with `copy_label()`.*
 - const char * `label` () const
 - Gets the current label text.*
 - void `label` (const char *text)
 - Sets the current label pointer.*
 - void `label` (`FI_Labeltype a`, const char *b)
 - Shortcut to set the label text and type in one call.*
 - `FI_Color labelcolor` () const
 - Gets the label color.*
 - void `labelcolor` (`FI_Color c`)
 - Sets the label color.*
 - `FI_Font labelfont` () const
 - Gets the font to use.*
 - void `labelfont` (`FI_Font f`)
 - Sets the font to use.*
 - `FI_Fontsize labelsize` () const
 - Gets the font size in pixels.*
 - void `labelsize` (`FI_Fontsize pix`)
 - Sets the font size in pixels.*
 - `FI_Labeltype labeltype` () const
 - Gets the label type.*
 - void `labeltype` (`FI_Labeltype a`)
 - Sets the label type.*
 - void `measure_label` (int &ww, int &hh) const
 - Sets width `ww` and height `hh` accordingly with the label size.*
 - bool `needs_keyboard` () const
 - Returns whether this widget needs a keyboard.*
 - void `needs_keyboard` (bool needs)
 - Sets whether this widget needs a keyboard.*
 - unsigned int `output` () const
 - Returns if a widget is used for output only.*
 - `FI_Group * parent` () const
 - Returns a pointer to the parent widget.*
 - void `parent` (`FI_Group *p`)
 - Internal use only - "for hacks only".*

- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `Fl_Color selection_color` () const
Gets the selection color.
- void `selection_color` (`Fl_Color` a)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `Fl_Window * top_window` () const
Returns a pointer to the top-level window for the widget.
- `Fl_Window * top_window_offset` (int &xoff, int &yoff) const
Finds the x/y offset of the current widget relative to the top-level window.
- `uchar type` () const
Gets the widget type.
- void `type` (`uchar` t)
Sets the widget type.
- int `use_accents_menu` ()
Returns non zero if `MAC_USE_ACCENTS_MENU` flag is set, 0 otherwise.
- void * `user_data` () const
Gets the user data for this widget.
- void `user_data` (`Fl_Callback_User_Data` *v, bool auto_free)
Sets the user data for this widget.
- void `user_data` (void *v)

- Sets the user data for this widget.*
- unsigned int `visible` () const
 - Returns whether a widget is visible.*
- unsigned int `visible_focus` () const
 - Checks whether this widget has a visible focus.*
- void `visible_focus` (int v)
 - Modifies keyboard focus navigation.*
- int `visible_r` () const
 - Returns whether a widget and all its parents are visible.*
- int `w` () const
 - Gets the widget width.*
- `FI_When` `when` () const
 - Returns the conditions under which the callback is called.*
- void `when` (uchar i)
 - Sets the flags used to decide when a callback is called.*
- `FI_Window` * `window` () const
 - Returns a pointer to the nearest parent window up the widget hierarchy.*
- int `x` () const
 - Gets the widget position in its window.*
- int `y` () const
 - Gets the widget position in its window.*
- virtual `~FI_Widget` ()
 - Destroys the widget.*

Static Public Member Functions

- static `FI_Window` * `current` ()
 - Returns the last window that was made current.*
- static void `default_callback` (`FI_Window` *, void *v)
 - Back compatibility: Sets the default callback v for win to call on close event.*
- static void `default_icon` (const `FI_RGB_Image` *)
 - Sets a single default window icon.*
- static void `default_icons` (const `FI_RGB_Image` *[], int)
 - Sets the default window icons.*
- static void `default_icons` (HICON big_icon, HICON small_icon)
 - Sets the default window icons (Windows platform only).*
- static const char * `default_xclass` ()
 - Returns the default xclass.*
- static void `default_xclass` (const char *)
 - Sets the default window xclass.*
- static bool `is_a_rescale` ()
 - Returns true when a window is being rescaled.*
- static char `show_next_window_iconic` ()
 - Returns the static flag whether the next window should be opened iconified.*
- static void `show_next_window_iconic` (char stat)
 - Sets a static flag whether the next window should be opened iconified.*

Static Public Member Functions inherited from `FI_Group`

- static `FI_Group` * `current` ()
 - Returns the currently active group.*
- static void `current` (`FI_Group` *g)
 - Sets the current group.*

Static Public Member Functions inherited from FI_Widget

- static void `default_callback` (`FI_Widget *widget`, `void *data`)
The default callback for all widgets that don't set a callback.
- static unsigned int `label_shortcut` (`const char *t`)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int `test_shortcut` (`const char *`, `const bool require_alt=false`)
*Returns true if the given text *t* contains the entered '&x' shortcut.*

Protected Member Functions

- void `default_size_range` ()
Protected method to calculate the default size range of a window.
- void `draw` () `FL_OVERRIDE`
Draws the widget.
- virtual void `flush` ()
Forces the window to be drawn, this window is also made current and calls `draw()`.
- int `force_position` () `const`
Returns the internal state of the window's `FORCE_POSITION` flag.
- void `force_position` (`int force`)
Sets an internal flag that tells FLTK and the window manager to honor position requests.
- void `free_icons` ()
Deletes all icons previously attached to the window.
- int `is_resizable` ()
Protected method to determine whether a window is resizable.

Protected Member Functions inherited from FI_Group

- `FI_Rect *` `bounds` ()
Returns the internal array of widget sizes and positions.
- void `draw_child` (`FI_Widget &widget`) `const`
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (`const FI_Widget &widget`) `const`
Parents normally call this to draw outside labels of child widgets.
- virtual int `on_insert` (`FI_Widget *`, `int`)
Allow derived groups to act when a widget is added as a child.
- virtual int `on_move` (`int`, `int`)
Allow derived groups to act when a widget is moved within the group.
- virtual void `on_remove` (`int`)
Allow derived groups to act when a child widget is removed from the group.
- `int *` `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`FI_Widget &widget`) `const`
Draws a child only if it needs it.

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
Clears a flag in the flags mask.
- void **draw_backdrop** () const
If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.
- void **draw_box** () const
Draws the widget box according its box style.
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
Draws a box of type t, of color c at the widget's position and size.
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
Draws a box of type t, of color c at the position X,Y and size W,H.
- void **draw_focus** () const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
Draws a focus rectangle around the widget.
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
Draws a focus box for the widget at the given position and size.
- void **draw_label** () const
Draws the widget's label at the defined label position.
- void **draw_label** (int, int, int, int) const
Draws the label in an arbitrary bounding box.
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
Creates a widget at the given position and size.
- unsigned int **flags** () const
Gets the widget flags mask.
- void **h** (int v)
Internal use only.
- void **set_flag** (unsigned int c)
Sets a flag in the flags mask.
- void **w** (int v)
Internal use only.
- void **x** (int v)
Internal use only.
- void **y** (int v)
Internal use only.

Static Protected Attributes

- static [FI_Window](#) * **current_**
Stores the last window that was made current.

Friends

- class [FI_Window_Driver](#)
- class [FI_X](#)

Additional Inherited Members

Protected Types inherited from Fl_Widget

- enum {
 - INACTIVE = 1<<0 , INVISIBLE = 1<<1 , OUTPUT = 1<<2 , NOBORDER = 1<<3 ,
 - FORCE_POSITION = 1<<4 , NON_MODAL = 1<<5 , SHORTCUT_LABEL = 1<<6 , CHANGED = 1<<7
 - ,
 - OVERRIDE = 1<<8 , VISIBLE_FOCUS = 1<<9 , COPIED_LABEL = 1<<10 , CLIP_CHILDREN = 1<<11
 - ,
 - MENU_WINDOW = 1<<12 , TOOLTIP_WINDOW = 1<<13 , MODAL = 1<<14 , NO_OVERLAY = 1<<15
 - ,
 - GROUP_RELATIVE = 1<<16 , COPIED_TOOLTIP = 1<<17 , FULLSCREEN = 1<<18 , MAC_USE_ACCENTS_MENU = 1<<19 ,
 - NEEDS_KEYBOARD = 1<<20 , IMAGE_BOUND = 1<<21 , DEIMAGE_BOUND = 1<<22 ,
 - AUTO_DELETE_USER_DATA = 1<<23 ,
 - MAXIMIZED = 1<<24 , POPUP = 1<<25 , USERFLAG3 = 1<<29 , USERFLAG2 = 1<<30 ,
 - USERFLAG1 = 1<<31 }

flags possible values enumeration.

12.163.1 Detailed Description

This widget produces an actual window.

This can either be a main window, with a border and title and all the window management controls, or a "subwindow" inside a window. This is controlled by whether or not the window has a [parent\(\)](#).

Once you create a window, you usually add children [Fl_Widget](#)'s to it by using `window->add(child)` for each new widget. See [Fl_Group](#) for more information on how to add and remove children.

There are several subclasses of [Fl_Window](#) that provide double-buffering, overlay, menu, and OpenGL support.

The window's callback is done if the user tries to close a window using the window manager and [Fl::modal\(\)](#) is zero or equal to the window. [Fl_Window](#) has a default callback that calls [Fl_Window::hide\(\)](#). Callback reasons can be `FL_REASON_CANCELLED` if the Escape key was pressed, or `FL_REASON_CLOSED` when the close button is clicked. `FL_WHEN_...` flags are ignored.

12.163.2 Constructor & Destructor Documentation

12.163.2.1 Fl_Window() [1/2]

```
Fl_Window::Fl_Window (
    int w,
    int h,
    const char * title = 0 )
```

Creates a window from the given width `w`, height `h`, and `title`.

If [Fl_Group::current\(\)](#) is not NULL, the window is created as a subwindow of the parent window.

The `(w, h)` form of the constructor creates a top-level window and asks the window manager to position the window.

The `(x, y, w, h)` form of the constructor either creates a subwindow or a top-level window at the specified location `(x, y)`, subject to window manager configuration. If you do not specify the position of the window, the window manager will pick a place to show the window or allow the user to pick a location. Use `position(x, y)` or `hotspot()` before calling `show()` to request a position on the screen. See [Fl_Window::resize\(\)](#) for some more details on positioning windows. Top-level windows initially have `visible()` set to 0 and `parent()` set to NULL. Subwindows initially have `visible()` set to 1 and `parent()` set to the parent window pointer.

[Fl_Widget::box\(\)](#) defaults to `FL_FLAT_BOX`. If you plan to completely fill the window with children widgets you should change this to `FL_NO_BOX`. If you turn the window border off you may want to change this to `FL_UP_BOX`.

See also

[Fl_Window\(int x, int y, int w, int h, const char *title\)](#)

12.163.2.2 Fl_Window() [2/2]

```
Fl_Window::Fl_Window (
```

```

    int x,
    int y,
    int w,
    int h,
    const char * title = 0 )

```

Creates a window from the given position (x, y), size (w, h) and title.

On a multi-screen system, the values computed by [Fl::screen_xywh\(int &X, int &Y, int &W, int &H, int n\)](#) can be used to discover the coordinates of the area of screen #n. When these screens have various scale factor values, an (x, y) pair may not be enough to specify the targeted screen for the window, because the same (x,y) pair can belong to several screens. In that situation, a call to [Fl_Window::screen_num\(int\)](#) is to be used to identify unambiguously the targeted screen.

See also

[Fl_Window\(int w, int h, const char *title\)](#)

[Fl::screen_xywh\(int &X, int &Y, int &W, int &H, int n\)](#)

Note

Under Wayland, it's generally not possible for the client app to control the position of a window in the system. It's only possible to specify on what screen should the compositor place a fullscreen window.

12.163.2.3 ~Fl_Window()

```
Fl_Window::~~Fl_Window ( ) [virtual]
```

The destructor *also deletes all the children*.

This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [Fl_Window](#) and all of its children can be automatic (local) variables, but you must declare the [Fl_Window](#) *first* so that it is destroyed last.

12.163.3 Member Function Documentation

12.163.3.1 as_double_window()

```
virtual class Fl_Double_Window * Fl_Window::as_double_window ( ) [inline], [virtual]
```

Return non-null if this is an [Fl_Double_Window](#) object.

Reimplemented in [Fl_Double_Window](#).

12.163.3.2 as_overlay_window()

```
virtual class Fl_Overlay_Window * Fl_Window::as_overlay_window ( ) [inline], [virtual]
```

Return non-null if this is an [Fl_Overlay_Window](#) object.

Reimplemented in [Fl_Overlay_Window](#).

12.163.3.3 as_window() [1/2]

```
Fl_Window const * Fl_Window::as_window ( ) const [inline], [virtual]
```

Reimplemented from [Fl_Widget](#).

12.163.3.4 as_window() [2/2]

```
Fl_Window * Fl_Window::as_window ( ) [inline], [virtual]
```

Returns an [Fl_Window](#) pointer if this widget is an [Fl_Window](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [Fl_Window](#). If it returns non-NULL, then the widget in question is derived from [Fl_Window](#), and you can use the returned pointer to access its children or other [Fl_Window](#)-specific methods.

Return values

NULL	if this widget is not derived from Fl_Window .
------	--

Note

This method is provided to avoid `dynamic_cast`.

See also

[Fl_Widget::as_group\(\)](#), [Fl_Widget::as_gl_window\(\)](#)

Reimplemented from [Fl_Widget](#).

12.163.3.5 border()

```
void Fl_Window::border (
    int b )
```

Sets whether or not the window manager border is around the window.

The default value is true. *With some X window managers, this does not work after [show\(\)](#) has been called.*

12.163.3.6 clear_border()

```
void Fl_Window::clear_border ( ) [inline]
```

Fast inline function to turn the window manager border off.

It only works before [show\(\)](#) is called.

12.163.3.7 clear_modal_states()

```
void Fl_Window::clear_modal_states ( ) [inline]
```

Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.

Note that there are *three* states for a window: modal, non-modal, and normal.

You can not change the "modality" of a window whilst it is shown, so it is necessary to first [hide\(\)](#) the window, change its "modality" as required, then re-show the window for the new state to take effect.

This method can also be used to change a "modal" window into a "non-modal" one. On several supported platforms, the "modal" state over-rides the "non-modal" state, so the "modal" state must be cleared before the window can be set into the "non-modal" state. In general, the following sequence should work:

```
win->hide();
win->clear_modal_states();
// Set win to new state as desired, or leave "normal", e.g...
win->set_non_modal();
win->show();
```

Note

Under some window managers, the sequence of hiding the window and changing its modality will often cause it to be re-displayed at a different position when it is subsequently shown. This is an irritating feature but appears to be unavoidable at present. As a result we would advise to use this method only when absolutely necessary.

See also

void [set_modal\(\)](#), void [set_non_modal\(\)](#)

12.163.3.8 current()

```
Fl_Window * Fl_Window::current ( ) [static]
```

Returns the last window that was made current.

See also

[Fl_Window::make_current\(\)](#)

12.163.3.9 cursor() [1/3]

```
void Fl_Window::cursor (
    const Fl_RGB_Image * image,
    int hotx,
    int hoty )
```

Changes the cursor for this window using the provided image as cursor's shape.

The window must be [show\(\)](#) for this function to have any effect. This always calls the system. If you are changing the cursor a lot you may want to keep track of how you set it in a static variable and call this only if the new cursor is different.

The default cursor will be used if the provided image cannot be used as a cursor.

Parameters

<i>image</i>	Sets the cursor size and shape
<i>hotx,hoty</i>	Sets the cursor's active location relatively to top-left of <i>image</i> when clicking

See also

[cursor\(Fl_Cursor\)](#), [default_cursor\(\)](#)

12.163.3.10 cursor() [2/3]

```
void Fl_Window::cursor (
    Fl_Cursor c,
    Fl_Color ,
    Fl_Color = FL_WHITE )
```

For back compatibility only.

Same as [Fl_Window::cursor\(Fl_Cursor\)](#)

12.163.3.11 cursor() [3/3]

```
void Fl_Window::cursor (
    Fl_Cursor c )
```

Changes the cursor for this window.

The window must be [show\(\)](#) for this function to have any effect. This always calls the system. If you are changing the cursor a lot you may want to keep track of how you set it in a static variable and call this only if the new cursor is different.

The type `Fl_Cursor` is an enumeration defined in [<FL/Enumerations.H>](#).

See also

[cursor\(const Fl_RGB_Image*, int, int\)](#), [default_cursor\(\)](#)

12.163.3.12 decorated_h()

```
int Fl_Window::decorated_h ( ) const
```

Returns the window height including any window title bar and any frame added by the window manager.

Same as [h\(\)](#) if applied to a subwindow, or if window is not yet mapped.

Note

Under X11, FLTK is able to compute the size of window titlebars and borders only if these decoration elements are strictly X11-based. When that's not the case, [decorated_h\(\)](#) returns the same value as [h\(\)](#) and [decorated_w\(\)](#) as [w\(\)](#), and FLTK cannot access window decorations.

Under X11 again, the values returned by [decorated_h\(\)](#) and [decorated_w\(\)](#) may not be reliable **during a resize operation**. The size of decoration elements of a window is best computed when the window is first mapped.

12.163.3.13 decorated_w()

```
int Fl_Window::decorated_w ( ) const
```

Returns the window width including any frame added by the window manager. Same as [w\(\)](#) if applied to a subwindow, or if window is not yet mapped.

See also

[decorated_h\(\)](#).

12.163.3.14 default_cursor() [1/2]

```
void Fl_Window::default_cursor (
    Fl_Cursor c,
    Fl_Color ,
    Fl_Color = FL_WHITE )
```

For back compatibility only.
same as [Fl_Window::default_cursor\(Fl_Cursor\)](#)

12.163.3.15 default_cursor() [2/2]

```
void Fl_Window::default_cursor (
    Fl_Cursor c )
```

Sets the default window cursor.
This is the cursor that will be used after the mouse pointer leaves a widget with a custom cursor set.

See also

[cursor\(const Fl_RGB_Image*, int, int\), default_cursor\(\)](#)

12.163.3.16 default_icon()

```
void Fl_Window::default_icon (
    const Fl_RGB_Image * icon ) [static]
```

Sets a single default window icon.
If *icon* is NULL the current default icons are removed.

Parameters

in	<i>icon</i>	default icon for all windows subsequently created or NULL
----	-------------	---

See also

[Fl_Window::default_icons\(const Fl_RGB_Image *\[\], int\)](#)
[Fl_Window::icon\(const Fl_RGB_Image *\)](#)
[Fl_Window::icons\(const Fl_RGB_Image *\[\], int\)](#)

Note

See [Window icons](#) for the Wayland platform.

12.163.3.17 default_icons() [1/2]

```
void Fl_Window::default_icons (
    const Fl_RGB_Image * icons[],
    int count ) [static]
```

Sets the default window icons.

The default icons are used for all windows that don't have their own icons set before `show()` is called. You can change the default icons whenever you want, but this only affects windows that are created (and shown) after this call.

The given images in `icons` are copied. You can use a local variable or free the images immediately after this call.

Parameters

in	<i>icons</i>	default icons for all windows subsequently created
in	<i>count</i>	number of images in <code>icons</code> . Set to 0 to remove the current default icons

See also

[Fl_Window::default_icon\(const Fl_RGB_Image *\)](#)

[Fl_Window::icon\(const Fl_RGB_Image *\)](#)

[Fl_Window::icons\(const Fl_RGB_Image *\[\], int\)](#)

Note

See [Window icons](#) for the Wayland platform.

12.163.3.18 default_icons() [2/2]

```
static void Fl_Window::default_icons (
    HICON big_icon,
    HICON small_icon ) [static]
```

Sets the default window icons (Windows platform only).

Convenience function to set the default icons using Windows' native HICON icon handles.

The given icons are copied. You can free the icons immediately after this call.

Parameters

in	<i>big_icon</i>	default large icon for all windows subsequently created
in	<i>small_icon</i>	default small icon for all windows subsequently created

See also

[Fl_Window::default_icon\(const Fl_RGB_Image *\)](#)

[Fl_Window::default_icons\(const Fl_RGB_Image *\[\], int\)](#)

[Fl_Window::icon\(const Fl_RGB_Image *\)](#)

[Fl_Window::icons\(const Fl_RGB_Image *\[\], int\)](#)

[Fl_Window::icons\(HICON, HICON\)](#)

12.163.3.19 default_size_range()

```
void Fl_Window::default_size_range ( ) [protected]
```

Protected method to calculate the default size range of a window.

This method is called internally prior to showing a window to ensure that the window's size range values are calculated if a [resizable\(\)](#) widget has been set but [size_range\(\)](#) has not been called explicitly.

This method does nothing if [size_range\(\)](#) has been called before.

Otherwise FLTK tries to figure out the window's size range from the setting of the window's [resizable\(\)](#) widget as follows and roughly in the given order.

1. If [resizable\(\)](#) is NULL (this is the default) then the window cannot be resized and the resize border and max-size control will not be displayed for the window.

2. If either dimension of `resizable()` is zero, then the window cannot resize in that direction.
3. The `resizable()` widget is clipped to the window area.
4. The non-resizable portion of the window is calculated as the difference of the window's size and the clipped `resizable()` widget's size.
5. If either dimension of the clipped `resizable()` widget is greater than 100, then 100 is considered its minimum width/height. This allows the resizable widget to shrink below its original size.
6. Finally the minimum width/height of the window is set to the non-resizable portion plus the width/height of the `resizable()` widget as calculated above.

In simple words:

- It is assumed that the `resizable()` widget can be indefinitely enlarged and/or shrunk to a minimum width/height of 100 unless it is smaller than that, which is then considered the minimum.
- The window's `size_range()` minimum values are set to the sum of the non-resizable portion of the window and the previously calculated minimum size of the `resizable()` widget.

Examples:

```
Fl_Window win(400, 400);
win.resizable(win);
// win.size_range(100, 100, 0, 0);
```

The minimum size of the resizable is 100, hence the minimum size of the total window is also 100 in both directions.

```
Fl_Window win(400, 400);
Fl_Box box(20, 20, 360, 360);
win.resizable(box);
// win.size_range(140, 140, 0, 0);
```

The calculated minimum width and height would be 20 + 100 + 20 in both dimensions.

```
Fl_Window win(400, 400);
Fl_Box box(200, 0, 500, 300); // note: width 500 too large: clipped
win.resizable(box);
// win.size_range(300, 200, 0, 0);
```

The width of the resizable is clipped to 200, hence the minimum size of the total window is also 200 (fix) + 100 (min. resizable) in x direction. The minimum value in y direction is 100 (resizable) + 100 (fixed part).

The calculation is based on clipping the resizable widget to the window area to prevent programming errors and the assumption that the resizable widget can be shrunk to 100x100 or its original size, whichever is smaller.

If this is not what you want, please use `Fl_Window::size_range()` explicitly so you can set any appropriate range.

12.163.3.20 default_xclass() [1/2]

```
const char * Fl_Window::default_xclass ( ) [static]
```

Returns the default xclass.

See also

[Fl_Window::default_xclass\(const char *\)](#)

12.163.3.21 default_xclass() [2/2]

```
void Fl_Window::default_xclass (
    const char * xc ) [static]
```

Sets the default window xclass.

The default xclass is used for all windows that don't have their own xclass set before `show()` is called. You can change the default xclass whenever you want, but this only affects windows that are created (and shown) after this call.

The given string `xc` is copied. You can use a local variable or free the string immediately after this call.

If you don't call this, the default xclass for all windows will be "FLTK". You can reset the default xclass by specifying NULL for `xc`.

If you call `Fl_Window::xclass(const char *)` for any window, then this also sets the default xclass, unless it has been set before.

Parameters

in	<code>xc</code>	default xclass for all windows subsequently created
----	-----------------	---

See also

[Fl_Window::xclass\(const char *\)](#)

12.163.3.22 draw()

```
void Fl_Window::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scrollbar; // scrollbar is an embedded Fl_Scrollbar
s->draw();                // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Group](#).

12.163.3.23 flush()

```
void Fl_Window::flush ( ) [protected], [virtual]
```

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

Reimplemented in [Fl_Double_Window](#), [Fl_Gl_Window](#), and [Fl_Overlay_Window](#).

12.163.3.24 force_position() [1/2]

```
int Fl_Window::force_position ( ) const [inline], [protected]
```

Returns the internal state of the window's FORCE_POSITION flag.

Return values

1	if flag is set
0	otherwise

See also

[force_position\(int\)](#)

12.163.3.25 force_position() [2/2]

```
void Fl_Window::force_position (
    int force ) [inline], [protected]
```

Sets an internal flag that tells FLTK and the window manager to honor position requests.

This is used internally and should not be needed by user code.

Parameters

in	<code>force</code>	1 to set the FORCE_POSITION flag, 0 to clear it
----	--------------------	---

12.163.3.26 free_icons()

```
void Fl_Window::free_icons ( ) [protected]
```

Deletes all icons previously attached to the window.

See also

[Fl_Window::icons\(const Fl_RGB_Image *icons\[\], int count\)](#)

12.163.3.27 free_position()

```
void Fl_Window::free_position ( ) [inline]
```

Undoes the effect of a previous [resize\(\)](#) or [show\(\)](#) so that the next time [show\(\)](#) is called the window manager is free to position the window.

This is for Forms compatibility only.

Deprecated please use [force_position\(0\)](#) instead

12.163.3.28 fullscreen()

```
void Fl_Window::fullscreen ( )
```

Makes the window completely fill one or more screens, without any window manager border visible.

You must use [fullscreen_off\(\)](#) to undo this.

Note

On some platforms, this can result in the keyboard being grabbed. The window may also be recreated, meaning [hide\(\)](#) and [show\(\)](#) will be called.

See also

[void Fl_Window::fullscreen_screens\(\)](#)

12.163.3.29 fullscreen_screens()

```
void Fl_Window::fullscreen_screens (
    int top,
    int bottom,
    int left,
    int right )
```

Sets which screens should be used when this window is in fullscreen mode.

The window will be resized to the top of the screen with index `top`, the bottom of the screen with index `bottom`, etc.

If this method is never called, or if any argument is < 0 , then the window will be resized to fill the screen it is currently on.

See also

[void Fl_Window::fullscreen\(\)](#)

12.163.3.30 handle()

```
int Fl_Window::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee `retval`.

One exception to the rule in the previous paragraph is if you really want to *override* the behavior of the base class. This requires knowledge of the details of the inherited class.

In rare cases you may want to return 1 from your [handle\(\)](#) method although you don't really handle the event. The effect would be to *filter* event processing, for instance if you want to dismiss non-numeric characters (keypresses) in a numeric input widget. You may "ring the bell" or show another visual indication or drop the event silently. In such a case you must not call the [handle\(\)](#) method of the base class and tell FLTK that you *consumed* the event by returning 1 even if you didn't *do* anything with it.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Group](#).

12.163.3.31 hide()

```
void Fl_Window::hide ( ) [virtual]
```

Removes the window from the screen.

If the window is already hidden or has not been shown then this does nothing and is harmless.

Reimplemented from [Fl_Widget](#).

12.163.3.32 hotspot()

```
void Fl_Window::hotspot (
    int x,
    int y,
    int offscreen = 0 )
```

Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.

If the optional offscreen parameter is non-zero, then the window is allowed to extend off the screen (this does not work with some X window managers).

See also

[position\(\)](#)

12.163.3.33 icon() [1/3]

```
const void * Fl_Window::icon ( ) const
```

Gets the current icon window target dependent data.

Deprecated in 1.3.3

12.163.3.34 icon() [2/3]

```
void Fl_Window::icon (
    const Fl_RGB_Image * icon )
```

Sets or resets a single window icon.

A window icon *can* be changed while the window is shown, but this *may* be platform and/or window manager dependent. To be sure that the window displays the correct window icon you should always set the icon before the window is shown.

If a window icon has not been set for a particular window, then the default window icon (see links below) or the system default icon will be used.

This method makes an internal copy of the `icon` pixel buffer, so once set, the [Fl_RGB_Image](#) instance can be freed by the caller.

Parameters

in	<i>icon</i>	icon for this window, NULL to reset window icon.
----	-------------	--

See also

[Fl_Window::default_icon\(const Fl_RGB_Image *\)](#)
[Fl_Window::default_icons\(const Fl_RGB_Image *\[\], int\)](#)
[Fl_Window::icons\(const Fl_RGB_Image *\[\], int\)](#)

Note

See [Window icons](#) for the Wayland platform.

12.163.3.35 icon() [3/3]

```
void Fl_Window::icon (
    const void * ic )
```

Platform-specific method to set the window icon usable on Windows and X11 only.

See [Setting the Icon of a Window](#) for its use under X11, and [Setting the Icon of a Window](#) under Windows.

Deprecated in 1.3.3 in favor of platform-independent methods [Fl_Window::icon\(const Fl_RGB_Image *icon\)](#) and [Fl_Window::icons\(const Fl_RGB_Image *icons\[\], int count\)](#).

12.163.3.36 iconize()

```
void Fl_Window::iconize ( )
```

Iconifies the window.

If you call this when [shown\(\)](#) is false it will [show\(\)](#) it as an icon. If the window is already iconified this does nothing. Call [show\(\)](#) to restore the window.

When a window is iconified/restored (either by these calls or by the user) the [handle\(\)](#) method is called with FL_HIDE and FL_SHOW events and [visible\(\)](#) is turned on and off.

There is no way to control what is drawn in the icon except with the string passed to [Fl_Window::xclass\(\)](#). You should not rely on window managers displaying the icons.

12.163.3.37 icons() [1/2]

```
void Fl_Window::icons (
    const Fl_RGB_Image * icons[],
    int count )
```

Sets the window icons.

You may set multiple window icons with different sizes. Dependent on the platform and system settings the best (or the first) icon will be chosen.

The given images in *icons* are copied. You can use a local variable or free the images immediately after this call. If *count* is zero, current icons are removed. If *count* is greater than zero (must not be negative), then *icons*[] must contain at least *count* valid image pointers (not NULL). Otherwise the behavior is undefined.

Parameters

in	<i>icons</i>	icons for this window
in	<i>count</i>	number of images in <i>icons</i> . Set to 0 to remove the current icons

See also

[Fl_Window::default_icon\(const Fl_RGB_Image *\)](#)
[Fl_Window::default_icons\(const Fl_RGB_Image *\[\], int\)](#)

[Fl_Window::icon\(const Fl_RGB_Image *\)](#)

Note

See [Window icons](#) for the Wayland platform.

12.163.3.38 icons() [2/2]

```
void Fl_Window::icons (
    HICON big_icon,
    HICON small_icon )
```

Sets the window icons using HICON handles (Windows platform only). The given icons are copied. You can free the icons immediately after this call.

Parameters

in	<i>big_icon</i>	large window icon
in	<i>small_icon</i>	small window icon

12.163.3.39 is_resizable()

```
int Fl_Window::is_resizable ( ) [protected]
```

Protected method to determine whether a window is resizable.

If [size_range\(\)](#) has not yet been called this method calculates the default size range values by calling [default_size_range\(\)](#).

This method is for internal use only. The returned value is a bit mask and non-zero if the window is resizable in at least one direction.

Returns

non-zero if the window is resizable

Return values

0	the window is not resizable
1	the window is resizable in horizontal direction (w)
2	the window is resizable in vertical direction (h)
3	the window is resizable in both directions (w and h)

See also

[default_size_range\(\)](#)

12.163.3.40 make_current()

```
void Fl_Window::make_current ( )
```

Sets things up so that the drawing functions in [<FL/fl_draw.H>](#) will go into this window.

This is useful for incremental update of windows, such as in an idle callback, which will make your program behave much better if it draws a slow graphic. **Danger: incremental update is very hard to debug and maintain!**

This method only works for the [Fl_Window](#) and [Fl_Gl_Window](#) derived classes.

12.163.3.41 maximize()

```
void Fl_Window::maximize ( )
```

Maximizes a top-level window to its current screen.

This function is effective only with a [show\(\)](#)'n, resizable, top-level window. Bordered and borderless windows can be used.

See also

[Fl_Window::un_maximize\(\)](#), [Fl_Window::maximize_active\(\)](#)

12.163.3.42 modal()

```
unsigned int Fl_Window::modal ( ) const [inline]
```

Returns true if this window is modal.

12.163.3.43 os_id()

```
fl_uintptr_t Fl_Window::os_id ( )
```

Returns a platform-specific identification of a shown window, or 0 if not shown.

Note

This identification may differ from the platform-specific reference of an [Fl_Window](#) object used by functions [fl_x11_xid\(\)](#), [fl_mac_xid\(\)](#), [fl_x11_find\(\)](#), and [fl_mac_find\(\)](#).

- X11 platform: the window's XID.
- macOS platform: The window number of the window's window device.
- other platforms: 0.

12.163.3.44 resize()

```
void Fl_Window::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Changes the size and position of the window.

If [shown\(\)](#) is true, these changes are communicated to the window server (which may refuse that size and cause a further resize). If [shown\(\)](#) is false, the size and position are used when [show\(\)](#) is called. See [Fl_Group](#) for the effect of resizing on the child widgets.

You can also call the [Fl_Widget](#) methods [size\(x,y\)](#) and [position\(w,h\)](#), which are inline wrappers for this virtual function.

A top-level window can not force, but merely suggest a position and size to the operating system. The window manager may not be willing or able to display a window at the desired position or with the given dimensions. It is up to the application developer to verify window parameters after the resize request.

Reimplemented from [Fl_Group](#).

12.163.3.45 screen_num()

```
void Fl_Window::screen_num (
    int screen_num )
```

Set the number of the screen where to map the window.

Call this and set also the window's desired position before [show\(\)](#)'ing the window. This can be necessary when a system has several screens with distinct scaling factor values because the window's [x\(\)](#) and [y\(\)](#) may not suffice to uniquely identify one screen. To see that, consider a system with two screens where the screen at left is A pixel-wide and has a scale factor of 1 whereas the screen at right has a scale factor of 2. For the sake of simplicity, consider only the X coordinates of windows. FLTK coordinates translate directly to pixel coordinates on the left screen, whereas FLTK coordinates multiplied by 2 correspond to pixel coordinates on the right screen. Consequently, FLTK coordinates between $A/2 + 1$ and $A-1$ can map to both screens. Both window coordinates and screen number are necessary to uniquely identify where a window is to be mapped.

12.163.3.46 set_menu_window()

```
void Fl_Window::set_menu_window ( ) [inline]
```

Marks the window as a menu window.

This is intended for internal use, but it can also be used if you write your own menu handling. However, this is not recommended.

This flag is used for correct "parenting" of windows in communication with the windowing system. Modern X window managers can use different flags to distinguish menu and tooltip windows from normal windows.

This must be called before the window is shown and cannot be changed later.

12.163.3.47 set_modal()

```
void Fl_Window::set_modal ( ) [inline]
```

A "modal" window, when [shown\(\)](#), will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).

Several modal windows may be shown at once, in which case only the last one shown gets events. You can see which window (if any) is modal by calling [Fl::modal\(\)](#).

12.163.3.48 set_non_modal()

```
void Fl_Window::set_non_modal ( ) [inline]
```

A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.

There are *three* states for a window: modal, non-modal, and normal.

12.163.3.49 set_tooltip_window()

```
void Fl_Window::set_tooltip_window ( ) [inline]
```

Marks the window as a tooltip window.

This is intended for internal use, but it can also be used if you write your own tooltip handling. However, this is not recommended.

This flag is used for correct "parenting" of windows in communication with the windowing system. Modern X window managers can use different flags to distinguish menu and tooltip windows from normal windows.

This must be called before the window is shown and cannot be changed later.

Note

Since [Fl_Tooltip_Window](#) is derived from [Fl_Menu_Window](#), this also **clears** the [menu_window\(\)](#) state.

12.163.3.50 shape() [1/2]

```
void Fl_Window::shape (
    const Fl_Image & img )
```

Set the window's shape with an [Fl_Image](#).

See also

void [shape\(const Fl_Image* img\)](#)

12.163.3.51 shape() [2/2]

```
void Fl_Window::shape (
    const Fl_Image * img )
```

Assigns a non-rectangular shape to the window.

This function gives an arbitrary shape (not just a rectangular region) to an [Fl_Window](#). An [Fl_Image](#) of any dimension can be used as mask; it is rescaled to the window's dimension as needed.

The layout and widgets inside are unaware of the mask shape, and most will act as though the window's rectangular bounding box is available to them. It is up to you to make sure they adhere to the bounds of their masking shape.

The `img` argument can be an [Fl_Bitmap](#), [Fl_Pixmap](#), [Fl_RGB_Image](#) or [Fl_Shared_Image](#):

- With [Fl_Bitmap](#) or [Fl_Pixmap](#), the shaped window covers the image part where bitmap bits equal one, or where the pixmap is not fully transparent.
- With an [Fl_RGB_Image](#) with an alpha channel (depths 2 or 4), the shaped window covers the image part that is not fully transparent.
- With an [Fl_RGB_Image](#) of depth 1 (gray-scale) or 3 (RGB), the shaped window covers the non-black image part.
- With an [Fl_Shared_Image](#), the shape is determined by rules above applied to the underlying image. The shared image should not have been scaled through [Fl_Image::scale\(\)](#).

Platform details:

- On the unix/linux platform, the SHAPE extension of the X server is required. This function does control the shape of [Fl_Gl_Window](#) instances.
- On the Windows platform, this function does nothing with class [Fl_Gl_Window](#).
- On the Mac platform, OS version 10.4 or above is required. An 8-bit shape-mask is used when `img` is an [Fl_RGB_Image](#): with depths 2 or 4, the image alpha channel becomes the shape mask such that areas with `alpha = 0` are out of the shaped window; with depths 1 or 3, white and black are in and out of the shaped window, respectively, and other colors give intermediate masking scores. This function does nothing with class [Fl_Gl_Window](#).

The window borders and caption created by the window system are turned off by default. They can be re-enabled by calling [Fl_Window::border\(1\)](#).

A usage example is found at `example/shapedwindow.cxx`.

Version

1.3.3

12.163.3.52 [show\(\)](#) [1/2]

```
void Fl_Window::show ( ) [virtual]
```

Puts the window on the screen.

This has the side effect of opening the display, if not done before.

If the window is already shown then it is restored and raised to the top. This is really convenient because your program can call [show\(\)](#) at any time, even if the window is already up. It also means that [show\(\)](#) serves the purpose of [raise\(\)](#) in other toolkits.

[Fl_Window::show\(int argc, char **argv\)](#) is used for top-level windows and allows standard arguments to be parsed from the command-line.

Note

For some obscure reasons [Fl_Window::show\(\)](#) resets the current group by calling [Fl_Group::current\(0\)](#). The comments in the code say "get rid of very common user bug: forgot end()". Although this is true it may have unwanted side effects if you [show\(\)](#) an unrelated window (maybe for an error message or warning) while building a window or any other group widget.

Todo Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

See also

[Fl_Window::show\(int argc, char **argv\)](#)

Reimplemented from [Fl_Widget](#).

12.163.3.53 show() [2/2]

```
void Fl_Window::show (
    int argc,
    char ** argv )
```

Puts the window on the screen with [show\(\)](#) and parses command-line arguments.

This call should be used for top-level windows, at least for the first (main) window. It allows standard arguments to be parsed, as done by [Fl::args\(int, char **\)](#), from the command-line. You can use `argc` and `argv` from `main(int argc, char **argv)` for this call.

This call also sets up some system-specific internal variables, that is, it sets `FL_SELECTION_COLOR` and calls [Fl::background\(\)](#), [Fl::background2\(\)](#), [Fl::foreground\(\)](#) with default or X resources-given values, and calls [Fl::scheme\(const char *\)](#) for the current scheme. On X11, it also calls [Fl::dnd_text_ops\(int\)](#), [Fl::Tooltip::enable\(int\)](#), [Fl::visible_focus\(int\)](#) with X resources-given values.

Parameters

<i>argc</i>	command-line argument count, usually from <code>main()</code>
<i>argv</i>	command-line argument vector, usually from <code>main()</code>

See also

virtual void [Fl_Window::show\(\)](#)
[Fl::args\(int, char **\)](#)

12.163.3.54 show_next_window_iconic() [1/2]

```
static char Fl_Window::show_next_window_iconic ( ) [inline], [static]
```

Returns the static flag whether the next window should be opened iconified.

Note

This is an **internal function**, you should not use this in user code.

Please use [Fl_Window::iconize\(\)](#) to iconify a window.

12.163.3.55 show_next_window_iconic() [2/2]

```
static void Fl_Window::show_next_window_iconic (
    char stat ) [inline], [static]
```

Sets a static flag whether the next window should be opened iconified.

Note

This is an **internal function**, you should not use this in user code.

Please use [Fl_Window::iconize\(\)](#) instead.

12.163.3.56 shown()

```
int Fl_Window::shown ( ) [inline]
```

Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).

You can tell if a window is iconified with `(w->shown() && !w->visible())`.

12.163.3.57 size_range()

```
void Fl_Window::size_range (
    int minWidth,
    int minHeight,
    int maxWidth = 0,
    int maxHeight = 0,
```

```
int deltaX = 0,
int deltaY = 0,
int aspectRatio = 0 )
```

Sets the allowable range the user can resize this window to.

We recommend to call [size_range\(\)](#) if you have a [resizable\(\)](#) widget in a main window, and to call it after setting the [resizable\(\)](#) and before [show\(\)](#)'ing the window for best cross platform compatibility.

If this function is **not** called, FLTK tries to figure out the range when the window is shown. Please see the protected method [default_size_range\(\)](#) for details.

It is undefined what happens if the current window size does not fit in the constraints passed to [size_range\(\)](#).

Note

This only works for top-level windows and the exact behavior can be platform specific. To work correctly across all platforms [size_range\(\)](#) must be called after setting the [resizable\(\)](#) widget of the window and before the window is [show\(\)](#)'n.

Calling [size_range\(\)](#) after the window has been shown may work on some but not all platforms. If you need to change the [size_range\(\)](#) after the window has been shown, then you should consider to [hide\(\)](#) and [show\(\)](#) the window again, i.e. call [hide\(\)](#), [size_range\(\)](#), and [show\(\)](#) in this order.

Typical usage: call

```
size_range(minWidth, minHeight);
```

after setting the resizable widget and before calling [show\(\)](#). This ensures that the window cannot be resized smaller than the given values by user interaction.

`maxWidth` and `maxHeight` might be useful in some special cases but less frequently used.

The other optional parameters `deltaX`, `deltaY`, and `aspectRatio` are not recommended because they may not work on all platforms and may even under X11 not be supported by all Window Managers.

Parameters

in	<i>minWidth,minHeight</i>	The smallest the window can be. Either value must be greater than 0.
in	<i>maxWidth,maxHeight</i>	The largest the window can be. If either is equal to the minimum then you cannot resize in that direction. If either is zero then FLTK picks a maximum size in that direction such that the window will fill the screen.
in	<i>deltaX,deltaY</i>	These are size increments. The window will be constrained to widths of $\text{minWidth} + N * \text{deltaX}$, where N is any non-negative integer. If these are less or equal to 1 they are ignored (this is always ignored on Windows).
in	<i>aspectRatio</i>	A flag that indicates that the window should preserve its aspect ratio. This only works if both the maximum and minimum have the same aspect ratio (ignored on Windows and by many X window managers).

12.163.3.58 un_maximize()

```
void Fl_Window::un_maximize ( )
```

Returns a previously maximized top-level window to its previous size.

See also

[Fl_Window::maximize\(\)](#)

12.163.3.59 wait_for_expose()

```
void Fl_Window::wait_for_expose ( )
```

Waits for the window to be displayed after calling [show\(\)](#).

[Fl_Window::show\(\)](#) is not guaranteed to show and draw the window on all platforms immediately. Instead this is done in the background; particularly on X11 it will take a few messages (client server roundtrips) to display the window. Usually this small delay doesn't matter, but in some cases you may want to have the window instantiated and displayed synchronously.

Currently (as of FLTK 1.3.4) this method has an effect on X11 and Mac OS. On Windows, [show\(\)](#) is always synchronous. The effect of [show\(\)](#) varies with versions of Mac OS X: early versions have the window appear on the

screen when `show()` returns, later versions don't. If you want to write portable code and need this synchronous `show()` feature, add `win->wait_for_expose()` on all platforms, and FLTK will just do the right thing.

This method can be used for displaying splash screens before calling `Fl::run()` or for having exact control over which window has the focus after calling `show()`.

If the window is not `shown()`, this method does nothing.

Note

Depending on the platform and window manager `wait_for_expose()` may not guarantee that the window is fully drawn when it is called. Under X11 it may only make sure that the window is **mapped**, i.e. the internal (OS dependent) window object was created (and maybe shown on the desktop as an empty frame or something like that). You may need to call `Fl::flush()` after `wait_for_expose()` to make sure the window and all its widgets are drawn and thus visible.

FLTK does the best it can do to make sure that all widgets get drawn if you call `wait_for_expose()` and `Fl::flush()`. However, dependent on the window manager it can not be guaranteed that this does always happen synchronously. The only guaranteed behavior that all widgets are eventually drawn is if the FLTK event loop is run continuously, for instance with `Fl::run()`.

See also

virtual void `Fl_Window::show()`

Example code for displaying a window before calling `Fl::run()`

```
Fl_Double_Window win = new Fl_Double_Window(...);

// do more window initialization here ...

win->show();           // show window
win->wait_for_expose(); // wait, until displayed
Fl::flush();          // make sure everything gets drawn

// do more initialization work that needs some time here ...

Fl::run();             // start FLTK event loop
```

Note that the window will not be responsive until the event loop is started with `Fl::run()`.

12.163.3.60 `xclass()` [1/2]

```
const char * Fl_Window::xclass ( ) const
```

Returns the xclass for this window, or a default.

See also

`Fl_Window::default_xclass(const char *)`

`Fl_Window::xclass(const char *)`

12.163.3.61 `xclass()` [2/2]

```
void Fl_Window::xclass (
    const char * xc )
```

Sets the xclass for this window.

A string used to tell the system what type of window this is. Mostly this identifies the picture to draw in the icon. This only works if called *before* calling `show()`.

Under X, this is turned into a XA_WM_CLASS pair by truncating at the first non-alphanumeric character and capitalizing the first character, and the second one if the first is 'x'. Thus "foo" turns into "foo, Foo", and "xprog.1" turns into "xprog, XProg".

Under Microsoft Windows, this string is used as the name of the WNDCLASS structure, though it is not clear if this can have any visible effect.

Since

FLTK 1.3 the passed string is copied. You can use a local variable or free the string immediately after this call. Note that FLTK 1.1 stores the *pointer* without copying the string.

If the default xclass has not yet been set, this also sets the default xclass for all windows created subsequently.

See also

[Fl_Window::default_xclass\(const char *\)](#)

12.163.4 Member Data Documentation

12.163.4.1 current_

`Fl_Window * Fl_Window::current_ [static], [protected]`

Stores the last window that was made current.

See `current()` const

The documentation for this class was generated from the following files:

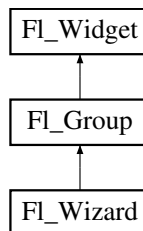
- [Fl_Window.H](#)
- [Fl_arg.cxx](#)
- [fl_cursor.cxx](#)
- [Fl_Window.cxx](#)
- [Fl_Window_fullscreen.cxx](#)
- [Fl_Window_hotspot.cxx](#)
- [Fl_Window_iconize.cxx](#)

12.164 Fl_Wizard Class Reference

This widget is based off the [Fl_Tabs](#) widget, but instead of displaying tabs it only changes "tabs" under program control.

```
#include <Fl_Wizard.H>
```

Inheritance diagram for Fl_Wizard:



Public Member Functions

- [Fl_Wizard](#) (int, int, int, int, const char *=0)
 - The constructor creates the [Fl_Wizard](#) widget at the specified position and size.*
- void [next](#) ()
 - This method shows the next child of the wizard.*
- void [prev](#) ()
 - Shows the previous child.*
- [Fl_Widget * value](#) ()
 - Gets the current visible child widget.*
- void [value](#) ([Fl_Widget *](#))
 - Sets the child widget that is visible.*

Public Member Functions inherited from [Fl_Group](#)

- [Fl_Widget *& _ddfdesign_kludge](#) ()
 - This is for forms compatibility only.*
- void [add](#) ([Fl_Widget &](#))
 - The widget is removed from its current group (if any) and then added to the end of this group.*
- void [add](#) ([Fl_Widget *o](#))

- See void [FL_Group::add\(FL_Widget &w\)](#)
- void **add_resizable** ([FL_Widget](#) &o)
 - Adds a widget to the group and makes it the resizable widget.*
 - [FL_Widget](#) *const * **array** () const
 - Returns a pointer to the array of children.*
 - [FL_Group](#) const * **as_group** () const [FL_OVERRIDE](#)
 - [FL_Group](#) * **as_group** () [FL_OVERRIDE](#)
 - Returns an [FL_Group](#) pointer if this widget is an [FL_Group](#).*
 - void **begin** ()
 - Sets the current group so you can build the widget tree by just constructing the widgets.*
 - [FL_Widget](#) * **child** (int n) const
 - Returns [array\(\)\[n\]](#).*
 - int **children** () const
 - Returns how many child widgets the group has.*
 - void **clear** ()
 - Deletes all child widgets from memory recursively.*
 - unsigned int **clip_children** ()
 - Returns the current clipping mode.*
 - void **clip_children** (int c)
 - Controls whether the group widget clips the drawing of child widgets to its bounding box.*
 - virtual int **delete_child** (int n)
 - Removes the widget at *index* from the group and deletes it.*
 - void **end** ()
 - Exactly the same as [current\(this->parent\(\)\)](#).*
 - int **find** (const [FL_Widget](#) &o) const
 - See [int FL_Group::find\(const FL_Widget *w\) const](#).*
 - int **find** (const [FL_Widget](#) *) const
 - Searches the child array for the widget and returns the index.*
 - [FL_Group](#) (int, int, int, int, const char * =0)
 - Creates a new [FL_Group](#) widget using the given position, size, and label string.*
 - void **focus** ([FL_Widget](#) *W)
 - void **forms_end** ()
 - This is for forms compatibility only.*
 - int **handle** (int) [FL_OVERRIDE](#)
 - Handles the specified event.*
 - void **init_sizes** ()
 - Resets the internal array of widget sizes and positions.*
 - void **insert** ([FL_Widget](#) &, int i)
 - The widget is removed from its current group (if any) and then inserted into this group.*
 - void **insert** ([FL_Widget](#) &o, [FL_Widget](#) *before)
 - This does [insert\(w, find\(before\)\)](#).*
 - void **remove** ([FL_Widget](#) &)
 - Removes a widget from the group but does not delete it.*
 - void **remove** ([FL_Widget](#) *o)
 - Removes the widget o from the group.*
 - void **remove** (int index)
 - Removes the widget at *index* from the group but does not delete it.*
 - [FL_Widget](#) * **resizable** () const
 - Returns the group's resizable widget.*
 - void **resizable** ([FL_Widget](#) &o)
 - Sets the group's resizable widget.*

- void `resizable` (`FI_Widget *o`)
The resizable widget defines both the resizing box and the resizing behavior of the group and its children.
- void `resize` (int, int, int, int) `FL_OVERRIDE`
Resizes the `FI_Group` widget and all of its children.
- virtual `~FI_Group` ()
The destructor also deletes all the children.

Public Member Functions inherited from `FI_Widget`

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
Activates the widget.
- unsigned int `active` () const
Returns whether the widget is active.
- int `active_r` () const
Returns whether the widget and all of its parents are active.
- `FI_Align align` () const
Gets the label alignment.
- void `align` (`FI_Align alignment`)
Sets the label alignment.
- long `argument` () const
Gets the current user data (long) argument that is passed to the callback function.
- void `argument` (long v)
Sets the current user data (long) argument that is passed to the callback function.
- virtual class `FI_Gl_Window * as_gl_window` ()
Returns an `FI_Gl_Window` pointer if this widget is an `FI_Gl_Window`.
- virtual class `FI_Gl_Window const * as_gl_window` () const
- virtual `FI_Window * as_window` ()
Returns an `FI_Window` pointer if this widget is an `FI_Window`.
- virtual `FI_Window const * as_window` () const
- void `bind_deimage` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `bind_deimage` (int f)
Bind the inactive image to the widget, so the widget will delete the image when it is no longer needed.
- void `bind_image` (`FI_Image *img`)
Sets the image to use as part of the widget label when in the active state.
- void `bind_image` (int f)
Bind the image to the widget, so the widget will delete the image when it is no longer needed.
- `FI_Boxtype box` () const
Gets the box type of the widget.
- void `box` (`FI_Boxtype new_box`)
Sets the box type for the widget.
- `FI_Callback_p callback` () const
Gets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback *cb`, `FI_Callback_User_Data *p`, bool auto_free)
Sets the current callback function and managed user data for the widget.
- void `callback` (`FI_Callback *cb`, void *p)
Sets the current callback function and data for the widget.

- void `callback` (`FI_Callback0 *cb`)
Sets the current callback function for the widget.
- void `callback` (`FI_Callback1 *cb`, long `p=0`)
Sets the current callback function for the widget.
- unsigned int `changed` () const
Checks if the widget value changed since the last callback.
- void `clear_active` ()
Marks the widget as inactive without sending events or changing focus.
- void `clear_changed` ()
Marks the value of the widget as unchanged.
- void `clear_damage` (`uchar c=0`)
Clears or sets the damage flags.
- void `clear_output` ()
Sets a widget to accept input.
- void `clear_visible` ()
Hides the widget.
- void `clear_visible_focus` ()
Disables keyboard focus navigation with this widget.
- `FI_Color color` () const
Gets the background color of the widget.
- void `color` (`FI_Color bg`)
Sets the background color of the widget.
- void `color` (`FI_Color bg`, `FI_Color sel`)
Sets the background and selection color of the widget.
- `FI_Color color2` () const
For back compatibility only.
- void `color2` (unsigned `a`)
For back compatibility only.
- int `contains` (const `FI_Widget *w`) const
Checks if `w` is a child of this widget.
- void `copy_label` (const char `*new_label`)
Sets the current label.
- void `copy_tooltip` (const char `*text`)
Sets the current tooltip text.
- `uchar damage` () const
Returns non-zero if `draw()` needs to be called.
- void `damage` (`uchar c`)
Sets the damage bits for the widget.
- void `damage` (`uchar c`, int `x`, int `y`, int `w`, int `h`)
Sets the damage bits for an area inside the widget.
- int `damage_resize` (int, int, int, int)
Internal use only.
- void `deactivate` ()
Deactivates the widget.
- `FI_Image * deimage` ()
Gets the image that is used as part of the widget label when in the inactive state.
- const `FI_Image * deimage` () const
Gets the image that is used as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image &img`)
Sets the image to use as part of the widget label when in the inactive state.
- void `deimage` (`FI_Image *img`)

- Sets the image to use as part of the widget label when in the inactive state.*

 - int `deimage_bound` () const

Returns whether the inactive image is managed by the widget.
- void `do_callback` (`FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with default arguments.
- void `do_callback` (`FI_Widget` *widget, long arg, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `do_callback` (`FI_Widget` *widget, void *arg=0, `FI_Callback_Reason` reason=`FL_REASON_UNKNOWN`)

Calls the widget callback function with arbitrary arguments.
- void `draw_label` (int, int, int, int, `FI_Align`) const

Draws the label in an arbitrary bounding box with an arbitrary alignment.
- int `h` () const

Gets the widget height.
- virtual void `hide` ()

Makes a widget invisible.
- `FI_Image` * `image` ()

Gets the image that is used as part of the widget label when in the active state.
- const `FI_Image` * `image` () const

Gets the image that is used as part of the widget label when in the active state.
- void `image` (`FI_Image` &img)

Sets the image to use as part of the widget label when in the active state.
- void `image` (`FI_Image` *img)

Sets the image to use as part of the widget label when in the active state.
- int `image_bound` () const

Returns whether the image is managed by the widget.
- int `inside` (const `FI_Widget` *wgt) const

Checks if this widget is a child of wgt.
- int `is_label_copied` () const

Returns whether the current label was assigned with `copy_label()`.
- const char * `label` () const

Gets the current label text.
- void `label` (const char *text)

Sets the current label pointer.
- void `label` (`FI_Labeltype` a, const char *b)

Shortcut to set the label text and type in one call.
- `FI_Color` `labelcolor` () const

Gets the label color.
- void `labelcolor` (`FI_Color` c)

Sets the label color.
- `FI_Font` `labelfont` () const

Gets the font to use.
- void `labelfont` (`FI_Font` f)

Sets the font to use.
- `FI_Fontsize` `labelsize` () const

Gets the font size in pixels.
- void `labelsize` (`FI_Fontsize` pix)

Sets the font size in pixels.
- `FI_Labeltype` `labeltype` () const

Gets the label type.
- void `labeltype` (`FI_Labeltype` a)

Sets the label type.

- void `measure_label` (int &ww, int &hh) const
Sets width ww and height hh accordingly with the label size.
- bool `needs_keyboard` () const
Returns whether this widget needs a keyboard.
- void `needs_keyboard` (bool needs)
Sets whether this widget needs a keyboard.
- unsigned int `output` () const
Returns if a widget is used for output only.
- `FI_Group * parent` () const
Returns a pointer to the parent widget.
- void `parent` (`FI_Group *p`)
Internal use only - "for hacks only".
- void `position` (int X, int Y)
Repositions the window or widget.
- void `redraw` ()
Schedules the drawing of the widget.
- void `redraw_label` ()
Schedules the drawing of the label.
- `FI_Color selection_color` () const
Gets the selection color.
- void `selection_color` (`FI_Color a`)
Sets the selection color.
- void `set_active` ()
Marks the widget as active without sending events or changing focus.
- void `set_changed` ()
Marks the value of the widget as changed.
- void `set_output` ()
Sets a widget to output only.
- void `set_visible` ()
Makes the widget visible.
- void `set_visible_focus` ()
Enables keyboard focus navigation with this widget.
- int `shortcut_label` () const
Returns whether the widget's label uses '&' to indicate shortcuts.
- void `shortcut_label` (int value)
Sets whether the widget's label uses '&' to indicate shortcuts.
- virtual void `show` ()
Makes a widget visible.
- void `size` (int W, int H)
Changes the size of the widget.
- int `take_focus` ()
Gives the widget the keyboard focus.
- unsigned int `takeevents` () const
Returns if the widget is able to take events.
- int `test_shortcut` ()
Returns true if the widget's label contains the entered '&x' shortcut.
- const char * `tooltip` () const
Gets the current tooltip text.
- void `tooltip` (const char *text)
Sets the current tooltip text.
- `FI_Window * top_window` () const

- Returns a pointer to the top-level window for the widget.*

 - [FI_Window](#) * [top_window_offset](#) (int &xoff, int &yoff) const

Finds the x/y offset of the current widget relative to the top-level window.
- [uchar](#) [type](#) () const
- Gets the widget type.*
- void [type](#) ([uchar](#) t)
- Sets the widget type.*
- int [use_accents_menu](#) ()
- Returns non zero if MAC_USE_ACCENTS_MENU flag is set, 0 otherwise.*
- void * [user_data](#) () const
- Gets the user data for this widget.*
- void [user_data](#) ([FI_Callback_User_Data](#) *v, bool auto_free)
- Sets the user data for this widget.*
- void [user_data](#) (void *v)
- Sets the user data for this widget.*
- unsigned int [visible](#) () const
- Returns whether a widget is visible.*
- unsigned int [visible_focus](#) () const
- Checks whether this widget has a visible focus.*
- void [visible_focus](#) (int v)
- Modifies keyboard focus navigation.*
- int [visible_r](#) () const
- Returns whether a widget and all its parents are visible.*
- int [w](#) () const
- Gets the widget width.*
- [FI_When](#) [when](#) () const
- Returns the conditions under which the callback is called.*
- void [when](#) ([uchar](#) i)
- Sets the flags used to decide when a callback is called.*
- [FI_Window](#) * [window](#) () const
- Returns a pointer to the nearest parent window up the widget hierarchy.*
- int [x](#) () const
- Gets the widget position in its window.*
- int [y](#) () const
- Gets the widget position in its window.*
- virtual [~FI_Widget](#) ()
- Destroys the widget.*

Protected Member Functions

- void [draw](#) () [FL_OVERRIDE](#)
- Draws the wizard border and visible child.*

Protected Member Functions inherited from [FI_Group](#)

- [FI_Rect](#) * [bounds](#) ()
- Returns the internal array of widget sizes and positions.*
- void [draw_child](#) ([FI_Widget](#) &widget) const
- Forces a child to redraw.*
- void [draw_children](#) ()
- Draws all children of the group.*
- void [draw_outside_label](#) (const [FI_Widget](#) &widget) const

- Parents normally call this to draw outside labels of child widgets.*

 - virtual int **on_insert** ([FI_Widget](#) *, int)
 - Allow derived groups to act when a widget is added as a child.*
 - virtual int **on_move** (int, int)
 - Allow derived groups to act when a widget is moved within the group.*
 - virtual void **on_remove** (int)
 - Allow derived groups to act when a child widget is removed from the group.*
 - int * **sizes** ()
 - Returns the internal array of widget sizes and positions.*
 - void **update_child** ([FI_Widget](#) &widget) const
 - Draws a child only if it needs it.*

Protected Member Functions inherited from [FI_Widget](#)

- void **clear_flag** (unsigned int c)
 - Clears a flag in the flags mask.*
- void **draw_backdrop** () const
 - If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.*
- void **draw_box** () const
 - Draws the widget box according its box style.*
- void **draw_box** ([FI_Boxtype](#) t, [FI_Color](#) c) const
 - Draws a box of type t, of color c at the widget's position and size.*
- void **draw_box** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) c) const
 - Draws a box of type t, of color c at the position X,Y and size W,H.*
- void **draw_focus** () const
 - Draws a focus rectangle around the widget.*
- void **draw_focus** ([FI_Boxtype](#) t, int X, int Y, int W, int H) const
 - Draws a focus rectangle around the widget.*
- void **draw_focus** ([FI_Boxtype](#) t, int x, int y, int w, int h, [FI_Color](#) bg) const
 - Draws a focus box for the widget at the given position and size.*
- void **draw_label** () const
 - Draws the widget's label at the defined label position.*
- void **draw_label** (int, int, int, int) const
 - Draws the label in an arbitrary bounding box.*
- [FI_Widget](#) (int x, int y, int w, int h, const char *label=0L)
 - Creates a widget at the given position and size.*
- unsigned int **flags** () const
 - Gets the widget flags mask.*
- void **h** (int v)
 - Internal use only.*
- void **set_flag** (unsigned int c)
 - Sets a flag in the flags mask.*
- void **w** (int v)
 - Internal use only.*
- void **x** (int v)
 - Internal use only.*
- void **y** (int v)
 - Internal use only.*

Additional Inherited Members

Static Public Member Functions inherited from FI_Group

- static [FI_Group](#) * [current](#) ()
Returns the currently active group.
- static void [current](#) ([FI_Group](#) *g)
Sets the current group.

Static Public Member Functions inherited from FI_Widget

- static void [default_callback](#) ([FI_Widget](#) *widget, void *data)
The default callback for all widgets that don't set a callback.
- static unsigned int [label_shortcut](#) (const char *t)
Returns the Unicode value of the '&x' shortcut in a given text.
- static int [test_shortcut](#) (const char *, const bool require_alt=false)
Returns true if the given text t contains the entered '&x' shortcut.

Protected Types inherited from FI_Widget

- enum {
[INACTIVE](#) = 1<<0 , [INVISIBLE](#) = 1<<1 , [OUTPUT](#) = 1<<2 , [NOBORDER](#) = 1<<3 ,
[FORCE_POSITION](#) = 1<<4 , [NON_MODAL](#) = 1<<5 , [SHORTCUT_LABEL](#) = 1<<6 , [CHANGED](#) = 1<<7
, [OVERRIDE](#) = 1<<8 , [VISIBLE_FOCUS](#) = 1<<9 , [COPIED_LABEL](#) = 1<<10 , [CLIP_CHILDREN](#) = 1<<11
, [MENU_WINDOW](#) = 1<<12 , [TOOLTIP_WINDOW](#) = 1<<13 , [MODAL](#) = 1<<14 , [NO_OVERLAY](#) = 1<<15
, [GROUP_RELATIVE](#) = 1<<16 , [COPIED_TOOLTIP](#) = 1<<17 , [FULLSCREEN](#) = 1<<18 , [MAC_USE_ACCENTS_MENU](#)
= 1<<19 ,
[NEEDS_KEYBOARD](#) = 1<<20 , [IMAGE_BOUND](#) = 1<<21 , [DEIMAGE_BOUND](#) = 1<<22 ,
[AUTO_DELETE_USER_DATA](#) = 1<<23 ,
[MAXIMIZED](#) = 1<<24 , [POPUP](#) = 1<<25 , [USERFLAG3](#) = 1<<29 , [USERFLAG2](#) = 1<<30 ,
[USERFLAG1](#) = 1<<31 }
flags possible values enumeration.

12.164.1 Detailed Description

This widget is based off the [FI_Tabs](#) widget, but instead of displaying tabs it only changes "tabs" under program control.

Its primary purpose is to support "wizards" that step a user through configuration or troubleshooting tasks.

As with [FI_Tabs](#), wizard panes are composed of child (usually [FI_Group](#)) widgets. Navigation buttons must be added separately.

12.164.2 Constructor & Destructor Documentation

12.164.2.1 FI_Wizard()

```
Fl_Wizard::Fl_Wizard (
    int xx,
    int yy,
    int ww,
    int hh,
    const char * l = 0 )
```

The constructor creates the [FI_Wizard](#) widget at the specified position and size.

The inherited destructor destroys the widget and its children.

12.164.3 Member Function Documentation

12.164.3.1 draw()

```
void Fl_Wizard::draw (
    void ) [protected], [virtual]
```

Draws the wizard border and visible child.

Reimplemented from [Fl_Group](#).

12.164.3.2 next()

```
void Fl_Wizard::next ( )
```

This method shows the next child of the wizard.

If the last child is already visible, this function does nothing.

The documentation for this class was generated from the following files:

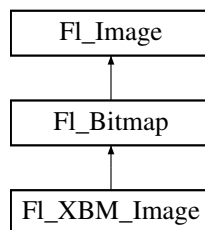
- [Fl_Wizard.H](#)
- [Fl_Wizard.cxx](#)

12.165 FI_XBM_Image Class Reference

The [Fl_XBM_Image](#) class supports loading, caching, and drawing of X Bitmap (XBM) bitmap files.

```
#include <Fl_XBM_Image.H>
```

Inheritance diagram for [Fl_XBM_Image](#):



Public Member Functions

- [Fl_XBM_Image](#) (const char *filename)
The constructor loads the named XBM file from the given name filename.

Public Member Functions inherited from [Fl_Bitmap](#)

- int **cache_h** ()
- int **cache_w** ()
- [Fl_Image](#) * **copy** () const
- [Fl_Image](#) * **copy** (int W, int H) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void **draw** (int X, int Y)
- void **draw** (int X, int Y, int W, int H, int cx=0, int cy=0) [FL_OVERRIDE](#)
Draws the image to the current drawing surface with a bounding box.
- [Fl_Bitmap](#) (const char *bits, int bits_length, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- [Fl_Bitmap](#) (const char *bits, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- [Fl_Bitmap](#) (const uchar *bits, int bits_length, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- [Fl_Bitmap](#) (const uchar *bits, int W, int H)

- The constructors create a new bitmap from the specified bitmap data.*

 - void `label (FI_Menu_Item *m) FL_OVERRIDE`

This method is an obsolete way to set the image attribute of a menu item.
- void `label (FI_Widget *w) FL_OVERRIDE`

This method is an obsolete way to set the image attribute of a widget or menu item.
- void `uncache () FL_OVERRIDE`

If the image has been cached for display, delete the cache data.
- virtual `~FI_Bitmap ()`

The destructor frees all memory and server resources that are used by the bitmap.

Public Member Functions inherited from FI_Image

- virtual class `FI_Shared_Image * as_shared_image ()`

Returns whether an image is an FI_Shared_Image or not.
- virtual void `color_average (FI_Color c, float i)`

The color_average() method averages the colors in the image with the provided FLTK color value.
- `FI_Image * copy () const`

Creates a copy of the image in the same size.
- int `count () const`

Returns the number of data values associated with the image.
- int `d () const`

Returns the image depth.
- const char *const * `data () const`

Returns a pointer to the current image data array.
- int `data_h () const`

Returns the height of the image data.
- int `data_w () const`

Returns the width of the image data.
- virtual void `desaturate ()`

The desaturate() method converts an image to grayscale.
- void `draw (int X, int Y)`

Draws the image to the current drawing surface.
- int `fail () const`

Returns a value that is not 0 if there is currently no image available.
- `FI_Image (int W, int H, int D)`

The constructor creates an empty image with the specified width, height, and depth.
- int `h () const`

Returns the current image drawing height in FLTK units.
- void `inactive ()`

The inactive() method calls color_average(FL_BACKGROUND_COLOR, 0.33f) to produce an image that appears grayed out.
- int `ld () const`

Returns the current line data size in bytes.
- virtual void `release ()`

Releases an FI_Image - the same as 'delete this'.
- virtual void `scale (int width, int height, int proportional=1, int can_expand=0)`

Sets the drawing size of the image.
- int `w () const`

Returns the current image drawing width in FLTK units.
- virtual `~FI_Image ()`

The destructor is a virtual method that frees all memory used by the image.

Additional Inherited Members

Static Public Member Functions inherited from [FI_Image](#)

- static [FI_Labeltype](#) [define_FL_IMAGE_LABEL](#) ()
- static [FI_RGB_Scaling](#) [RGB_scaling](#) ()
Returns the currently used RGB image scaling method.
- static void [RGB_scaling](#) ([FI_RGB_Scaling](#))
Sets the RGB image scaling method used for copy(int, int).
- static [FI_RGB_Scaling](#) [scaling_algorithm](#) ()
Gets what algorithm is used when resizing a source image to draw it.
- static void [scaling_algorithm](#) ([FI_RGB_Scaling](#) algorithm)
Sets what algorithm is used when resizing a source image to draw it.

Public Attributes inherited from [FI_Bitmap](#)

- int [alloc_array](#)
Non-zero if array points to bitmap data allocated internally.
- const [uchar](#) * [array](#)
pointer to raw bitmap data

Static Public Attributes inherited from [FI_Image](#)

- static const int [ERR_FILE_ACCESS](#) = -2
- static const int [ERR_FORMAT](#) = -3
- static const int [ERR_MEMORY_ACCESS](#) = -4
- static const int [ERR_NO_IMAGE](#) = -1
- static bool [register_images_done](#) = false
True after [fl_register_images\(\)](#) was called, false before.

Protected Member Functions inherited from [FI_Image](#)

- void [d](#) (int D)
Sets the current image depth.
- void [data](#) (const char *const *p, int c)
Sets the current data pointer and count of pointers in the array.
- void [draw_empty](#) (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- int [draw_scaled](#) (int X, int Y, int W, int H)
Draw the image to the current drawing surface rescaled to a given width and height.
- void [h](#) (int H)
Sets the height of the image data.
- void [ld](#) (int LD)
Sets the current line data size in bytes.
- void [w](#) (int W)
Sets the width of the image data.

Static Protected Member Functions inherited from [FI_Image](#)

- static void [labeltype](#) (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void [measure](#) (const [FI_Label](#) *lo, int &lw, int &lh)

12.165.1 Detailed Description

The [FI_XBM_Image](#) class supports loading, caching, and drawing of X Bitmap (XBM) bitmap files.

12.165.2 Constructor & Destructor Documentation

12.165.2.1 Fl_XBM_Image()

```
Fl_XBM_Image::Fl_XBM_Image (
    const char * name )
```

The constructor loads the named XBM file from the given name filename.

The destructor frees all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

- Fl_XBM_Image.H
- Fl_XBM_Image.cxx

12.166 Fl_XColor Struct Reference

Public Attributes

- unsigned char **b**
- unsigned char **g**
- unsigned char **mapped**
- unsigned long **pixel**
- unsigned char **r**

The documentation for this struct was generated from the following file:

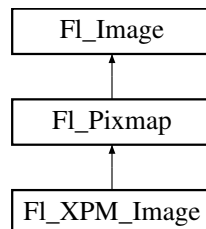
- Fl_XColor.H

12.167 Fl_XPM_Image Class Reference

The [Fl_XPM_Image](#) class supports loading, caching, and drawing of X Pixmap (XPM) images, including transparency.

```
#include <Fl_XPM_Image.H>
```

Inheritance diagram for Fl_XPM_Image:



Public Member Functions

- [Fl_XPM_Image](#) (const char *filename)
The constructor loads the XPM image from the name filename.

Public Member Functions inherited from [Fl_Pixmap](#)

- int **cache_h** ()
- int **cache_w** ()
- void **color_average** (Fl_Color c, float i) [FL_OVERRIDE](#)
The [color_average\(\)](#) method averages the colors in the image with the provided FLTK color value.
- [Fl_Image](#) * **copy** () const
- [Fl_Image](#) * **copy** (int W, int H) const [FL_OVERRIDE](#)
Creates a resized copy of the image.
- void **desaturate** () [FL_OVERRIDE](#)

- The `desaturate()` method converts an image to grayscale.*
- void **draw** (int X, int Y)
- void **draw** (int X, int Y, int W, int H, int cx=0, int cy=0) **FL_OVERRIDE**
Draws the image to the current drawing surface with a bounding box.
- **FI_Pixmap** (char *const *D)
The constructors create a new pixmap from the specified XPM data.
- **FI_Pixmap** (const char *const *D)
The constructors create a new pixmap from the specified XPM data.
- **FI_Pixmap** (const uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- **FI_Pixmap** (uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- void **label** (**FI_Menu_Item** *m) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a menu item.
- void **label** (**FI_Widget** *w) **FL_OVERRIDE**
This method is an obsolete way to set the image attribute of a widget or menu item.
- void **uncache** () **FL_OVERRIDE**
If the image has been cached for display, delete the cache data.
- virtual ~**FI_Pixmap** ()
The destructor frees all memory and server resources that are used by the pixmap.

Public Member Functions inherited from **FI_Image**

- virtual class **FI_Shared_Image** * **as_shared_image** ()
Returns whether an image is an `FI_Shared_Image` or not.
- **FI_Image** * **copy** () const
Creates a copy of the image in the same size.
- int **count** () const
Returns the number of data values associated with the image.
- int **d** () const
Returns the image depth.
- const char *const * **data** () const
Returns a pointer to the current image data array.
- int **data_h** () const
Returns the height of the image data.
- int **data_w** () const
Returns the width of the image data.
- void **draw** (int X, int Y)
Draws the image to the current drawing surface.
- int **fail** () const
Returns a value that is not 0 if there is currently no image available.
- **FI_Image** (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int **h** () const
Returns the current image drawing height in FLTK units.
- void **inactive** ()
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- int **ld** () const
Returns the current line data size in bytes.
- virtual void **release** ()

- *Releases an [FI_Image](#) - the same as 'delete this'.*
- virtual void [scale](#) (int width, int height, int proportional=1, int can_expand=0)
 - *Sets the drawing size of the image.*
- int [w](#) () const
 - *Returns the current image drawing width in FLTK units.*
- virtual [~FI_Image](#) ()
 - *The destructor is a virtual method that frees all memory used by the image.*

Additional Inherited Members

Static Public Member Functions inherited from [FI_Image](#)

- static [FI_Labeltype](#) [define_FL_IMAGE_LABEL](#) ()
- static [FI_RGB_Scaling](#) [RGB_scaling](#) ()
 - *Returns the currently used RGB image scaling method.*
- static void [RGB_scaling](#) ([FI_RGB_Scaling](#))
 - *Sets the RGB image scaling method used for copy(int, int).*
- static [FI_RGB_Scaling](#) [scaling_algorithm](#) ()
 - *Gets what algorithm is used when resizing a source image to draw it.*
- static void [scaling_algorithm](#) ([FI_RGB_Scaling](#) algorithm)
 - *Sets what algorithm is used when resizing a source image to draw it.*

Public Attributes inherited from [FI_Pixmap](#)

- int [alloc_data](#)

Static Public Attributes inherited from [FI_Image](#)

- static const int [ERR_FILE_ACCESS](#) = -2
- static const int [ERR_FORMAT](#) = -3
- static const int [ERR_MEMORY_ACCESS](#) = -4
- static const int [ERR_NO_IMAGE](#) = -1
- static bool [register_images_done](#) = false
 - *True after [fl_register_images\(\)](#) was called, false before.*

Protected Member Functions inherited from [FI_Pixmap](#)

- void [measure](#) ()

Protected Member Functions inherited from [FI_Image](#)

- void [d](#) (int D)
 - *Sets the current image depth.*
- void [data](#) (const char *const *p, int c)
 - *Sets the current data pointer and count of pointers in the array.*
- void [draw_empty](#) (int X, int Y)
 - *The protected method [draw_empty\(\)](#) draws a box with an X in it.*
- int [draw_scaled](#) (int X, int Y, int W, int H)
 - *Draw the image to the current drawing surface rescaled to a given width and height.*
- void [h](#) (int H)
 - *Sets the height of the image data.*
- void [ld](#) (int LD)
 - *Sets the current line data size in bytes.*
- void [w](#) (int W)
 - *Sets the width of the image data.*

Static Protected Member Functions inherited from [FI_Image](#)

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

12.167.1 Detailed Description

The [FI_XPM_Image](#) class supports loading, caching, and drawing of X Pixmap (XPM) images, including transparency.

12.167.2 Constructor & Destructor Documentation

12.167.2.1 [FI_XPM_Image](#)()

```
FI_XPM_Image::FI_XPM_Image (
    const char * name )
```

The constructor loads the XPM image from the name filename.

The destructor frees all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

- [FI_XPM_Image.H](#)
- [FI_XPM_Image.cxx](#)

12.168 [FI_GIF_Image::GIF_FRAME](#) Struct Reference

Classes

- struct [CPAL](#)

Public Member Functions

- void **colors** (int nclrs, int bg, int tp)
- void **disposal** (int mode, int delay)
- **GIF_FRAME** (int frame, int W, int H, int fx, int fy, int fw, int fh, [uchar](#) *data)
- **GIF_FRAME** (int frame, [uchar](#) *data)

Public Attributes

- int **bkgd**
- const [uchar](#) * **bptr**
- int **clrs**
- const struct [FI_GIF_Image::GIF_FRAME::CPAL](#) * **cpal**
- int **delay**
- int **dispose**
- int **h**
- int **height**
- int **ifrm**
- int **trans**
- int **w**
- int **width**
- int **x**
- int **y**

The documentation for this struct was generated from the following file:

- [FI_GIF_Image.H](#)

12.169 gtk_shell1_listener Struct Reference

Public Attributes

- void(* **capabilities**)(void *data, struct gtk_shell1 *gtk_shell1, uint32_t capabilities)

The documentation for this struct was generated from the following file:

- gtk-shell-client-protocol.h

12.170 gtk_surface1_listener Struct Reference

Public Attributes

- void(* **configure**)(void *data, struct gtk_surface1 *gtk_surface1, struct wl_array *states)
- void(* **configure_edges**)(void *data, struct gtk_surface1 *gtk_surface1, struct wl_array *constraints)

12.170.1 Member Data Documentation

12.170.1.1 configure_edges

```
void(* gtk_surface1_listener::configure_edges) (void *data, struct gtk_surface1 *gtk_surface1,
struct wl_array *constraints)
```

Since

2

The documentation for this struct was generated from the following file:

- gtk-shell-client-protocol.h

12.171 FI_ICO_Image::IconDirEntry Struct Reference

Windows ICONDIRENTRY structure

```
#include <FI_ICO_Image.H>
```

Public Attributes

- int **bColorCount**
Number of colors (0 if 8bpp)
- int **bHeight**
Image height.
- int **bReserved**
Reserved.
- int **bWidth**
Image width.
- int **dwBytesInRes**
Resource size in bytes.
- int **dwImageOffset**
Offset to the image.
- int **wBitCount**
Bits per pixel.
- int **wPlanes**
Color Planes.

12.171.1 Detailed Description

Windows ICONDIRENTRY structure

The documentation for this struct was generated from the following file:

- [FI_ICO_Image.H](#)

12.172 FI_Text_Editor::Key_Binding Struct Reference

Simple linked list item associating a key/state to a function.

```
#include <Fl_Text_Editor.H>
```

Public Attributes

- [Key_Func](#) **function**
associated function
- int **key**
the key pressed
- [Key_Binding](#) * **next**
next key binding in the list
- int **state**
the state of key modifiers

12.172.1 Detailed Description

Simple linked list item associating a key/state to a function.

The documentation for this struct was generated from the following file:

- [Fl_Text_Editor.H](#)

12.173 FI_Terminal::Margin Class Reference

Public Member Functions

- void **bottom** (int val)
- int **bottom** (void) const
- void **left** (int val)
- int **left** (void) const
- void **right** (int val)
- int **right** (void) const
- void **top** (int val)
- int **top** (void) const

The documentation for this class was generated from the following file:

- [Fl_Terminal.H](#)

12.174 FI_Preferences::Name Class Reference

'Name' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly.

```
#include <Fl_Preferences.H>
```


Public Member Functions

- [Name](#) (const char *format,...)
Creates a group name or entry name on the fly.
- [Name](#) (unsigned int n)
Creates a group name or entry name on the fly.
- **operator const char *** ()
Return the [Name](#) as a "C" string.

12.174.1 Detailed Description

'[Name](#)' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly.

Example: `prefs.set(Fl_Preferences::Name("File%d",i),file[i]);`

See `test/preferences.cxx` as a sample for writing arrays into preferences.

'[Name](#)' is actually implemented as a class inside [Fl_Preferences](#). It casts into `const char*` and gets automatically destroyed after the enclosing call ends.

12.174.2 Constructor & Destructor Documentation

12.174.2.1 Name() [1/2]

```
Fl_Preferences::Name::Name (
    unsigned int n )
```

Creates a group name or entry name on the fly.

This version creates a simple unsigned integer as an entry name.

```
int n, i;
Fl_Preferences prev( appPrefs, "PreviousFiles" );
prev.get( "n", 0 );
for ( i=0; i<n; i++ )
    prev.get( Fl_Preferences::Name(i), prevFile[i], "" );
```

12.174.2.2 Name() [2/2]

```
Fl_Preferences::Name::Name (
    const char * format,
    ... )
```

Creates a group name or entry name on the fly.

This version creates entry names as in 'printf'.

```
int n, i;
Fl_Preferences prefs( USER, "matthiasm.com", "test" );
prev.get( "nFiles", 0 );
for ( i=0; i<n; i++ )
    prev.get( Fl_Preferences::Name( "File%d", i ), prevFile[i], "" );
```

The documentation for this class was generated from the following files:

- `Fl_Preferences.H`
- `Fl_Preferences.cxx`

12.175 Fl_Preferences::Node Class Reference

Public Member Functions

- void **add** (const char *line)
- [Node *](#) **addChild** (const char *path)
- const char * **child** (int ix)
- [Node *](#) **childNode** (int ix)
- void **clearDirtyFlags** ()
- void **deleteAllChildren** ()
- void **deleteAllEntries** ()
- char **deleteEntry** (const char *name)

- char **dirty** ()
- [Entry](#) & **entry** (int i)
- [Node](#) * **find** (const char *path)
- [RootNode](#) * **findRoot** ()
- const char * **get** (const char *name)
- int **getEntry** (const char *name)
- const char * **name** ()
- int **nChildren** ()
- int **nEntry** ()
- [Node](#) (const char *path)
- [Node](#) * **parent** ()
- const char * **path** ()
- char **remove** ()
- [Node](#) * **search** (const char *path, int offset=0)
- void **set** (const char *line)
- void **set** (const char *name, const char *value)
- void **setParent** ([Node](#) *parent)
- void **setRoot** ([RootNode](#) *r)
- int **write** (FILE *f)

Static Public Attributes

- static int **lastEntrySet** = -1

The documentation for this class was generated from the following files:

- [Fl_Preferences.H](#)
- [Fl_Preferences.cxx](#)

12.176 [Fl_Paged_Device::page_format](#) Struct Reference

width, height and name of a page format

```
#include <Fl_Paged_Device.H>
```

Public Attributes

- int **height**
height in points
- const char * **name**
format name
- int **width**
width in points

12.176.1 Detailed Description

width, height and name of a page format

The documentation for this struct was generated from the following file:

- [Fl_Paged_Device.H](#)

12.177 FI_Terminal::PartialUtf8Buf Class Reference

Public Member Functions

- bool **append** (const char *p, int len)
- const char * **buf** (void) const
- int **buflen** (void) const
- void **clear** (void)
- bool **is_complete** (void) const
- bool **is_continuation** (char c)

The documentation for this class was generated from the following file:

- [FI_Terminal.H](#)

12.178 FI_Terminal::RingBuffer Class Reference

Public Member Functions

- void **change_disp_cols** (int dcols, const [CharStyle](#) &style)
- void **change_disp_rows** (int drows, const [CharStyle](#) &style)
- void **clear** (void)
- void **clear_disp_rows** (int sdrow, int edrow, const [CharStyle](#) &style)
- void **clear_hist** (void)
- void **create** (int drows, int dcols, int hrows)
- int **disp_cols** (void) const
- int **disp_erow** (void) const
- void **disp_rows** (int val)
- int **disp_rows** (void) const
- int **disp_srow** (void) const
- int **hist_cols** (void) const
- int **hist_erow** (void) const
- void **hist_rows** (int val)
- int **hist_rows** (void) const
- int **hist_srow** (void) const
- void **hist_use** (int val)
- int **hist_use** (void) const
- int **hist_use_srow** (void) const
- bool **is_disp_ring_row** (int grow) const
- bool **is_hist_ring_row** (int grow) const
- void **move_disp_row** (int src_row, int dst_row)
- int **offset** (void) const
- void **offset_adjust** (int rows)
- void **resize** (int drows, int dcols, int hrows, const [CharStyle](#) &style)
- [Utf8Char](#) * **ring_chars** (void)
- [Utf8Char](#) * **ring_chars** (void) const
- int **ring_cols** (void) const
- int **ring_erow** (void) const
- int **ring_rows** (void) const
- int **ring_srow** (void) const
- **RingBuffer** (int drows, int dcols, int hrows)
- void **scroll** (int rows, const [CharStyle](#) &style)
- [Utf8Char](#) * **u8c_disp_row** (int drow)
- const [Utf8Char](#) * **u8c_disp_row** (int drow) const
- [Utf8Char](#) * **u8c_hist_row** (int hrow)
- const [Utf8Char](#) * **u8c_hist_row** (int hrow) const

- [Utf8Char](#) * **u8c_hist_use_row** (int hurow)
- const [Utf8Char](#) * **u8c_hist_use_row** (int hurow) const
- [Utf8Char](#) * **u8c_ring_row** (int row)
- const [Utf8Char](#) * **u8c_ring_row** (int row) const

The documentation for this class was generated from the following files:

- [FI_Terminal.H](#)
- [FI_Terminal.cxx](#)

12.179 FI_Preferences::RootNode Class Reference

Public Member Functions

- char * **filename** ()
- char **getPath** (char *[path](#), int pathlen)
- int **read** ()
- [Root](#) **root** ()
- **RootNode** ([FI_Preferences](#) *)
- **RootNode** ([FI_Preferences](#) *, const char *[path](#), const char *[vendor](#), const char *[application](#), [Root](#) flags)
- **RootNode** ([FI_Preferences](#) *, [Root](#) root, const char *[vendor](#), const char *[application](#))
- int **write** ()

The documentation for this class was generated from the following files:

- [FI_Preferences.H](#)
- [FI_Preferences.cxx](#)

12.180 FI_Scroll::ScrollInfo Struct Reference

Structure to manage scrollbar and widget interior sizes.

```
#include <FI_Scroll.H>
```

Public Attributes

- [FI_Region_LRTB](#) **child**
child bounding box: left/right/top/bottom
- int **hneeded**
horizontal scrollbar visibility
- [FI_Scrollbar_Data](#) **hscroll**
horizontal scrollbar region + values
- [FI_Region_XYWH](#) **innerbox**
widget's inner box, excluding scrollbars
- [FI_Region_XYWH](#) **innerchild**
widget's inner box, including scrollbars
- int **scrollsize**
the effective scrollbar thickness (local or global)
- int **vneeded**
vertical scrollbar visibility
- [FI_Scrollbar_Data](#) **vscroll**
vertical scrollbar region + values

12.180.1 Detailed Description

Structure to manage scrollbar and widget interior sizes.

This is filled out by [recalc_scrollbars\(\)](#) for use in calculations that need to know the visible scroll area size, etc.

Version

1.3.3

The documentation for this struct was generated from the following file:

- [Fl_Scroll.H](#)

12.181 Fl_Terminal::Selection Class Reference

Public Member Functions

- bool **clear** (void)
- bool **dragged_off** (int row, int col)
- int **ecol** (void) const
- void **end** (void)
- int **erow** (void) const
- bool **extend** (int row, int col)
- bool [get_selection](#) (int &srow, int &scol, int &erow, int &ecol) const
Return selection start/end.
- bool **is_selection** (void) const
- void **push_clear** ()
- void **push_rowcol** (int row, int col)
- int **scol** (void) const
- void **scroll** (int nrows)
- void **select** (int srow, int scol, int erow, int ecol)
- void **selectionbgcolor** ([Fl_Color](#) val)
- [Fl_Color](#) **selectionbgcolor** (void) const
- void **selectionfgcolor** ([Fl_Color](#) val)
- [Fl_Color](#) **selectionfgcolor** (void) const
- int **srow** (void) const
- bool **start** (int row, int col)
- void **start_push** ()
- int **state** (void) const

12.181.1 Member Function Documentation

12.181.1.1 [get_selection\(\)](#)

```
bool Fl_Terminal::Selection::get_selection (
    int & srow,
    int & scol,
    int & erow,
    int & ecol ) const
```

Return selection start/end.

Ensures (start < end) to allow walking 'forward' thru selection, left-to-right, top-to-bottom.

Returns:

- true – valid selection values returned
- false – no selection was made, returned values undefined

The documentation for this class was generated from the following files:

- [Fl_Terminal.H](#)
- [Fl_Terminal.cxx](#)

12.182 FI_Tile::Size_Range Struct Reference

Public Attributes

- int **maxh**
- int **maxw**
- int **minh**
- int **minw**

The documentation for this struct was generated from the following file:

- FI_Tile.H

12.183 FI_Text_Display::Style_Table_Entry Struct Reference

This structure associates the color, font, and font size of a string to draw with an attribute mask matching attr.

```
#include <FI_Text_Display.H>
```

Public Attributes

- unsigned **attr**
further attributes for the text style (see ATTR_BGCOLOR, etc.)
- [FI_Color](#) **bgcolor**
text background color if ATTR_BGCOLOR or ATTR_BGCOLOR_EXT is set
- [FI_Color](#) **color**
text color
- [FI_Font](#) **font**
text font
- [FI_Fontsize](#) **size**
text font size

12.183.1 Detailed Description

This structure associates the color, font, and font size of a string to draw with an attribute mask matching attr.

There must be one entry for each style that can be used in an [FI_Text_Display](#) for displaying text. The style table is an array of struct [Style_Table_Entry](#).

The style table is associated with an [FI_Text_Display](#) by using [FI_Text_Display::highlight_data\(\)](#).

See also

[FI_Text_Display::highlight_data\(\)](#)

The documentation for this struct was generated from the following file:

- FI_Text_Display.H

12.184 FI_Terminal::Utf8Char Class Reference

Public Member Functions

- [FI_Color](#) **attr_bg_color** (const [FI_Widget](#) *grp) const
- [FI_Color](#) **attr_color** ([FI_Color](#) col, const [FI_Widget](#) *grp) const
- [FI_Color](#) **attr_fg_color** (const [FI_Widget](#) *grp) const
- [uchar](#) **attrib** (void) const
- [FI_Color](#) **bgcolor** (void) const
- [uchar](#) **charflags** (void) const
- void **clear** (const [CharStyle](#) &style)
- [FI_Color](#) **fgcolor** (void) const

- void **fl_font_set** (const [CharStyle](#) &style) const
- bool **is_char** (char c) const
- int **length** (void) const
- int **max_utf8** () const
- [Utf8Char](#) & **operator=** (const [Utf8Char](#) &o)
- double **pwidth** (void) const
- int **pwidth_int** (void) const
- void **show_char** (void) const
- void **show_char_info** (void) const
- void **text_ascii** (char c, const [CharStyle](#) &style)
- void **text_utf8** (const char *text, int len, const [CharStyle](#) &style)
- const char * **text_utf8** (void) const
- [Utf8Char](#) (const [Utf8Char](#) &o)

The documentation for this class was generated from the following files:

- [FI_Terminal.H](#)
- [FI_Terminal.cxx](#)

Chapter 13

File Documentation

13.1 Enumerations.H File Reference

This file contains type definitions and general enumerations.

```
#include <FL/fl_config.h>
#include "Fl_Export.H"
#include "fl_types.h"
#include <FL/platform_types.h>
```

Macros

- #define **FL_IMAGE_WITH_ALPHA** 0x40000000

Version Numbers

FLTK defines some constants to help the programmer to find out, for which FLTK version a program is compiled.

The following constants are defined:

- #define **FL_ABI_VERSION** **FL_API_VERSION**
The FLTK ABI (Application Binary Interface) version number as an int.
- #define **FL_API_VERSION** (**FL_MAJOR_VERSION***10000 + **FL_MINOR_VERSION***100 + **FL_PATCH_VERSION**)
The FLTK API version number as an int.
- #define **FL_MAJOR_VERSION** 1
The major release version of this FLTK library.
- #define **FL_MINOR_VERSION** 4
The minor release version for this library.
- #define **FL_PATCH_VERSION** 0
The patch version for this library.
- #define **FL_VERSION**
The FLTK version number as a double.

Names of Non-ASCII keys and mouse buttons

The following constants define the names of non-ASCII keys on the keyboard and of mouse buttons for **FL_↔** **KEYBOARD** and **FL_SHORTCUT** events.

See also

[Fl::event_key\(\)](#) and [Fl::get_key\(int\)](#) (use ASCII letters for all other keys):

- #define **FL_Alt_L** 0xffe9
The left alt key.
- #define **FL_Alt_R** 0xffea
The right alt key.
- #define **FL_Back** 0xEF26
Like back on a browser.

- **#define FL_BackSpace** 0xff08
The backspace key.
- **#define FL_Button** 0xfee8
A mouse button; use FL_Button + n for mouse button n.
- **#define FL_Caps_Lock** 0xfe5
The caps lock key.
- **#define FL_Control_L** 0xfe3
The lefthand control key.
- **#define FL_Control_R** 0xfe4
The righthand control key.
- **#define FL_Delete** 0xffff
The delete key.
- **#define FL_Down** 0xff54
The down arrow key.
- **#define FL_Eisu** 0xff2f
The Eisu key of JIS keyboards.
- **#define FL_End** 0xff57
The end key.
- **#define FL_Enter** 0xf0d
The enter key.
- **#define FL_Escape** 0xff1b
The escape key.
- **#define FL_F** 0xffbd
One of the function keys; use FL_F + n for function key n.
- **#define FL_F_Last** 0xfe0
The last function key; use to range-check function keys.
- **#define FL_Favorites** 0xEF30
Show favorite locations.
- **#define FL_Forward** 0xEF27
Like forward on a browser.
- **#define FL_Help** 0xff68
The 'help' key on Mac keyboards.
- **#define FL_Home** 0xff50
The home key.
- **#define FL_Home_Page** 0xEF18
Display user's home page.
- **#define FL_Insert** 0xff63
The insert key.
- **#define FL_Iso_Key** 0xff0c
The additional key of ISO keyboards.
- **#define FL_JIS_Underscore** 0xff31
The underscore key of JIS keyboards.
- **#define FL_Kana** 0xff2e
The Kana key of JIS keyboards.
- **#define FL_KP** 0xff80
One of the keypad numbers; use FL_KP + 'n' for digit n.
- **#define FL_KP_Enter** 0xff8d
The enter key on the keypad, same as FL_KP+'r'.
- **#define FL_KP_Last** 0xffbd
The last keypad key; use to range-check keypad.
- **#define FL_Left** 0xff51
The left arrow key.
- **#define FL_Mail** 0xEF19
Invoke user's mail program.
- **#define FL_Media_Next** 0xEF17
Next track.
- **#define FL_Media_Play** 0xEF14
Start playing of audio.
- **#define FL_Media_Prev** 0xEF16

- Previous track.*
- #define **FL_Media_Stop** 0xEF15
Stop playing audio.
- #define **FL_Menu** 0xf67
The menu key.
- #define **FL_Meta_L** 0xffe7
The left meta/Windows key.
- #define **FL_Meta_R** 0xffe8
The right meta/Windows key.
- #define **FL_Num_Lock** 0xff7f
The num lock key.
- #define **FL_Page_Down** 0xff56
The page-down key.
- #define **FL_Page_Up** 0xff55
The page-up key.
- #define **FL_Pause** 0xff13
The pause key.
- #define **FL_Print** 0xff61
The print (or print-screen) key.
- #define **FL_Refresh** 0xEF29
Refresh the page.
- #define **FL_Right** 0xff53
The right arrow key.
- #define **FL_Scroll_Lock** 0xff14
The scroll lock key.
- #define **FL_Search** 0xEF1B
Search.
- #define **FL_Shift_L** 0xffe1
The lefthand shift key.
- #define **FL_Shift_R** 0xffe2
The righthand shift key.
- #define **FL_Sleep** 0xEF2F
Put system to sleep.
- #define **FL_Stop** 0xEF28
Stop current operation.
- #define **FL_Tab** 0xff09
The tab key.
- #define **FL_Up** 0xff52
The up arrow key.
- #define **FL_Volume_Down** 0xEF11
Volume control down.
- #define **FL_Volume_Mute** 0xEF12
Mute sound from the system.
- #define **FL_Volume_Up** 0xEF13
Volume control up.
- #define **FL_Yen** 0xff30
The Yen key of JIS keyboards.

Mouse Buttons

These constants define the button numbers for `FL_PUSH` and `FL_RELEASE` events.

See also

[`Fl::event_button\(\)`](#)

- #define **FL_LEFT_MOUSE** 1
The left mouse button.
- #define **FL_MIDDLE_MOUSE** 2
The middle mouse button.
- #define **FL_RIGHT_MOUSE** 3

The right mouse button.

Event States

The following constants define bits in the `Fl::event_state()` value.

- `#define FL_ALT 0x00080000`
One of the alt keys is down.
- `#define FL_BUTTON(n) (0x00800000<<(n))`
Mouse button n (n > 0) is pushed.
- `#define FL_BUTTON1 0x01000000`
Mouse button 1 is pushed.
- `#define FL_BUTTON2 0x02000000`
Mouse button 2 is pushed.
- `#define FL_BUTTON3 0x04000000`
Mouse button 3 is pushed.
- `#define FL_BUTTONS 0x7f000000`
Any mouse button is pushed.
- `#define FL_CAPS_LOCK 0x00020000`
The caps lock is on.
- `#define FL_CTRL 0x00040000`
One of the ctrl keys is down.
- `#define FL_KEY_MASK 0x0000ffff`
All keys are 16 bit for now.
- `#define FL_META 0x00400000`
One of the meta/Windows keys is down.
- `#define FL_NUM_LOCK 0x00100000`
The num lock is on.
- `#define FL_SCROLL_LOCK 0x00800000`
The scroll lock is on.
- `#define FL_SHIFT 0x00010000`
One of the shift keys is down.

Typedefs

- `typedef int Fl_Fontsize`
Size of a font in pixels.

Enumerations

- `enum { FL_READ = 1 , FL_WRITE = 4 , FL_EXCEPT = 8 }`
FD "when" conditions.
- `enum Fl_Arrow_Type { FL_ARROW_SINGLE = 0x01 , FL_ARROW_DOUBLE = 0x02 , FL_ARROW_CHOICE = 0x03 , FL_ARROW_RETURN = 0x04 }`
Arrow types define the type of arrow drawing function.
- `enum Fl_Damage {
FL_DAMAGE_CHILD = 0x01 , FL_DAMAGE_EXPOSE = 0x02 , FL_DAMAGE_SCROLL = 0x04 ,
FL_DAMAGE_OVERLAY = 0x08 ,
FL_DAMAGE_USER1 = 0x10 , FL_DAMAGE_USER2 = 0x20 , FL_DAMAGE_ALL = 0x80 }`
Damage masks.
- `enum Fl_Event {
FL_NO_EVENT = 0 , FL_PUSH = 1 , FL_RELEASE = 2 , FL_ENTER = 3 ,
FL_LEAVE = 4 , FL_DRAG = 5 , FL_FOCUS = 6 , FL_UNFOCUS = 7 ,
FL_KEYDOWN = 8 , FL_KEYBOARD = 8 , FL_KEYUP = 9 , FL_CLOSE = 10 ,
FL_MOVE = 11 , FL_SHORTCUT = 12 , FL_DEACTIVATE = 13 , FL_ACTIVATE = 14 ,
FL_HIDE = 15 , FL_SHOW = 16 , FL_PASTE = 17 , FL_SELECTIONCLEAR = 18 ,
FL_MOUSEWHEEL = 19 , FL_DND_ENTER = 20 , FL_DND_DRAG = 21 , FL_DND_LEAVE = 22 ,
FL_DND_RELEASE = 23 , FL_SCREEN_CONFIGURATION_CHANGED = 24 , FL_FULLSCREEN = 25 ,
FL_ZOOM_GESTURE = 26 ,
FL_ZOOM_EVENT = 27 }`

Every time a user moves the mouse pointer, clicks a button, or presses a key, an event is generated and sent to your application.

- enum `Fl_Labeltype` {
`FL_NORMAL_LABEL` = 0, `FL_NO_LABEL`, `_FL_SHADOW_LABEL`, `_FL_ENGRAVED_LABEL`,
`_FL_EMBOSSED_LABEL`, `_FL_MULTI_LABEL`, `_FL_ICON_LABEL`, `_FL_IMAGE_LABEL`,
`FL_FREE_LABELTYPE` }

The `labeltype()` method sets the type of the label.

- enum `Fl_Mode` {
`FL_RGB` = 0, `FL_INDEX` = 1, `FL_SINGLE` = 0, `FL_DOUBLE` = 2,
`FL_ACCUM` = 4, `FL_ALPHA` = 8, `FL_DEPTH` = 16, `FL_STENCIL` = 32,
`FL_RGB8` = 64, `FL_MULTISAMPLE` = 128, `FL_STEREO` = 256, `FL_FAKE_SINGLE` = 512,
`FL_OPENGL3` = 1024 }

visual types and `Fl_Gl_Window::mode()` (values match `Glut`)

- enum `Fl_Orientation` {
`FL_ORIENT_NONE` = 0x00, `FL_ORIENT_RIGHT` = 0x00, `FL_ORIENT_NE` = 0x01, `FL_ORIENT_UP` =
0x02,
`FL_ORIENT_NW` = 0x03, `FL_ORIENT_LEFT` = 0x04, `FL_ORIENT_SW` = 0x05, `FL_ORIENT_DOWN` =
0x06,
`FL_ORIENT_SE` = 0x07 }

`Fl_Orientation` describes the orientation of a GUI element.

When Conditions

- enum `Fl_When` {
`FL_WHEN_NEVER` = 0, `FL_WHEN_CHANGED` = 1, `FL_WHEN_NOT_CHANGED` = 2, `FL_WHEN_RELEASE`
= 4,
`FL_WHEN_RELEASE_ALWAYS` = 6, `FL_WHEN_ENTER_KEY` = 8, `FL_WHEN_ENTER_KEY_ALWAYS`
= 10, `FL_WHEN_ENTER_KEY_CHANGED` = 11,
`FL_WHEN_CLOSED` = 16 }

These constants determine when a callback is performed.

Callback Reasons

- enum `Fl_Callback_Reason` {
`FL_REASON_UNKNOWN` = 0, `FL_REASON_SELECTED`, `FL_REASON_DESELECTED`, `FL_REASON_RESELECTED`
,
`FL_REASON_OPENED`, `FL_REASON_CLOSED`, `FL_REASON_DRAGGED`, `FL_REASON_CANCELLED`
,
`FL_REASON_CHANGED`, `FL_REASON_GOT_FOCUS`, `FL_REASON_LOST_FOCUS`, `FL_REASON_RELEASED`
,
`FL_REASON_ENTER_KEY`, `FL_REASON_USER` = 32 }

These constants describe why a callback is performed.

Cursors

- enum `Fl_Cursor` {
`FL_CURSOR_DEFAULT` = 0, `FL_CURSOR_ARROW` = 35, `FL_CURSOR_CROSS` = 66,
`FL_CURSOR_WAIT` = 76,
`FL_CURSOR_INSERT` = 77, `FL_CURSOR_HAND` = 31, `FL_CURSOR_HELP` = 47, `FL_CURSOR_MOVE`
= 27,
`FL_CURSOR_NS` = 78, `FL_CURSOR_WE` = 79, `FL_CURSOR_NWSE` = 80, `FL_CURSOR_NESW` =
81,
`FL_CURSOR_N` = 70, `FL_CURSOR_NE` = 69, `FL_CURSOR_E` = 49, `FL_CURSOR_SE` = 8,
`FL_CURSOR_S` = 9, `FL_CURSOR_SW` = 7, `FL_CURSOR_W` = 36, `FL_CURSOR_NW` = 68,
`FL_CURSOR_NONE` = 255 }

The following constants define the mouse cursors that are available in `FLTK`.

Variables

- [FL_Fontsize FL_NORMAL_SIZE](#)

normal font size

Box Types

FLTK standard box types

This enum defines the standard box types included with FLTK.

Note

The documented enum `Fl_Boxtype` contains some values (names) with leading underscores, e.g. `_FL_SHADOW_BOX`. This is due to technical reasons - please use the same values (names) without the leading underscore in your code! Enum values with leading underscores are reserved for internal use and subject to change without notice!

`FL_NO_BOX` means nothing is drawn at all, so whatever is already on the screen remains. The `FL_..._FRAME` types only draw their edges, leaving the interior unchanged. The blue color in the image below is the area that is not drawn by the frame types.

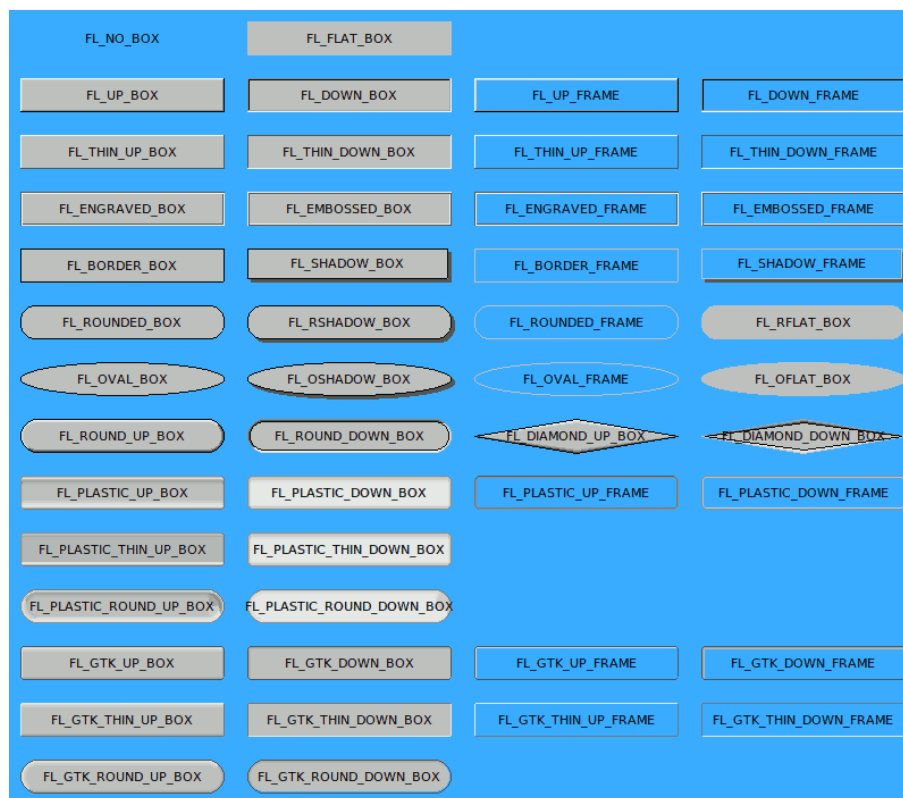


Figure 13.1 FLTK Standard Box Types

Note

Not all box types are depicted in the figure above. See enum [Fl_Boxtype](#) below for the complete list of box types.

See also

[Fl::get_system_colors\(\)](#)

- [Fl_Boxtype fl_box \(Fl_Boxtype b\)](#)

Get the filled version of a frame.

- enum `Fl_Boxtype` {
 - `FL_NO_BOX = 0`, `FL_FLAT_BOX`, `FL_UP_BOX`, `FL_DOWN_BOX`,
 - `FL_UP_FRAME`, `FL_DOWN_FRAME`, `FL_THIN_UP_BOX`, `FL_THIN_DOWN_BOX`,
 - `FL_THIN_UP_FRAME`, `FL_THIN_DOWN_FRAME`, `FL_ENGRAVED_BOX`, `FL_EMBOSSSED_BOX`,
 - `FL_ENGRAVED_FRAME`, `FL_EMBOSSSED_FRAME`, `FL_BORDER_BOX`, `_FL_SHADOW_BOX`,
 - `FL_BORDER_FRAME`, `_FL_SHADOW_FRAME`, `_FL_ROUNDED_BOX`, `_FL_RSHADOW_BOX`,
 - `_FL_ROUNDED_FRAME`, `_FL_RFLAT_BOX`, `_FL_ROUND_UP_BOX`, `_FL_ROUND_DOWN_BOX`,
 - `_FL_DIAMOND_UP_BOX`, `_FL_DIAMOND_DOWN_BOX`, `_FL_OVAL_BOX`, `_FL_OSHADOW_BOX`,
 - `_FL_OVAL_FRAME`, `_FL_OFLAT_BOX`, `_FL_PLASTIC_UP_BOX`, `_FL_PLASTIC_DOWN_BOX`,
 - `_FL_PLASTIC_UP_FRAME`, `_FL_PLASTIC_DOWN_FRAME`, `_FL_PLASTIC_THIN_UP_BOX`,
 - `_FL_PLASTIC_THIN_DOWN_BOX`,
 - `_FL_PLASTIC_ROUND_UP_BOX`, `_FL_PLASTIC_ROUND_DOWN_BOX`, `_FL_GTK_UP_BOX`,
 - `_FL_GTK_DOWN_BOX`,
 - `_FL_GTK_UP_FRAME`, `_FL_GTK_DOWN_FRAME`, `_FL_GTK_THIN_UP_BOX`, `_FL_GTK_THIN_DOWN_BOX`,
 - ,
 - `_FL_GTK_THIN_UP_FRAME`, `_FL_GTK_THIN_DOWN_FRAME`, `_FL_GTK_ROUND_UP_BOX`,
 - `_FL_GTK_ROUND_DOWN_BOX`,
 - `_FL_GLEAM_UP_BOX`, `_FL_GLEAM_DOWN_BOX`, `_FL_GLEAM_UP_FRAME`, `_FL_GLEAM_DOWN_FRAME`,
 - ,
 - `_FL_GLEAM_THIN_UP_BOX`, `_FL_GLEAM_THIN_DOWN_BOX`, `_FL_GLEAM_ROUND_UP_BOX`,
 - `_FL_GLEAM_ROUND_DOWN_BOX`,
 - `_FL_OXY_UP_BOX`, `_FL_OXY_DOWN_BOX`, `_FL_OXY_UP_FRAME`, `_FL_OXY_DOWN_FRAME`,
 - `_FL_OXY_THIN_UP_BOX`, `_FL_OXY_THIN_DOWN_BOX`, `_FL_OXY_THIN_UP_FRAME`, `_FL_OXY_THIN_DOWN_FRAME`,
 - ,
 - `_FL_OXY_ROUND_UP_BOX`, `_FL_OXY_ROUND_DOWN_BOX`, `_FL_OXY_BUTTON_UP_BOX`,
 - `_FL_OXY_BUTTON_DOWN_BOX`,
 - `FL_FREE_BOXTYPE` }

FLTK standard box types.

- `#define FL_CIRCLE_BOX FL_ROUND_DOWN_BOX`
- `#define FL_DIAMOND_BOX FL_DIAMOND_DOWN_BOX`
- `Fl_Boxtype fl_down (Fl_Boxtype b)`
 - Get the "pressed" or "down" version of a box.*
- `Fl_Boxtype fl_frame (Fl_Boxtype b)`
 - Get the unfilled, frame only version of a box.*
- `#define FL_FRAME FL_ENGRAVED_FRAME`
- `#define FL_FRAME_BOX FL_ENGRAVED_BOX`
- `Fl_Labeltype fl_define_FL_EMBOSSSED_LABEL ()`
 - Initializes the internal table entry for `FL_EMBOSSSED_LABEL` and returns its internal value.*
- `Fl_Labeltype fl_define_FL_ENGRAVED_LABEL ()`
 - Initializes the internal table entry for `FL_ENGRAVED_LABEL` and returns its internal value.*
- `Fl_Labeltype fl_define_FL_ICON_LABEL ()`
 - Initializes the internal table entry for `FL_ICON_LABEL` and returns its internal value.*
- `Fl_Labeltype fl_define_FL_IMAGE_LABEL ()`
 - Initializes the internal table entry for `FL_IMAGE_LABEL` and returns its internal value.*
- `Fl_Labeltype fl_define_FL_MULTI_LABEL ()`
 - Initializes the internal table entry for `FL_MULTI_LABEL` and returns its internal value.*
- `Fl_Labeltype fl_define_FL_SHADOW_LABEL ()`
 - Initializes the internal table entry for `FL_SHADOW_LABEL` and returns its internal value.*
- `#define FL_EMBOSSSED_LABEL fl_define_FL_EMBOSSSED_LABEL()`
 - Draws a label with embossed text.*
- `#define FL_ENGRAVED_LABEL fl_define_FL_ENGRAVED_LABEL()`
 - Draws a label with engraved text.*
- `#define FL_ICON_LABEL fl_define_FL_ICON_LABEL()`
 - Draws an icon as the label.*

- `#define FL_IMAGE_LABEL fl_define_FL_IMAGE_LABEL()`
Draws an image (FL_Image) as the label.
- `#define FL_MULTI_LABEL fl_define_FL_MULTI_LABEL()`
Draws a label that can comprise several parts like text and images.
- `#define FL_SHADOW_LABEL fl_define_FL_SHADOW_LABEL()`
Draws a label with shadows behind the text.
- `#define FL_SYMBOL_LABEL FL_NORMAL_LABEL`
Sets the current label type and returns its corresponding FL_Labeltype value.

Colors

The FL_Color type holds an FLTK color value.

Colors are either 8-bit indexes into a `virtual colormap` or 24-bit RGB color values. (See [Colors](#) for the default FLTK colormap)

Color indices occupy the lower 8 bits of the value, while RGB colors occupy the upper 24 bits, for a byte organization of RGBI.

```
Fl_Color => 0xrrgbbbii
           | | | |
           | | | +---- index between 0 and 255
           | | +----- blue color component (8 bit)
           | +----- green component (8 bit)
           +----- red component (8 bit)
```

A color can have either an index or an rgb value. Colors with rgb set and an index >0 are reserved for special use.

- `const FL_Color FL_BACKGROUND2_COLOR = 7`
the default background color for text, list, and valuator widgets
- `const FL_Color FL_BACKGROUND_COLOR = 49`
Default background color.
- `const FL_Color FL_BLACK = 56`
- `const FL_Color FL_BLUE = 216`
- `typedef unsigned int FL_Color`
An FLTK color value; see also [Colors](#)
- `FL_Color fl_color_average (FL_Color c1, FL_Color c2, float weight)`
Returns the weighted average color between the two given colors.
- `#define FL_COLOR_CUBE (FL_Color)56`
- `FL_Color fl_color_cube (int r, int g, int b)`
Returns a color out of the color cube.
- `FL_Color fl_contrast (FL_Color fg, FL_Color bg, FL_Fontsize fs=0, int context=0)`
Returns a color that contrasts with the background color.
- `typedef FL_Color() FL_Contrast_Function(FL_Color, FL_Color, FL_Fontsize, int)`
Type of a custom fl_contrast() function.
- `void fl_contrast_function (FL_Contrast_Function *f)`
Register a custom contrast function.
- `int fl_contrast_level ()`
Get the contrast level (sensitivity) of the fl_contrast() method.
- `void fl_contrast_level (int level)`
Set the contrast level (sensitivity) of the fl_contrast() method.
- `enum FL_Contrast_Mode {`
`FL_CONTRAST_NONE = 0, FL_CONTRAST_LEGACY, FL_CONTRAST_CIELAB, FL_CONTRAST_CUSTOM`
`,`
`FL_CONTRAST_LAST }`

- Define the possible modes to calculate `fl_contrast()`.
- `int fl_contrast_mode ()`
 - Return the current contrast algorithm (mode).
- `void fl_contrast_mode (int mode)`
 - Set the contrast algorithm (mode).
- `const FI_Color FL_CYAN = 223`
- `const FI_Color FL_DARK1 = 47`
- `const FI_Color FL_DARK2 = 45`
- `const FI_Color FL_DARK3 = 39`
- `const FI_Color FL_DARK_BLUE = 136`
- `const FI_Color FL_DARK_CYAN = 140`
- `const FI_Color FL_DARK_GREEN = 60`
- `const FI_Color FL_DARK_MAGENTA = 152`
- `const FI_Color FL_DARK_RED = 72`
- `const FI_Color FL_DARK_YELLOW = 76`
- `FI_Color fl_darker (FI_Color c)`
 - Returns a darker version of the specified color.
- `const FI_Color FL_FOREGROUND_COLOR = 0`
 - the default foreground color (0) used for labels and text
- `#define FL_FREE_COLOR (FI_Color)16`
 - Colors numbered between `FL_FREE_COLOR` and `FL_FREE_COLOR + FL_NUM_FREE_COLOR - 1` are free for the user to be given any value using `FI::set_color()`.
- `#define FL_GRAY FL_BACKGROUND_COLOR`
- `const FI_Color FL_GRAY0 = 32`
- `#define FL_GRAY_RAMP (FI_Color)32`
- `FI_Color fl_gray_ramp (int i)`
 - Returns a gray color value from black ($i == 0$) to white ($i == FL_NUM_GRAY - 1$).
- `const FI_Color FL_GREEN = 63`
- `FI_Color fl_inactive (FI_Color c)`
 - Returns the inactive, dimmed version of the given color.
- `const FI_Color FL_INACTIVE_COLOR = 8`
 - the inactive foreground color
- `const FI_Color FL_LIGHT1 = 50`
- `const FI_Color FL_LIGHT2 = 52`
- `const FI_Color FL_LIGHT3 = 54`
- `FI_Color fl_lighter (FI_Color c)`
 - Returns a lighter version of the specified color.
- `double fl_lightness (FI_Color color)`
 - Return the perceived lightness of a color.
- `double fl_luminance (FI_Color color)`
 - Return the raw / physical luminance of a color.
- `const FI_Color FL_MAGENTA = 248`
- `#define FL_NUM_BLUE 5`
- `#define FL_NUM_FREE_COLOR 16`
- `#define FL_NUM_GRAY 24`
- `#define FL_NUM_GREEN 8`
- `#define FL_NUM_RED 5`
- `const FI_Color FL_RED = 88`
- `FI_Color fl_rgb_color (uchar g)`
 - Returns the 24-bit color value closest to g (grayscale).
- `FI_Color fl_rgb_color (uchar r, uchar g, uchar b)`
 - Returns the 24-bit color value closest to x, g, b .
- `const FI_Color FL_SELECTION_COLOR = 15`
 - the default selection/highlight color
- `const FI_Color FL_WHITE = 255`
- `const FI_Color FL_YELLOW = 95`

Alignment Flags

Flags to control the label alignment.

This controls how the label is displayed next to or inside the widget. The default value is `FL_ALIGN_CENTER` (0) for most widgets, which centers the label inside the widget.

All alignment flags use the common prefix "`FL_ALIGN_`". In the following descriptions this prefix is sometimes omitted for brevity.

Flags can be or'd to achieve a combination of alignments, but there are some "*magic values*" (e.g. combinations of `TOP` and `BOTTOM` and of `LEFT` and `RIGHT`) that have special meanings (see below). For instance:

`FL_ALIGN_TOP_LEFT == (FL_ALIGN_TOP | FL_ALIGN_LEFT) != FL_ALIGN_LEFT_TOP.`

Outside alignments (`FL_ALIGN_INSIDE` is not set):

```

      TOP_LEFT      TOP      TOP_RIGHT
+-----+
LEFT_TOP |                | RIGHT_TOP
|                |                |
LEFT |          CENTER    | RIGHT
|                |                |
LEFT_BOTTOM |            | RIGHT_BOTTOM
+-----+
      BOTTOM_LEFT  BOTTOM  BOTTOM_RIGHT

```

Inside alignments (`FL_ALIGN_INSIDE` is set):

```

+-----+
|TOP_LEFT      TOP      TOP_RIGHT|
|                |                |
|LEFT          CENTER    RIGHT|
|                |                |
|BOTTOM_LEFT  BOTTOM  BOTTOM_RIGHT|
+-----+

```

See also

[Fl_Align](#), [FL_ALIGN_CENTER](#), etc.

Note

1. Bit positions not defined in the following constants of type `Fl_Align` are reserved for future extensions. Do not use.
2. The "*magic values*" (`FL_ALIGN_`)`LEFT_TOP`, `RIGHT_TOP`, `LEFT_BOTTOM`, and `RIGHT_BOTTOM` must not be used together with `FL_ALIGN_INSIDE`. Use `TOP_LEFT`, `TOP_RIGHT`, `BOTTOM_LEFT`, or `BOTTOM_RIGHT` instead.
3. Although bits can be or'd together there are some unused/illegal combinations, for instance:
 - setting both `FL_ALIGN_TOP` and `FL_ALIGN_BOTTOM` in combinations other than those given in the `Fl_Align` constants below (magic values)
 - setting both `FL_ALIGN_LEFT` and `FL_ALIGN_RIGHT` in combinations other than those given in the `Fl_Align` constants below (magic values)
 - using one of the "magic values" (2) together with `FL_ALIGN_INSIDE`

Using illegal bit combinations or undefined bits may yield unexpected behavior, and this behavior may be changed without notice in future FLTK versions.

• typedef unsigned **Fl_Align**

FLTK type for alignment control.

- const `Fl_Align FL_ALIGN_BOTTOM` = 0x0002

Align the label at the bottom of the widget.

- const `Fl_Align FL_ALIGN_BOTTOM_LEFT` = `FL_ALIGN_BOTTOM` | `FL_ALIGN_LEFT`
- const `Fl_Align FL_ALIGN_BOTTOM_RIGHT` = `FL_ALIGN_BOTTOM` | `FL_ALIGN_RIGHT`
- const `Fl_Align FL_ALIGN_CENTER` = 0x0000

Align the label horizontally in the middle.

- const `Fl_Align FL_ALIGN_CLIP` = 0x0040

All parts of the label that are larger than the widget will not be drawn.

- const `Fl_Align FL_ALIGN_IMAGE_BACKDROP` = 0x0200

If the label contains an image, draw the image or deimage in the background.

- const [Fl_Align](#) **FL_ALIGN_IMAGE_MASK** = 0x0320
Mask value to test for image alignment flags.
- const [Fl_Align](#) **FL_ALIGN_IMAGE_NEXT_TO_TEXT** = 0x0100
If the label contains an image, draw the text to the right of the image.
- const [Fl_Align](#) **FL_ALIGN_IMAGE_OVER_TEXT** = 0x0000
If the label contains an image, draw the text below the image.
- const [Fl_Align](#) **FL_ALIGN_INSIDE** = 0x0010
Draw the label inside of the widget.
- const [Fl_Align](#) **FL_ALIGN_LEFT** = 0x0004
Align the label at the left of the widget.
- const [Fl_Align](#) **FL_ALIGN_LEFT_BOTTOM** = 0x000d
Outside only, left of widget, bottom position, magic value: TOP | LEFT | RIGHT.
- const [Fl_Align](#) **FL_ALIGN_LEFT_TOP** = 0x0007
Outside only, left of widget, top position, magic value: TOP | BOTTOM | LEFT.
- const [Fl_Align](#) **FL_ALIGN_NOWRAP** = 0x0000
Nothing, same as FL_ALIGN_CENTER, for back compatibility.
- const [Fl_Align](#) **FL_ALIGN_POSITION_MASK** = 0x000f
Mask value to test for TOP, BOTTOM, LEFT, and RIGHT flags.
- const [Fl_Align](#) **FL_ALIGN_RIGHT** = 0x0008
Align the label to the right of the widget.
- const [Fl_Align](#) **FL_ALIGN_RIGHT_BOTTOM** = 0x000e
Outside only, right of widget, bottom position, magic value: BOTTOM | LEFT | RIGHT.
- const [Fl_Align](#) **FL_ALIGN_RIGHT_TOP** = 0x000b
Outside only, right of widget, top position, magic value: TOP | BOTTOM | RIGHT.
- const [Fl_Align](#) **FL_ALIGN_TEXT_NEXT_TO_IMAGE** = 0x0120
If the label contains an image, draw the text to the left of the image.
- const [Fl_Align](#) **FL_ALIGN_TEXT_OVER_IMAGE** = 0x0020
If the label contains an image, draw the text on top of the image.
- const [Fl_Align](#) **FL_ALIGN_TOP** = 0x0001
Align the label at the top of the widget.
- const [Fl_Align](#) **FL_ALIGN_TOP_LEFT** = [FL_ALIGN_TOP](#) | [FL_ALIGN_LEFT](#)
- const [Fl_Align](#) **FL_ALIGN_TOP_RIGHT** = [FL_ALIGN_TOP](#) | [FL_ALIGN_RIGHT](#)
- const [Fl_Align](#) **FL_ALIGN_WRAP** = 0x0080
Wrap text that does not fit the width of the widget.

Font Numbers

The following constants define the standard FLTK fonts:

- const [Fl_Font](#) **FL_BOLD** = 1
add this to Helvetica, Courier, or Times
- const [Fl_Font](#) **FL_BOLD_ITALIC** = 3
add this to Helvetica, Courier, or Times
- const [Fl_Font](#) **FL_COURIER** = 4
Courier normal.
- const [Fl_Font](#) **FL_COURIER_BOLD** = 5
Courier bold.
- const [Fl_Font](#) **FL_COURIER_BOLD_ITALIC** = 7
Courier bold-italic.
- const [Fl_Font](#) **FL_COURIER_ITALIC** = 6
Courier italic.
- typedef int **Fl_Font**

- A font number is an index into the internal font table.*
- const `Fl_Font FL_FREE_FONT` = 16
first one to allocate
 - const `Fl_Font FL_HELVETICA` = 0
Helvetica (or Arial) normal (0)
 - const `Fl_Font FL_HELVETICA_BOLD` = 1
Helvetica (or Arial) bold.
 - const `Fl_Font FL_HELVETICA_BOLD_ITALIC` = 3
Helvetica (or Arial) bold-oblique.
 - const `Fl_Font FL_HELVETICA_ITALIC` = 2
Helvetica (or Arial) oblique.
 - const `Fl_Font FL_ITALIC` = 2
add this to Helvetica, Courier, or Times
 - const `Fl_Font FL_SCREEN` = 13
Default monospaced screen font.
 - const `Fl_Font FL_SCREEN_BOLD` = 14
Default monospaced bold screen font.
 - const `Fl_Font FL_SYMBOL` = 12
Standard symbol font.
 - const `Fl_Font FL_TIMES` = 8
Times roman.
 - const `Fl_Font FL_TIMES_BOLD` = 9
Times roman bold.
 - const `Fl_Font FL_TIMES_BOLD_ITALIC` = 11
Times roman bold-italic.
 - const `Fl_Font FL_TIMES_ITALIC` = 10
Times roman italic.
 - const `Fl_Font FL_ZAPF_DINGBATS` = 15
Zapf-dingbats font.

13.1.1 Detailed Description

This file contains type definitions and general enumerations.

13.1.2 Macro Definition Documentation

13.1.2.1 FL_ABI_VERSION

```
#define FL_ABI_VERSION FL_API_VERSION
```

The FLTK ABI (Application Binary Interface) version number as an *int*.

`FL_ABI_VERSION` is an *int* that describes the major, minor, and patch ABI version numbers in the same format as `FL_API_VERSION`.

The ABI version number `FL_ABI_VERSION` is usually the same as the API version `FL_API_VERSION` with the last two digits set to '00'.

FLTK retains the ABI (Application Binary Interface) during patch releases of the same major and minor versions. Examples:

FLTK Version	<code>FL_API_VERSION</code>	<code>FL_ABI_VERSION</code>	<code>FL_VERSION</code> (deprecated)
1.3.0	10300	10300	1.0300
1.3.4	10304	10300	1.0304

Version 1.2.3 is actually stored as 10203 to allow for more than 9 minor and patch releases.

The `FL_MAJOR_VERSION`, `FL_MINOR_VERSION`, and `FL_PATCH_VERSION` constants give the integral values for the major, minor, and patch releases respectively.

To enable new ABI-breaking features in patch releases you can configure FLTK to use a higher `FL_ABI_VERSION`.

See also

[README.abi-version.txt](#)

13.1.2.2 FL_API_VERSION

```
#define FL_API_VERSION (FL_MAJOR_VERSION*10000 + FL_MINOR_VERSION*100 + FL_PATCH_VERSION)
```

The FLTK API version number as an *int*.

FL_API_VERSION is an *int* that describes the major, minor, and patch version numbers.

Version 1.2.3 is actually stored as 10203 to allow for more than 9 minor and patch releases.

The FL_MAJOR_VERSION, FL_MINOR_VERSION, and FL_PATCH_VERSION constants give the integral values for the major, minor, and patch releases respectively.

Note

FL_API_VERSION is intended to replace the deprecated *double* FL_VERSION.

See also

[Fl::api_version\(\)](#)

13.1.2.3 FL_IMAGE_LABEL

```
#define FL_IMAGE_LABEL fl_define_FL_IMAGE_LABEL()
```

Draws an image ([Fl_Image](#)) as the label.

This is useful for one particular part of an [Fl_Multi_Label](#). Use [Fl_Widget::image\(\)](#) and/or [Fl_Widget::deimage\(\)](#) for normal widgets with images as labels.

13.1.2.4 FL_MAJOR_VERSION

```
#define FL_MAJOR_VERSION 1
```

The major release version of this FLTK library.

See also

[FL_VERSION](#)

13.1.2.5 FL_MINOR_VERSION

```
#define FL_MINOR_VERSION 4
```

The minor release version for this library.

FLTK remains mostly source-code compatible between minor version changes.

13.1.2.6 FL_MULTI_LABEL

```
#define FL_MULTI_LABEL fl_define_FL_MULTI_LABEL()
```

Draws a label that can comprise several parts like text and images.

See also

[Fl_Multi_Label](#)

13.1.2.7 FL_PATCH_VERSION

```
#define FL_PATCH_VERSION 0
```

The patch version for this library.

FLTK remains binary compatible between patches.

13.1.2.8 FL_SYMBOL_LABEL

```
#define FL_SYMBOL_LABEL FL_NORMAL_LABEL
```

Sets the current label type and returns its corresponding Fl_Labeltype value.

FL_SYMBOL_LABEL is an alias for FL_NORMAL_LABEL.

'@' symbols can be drawn with normal labels as well.

This definition is for historical reasons only (forms compatibility). You should use FL_NORMAL_LABEL instead.

13.1.2.9 FL_VERSION

```
#define FL_VERSION
```

Value:

```
( (double)FL_MAJOR_VERSION + \
  (double)FL_MINOR_VERSION * 0.01 + \
  (double)FL_PATCH_VERSION * 0.0001 )
```

The FLTK version number as a *double*.

FL_VERSION is a *double* that describes the major, minor, and patch version numbers.

Version 1.2.3 is actually stored as 1.0203 to allow for more than 9 minor and patch releases.

Deprecated This *double* version number is retained for compatibility with existing program code. New code should use *int* FL_API_VERSION instead. FL_VERSION is deprecated because comparisons of floating point values may fail due to rounding errors. However, there are currently no plans to remove this deprecated constant.

FL_VERSION is equivalent to $(double)FL_API_VERSION / 10000$.

See also

[Fl::version\(\)](#) (deprecated as well)

[FL_API_VERSION](#)

[Fl::api_version\(\)](#)

13.1.3 Typedef Documentation

13.1.3.1 Fl_Contrast_Function

```
typedef Fl_Color() Fl_Contrast_Function(Fl_Color, Fl_Color, Fl_Fontsize, int)
```

Type of a custom [fl_contrast\(\)](#) function.

Use this signature to define your own custom [fl_contrast\(\)](#) function together with [fl_contrast_mode\(FL_↔ CONTRAST_CUSTOM\)](#). Example:

```
Fl_Color my_contrast(Fl_Color fg, Fl_Color bg, Fl_Fontsize fs, int context) {
    // calculate contrast and ...
    return color;
}
// call this early in your main() program:
fl_contrast_function(my_contrast);
fl_contrast_mode(FL_CONTRAST_CUSTOM);
```

See also

[fl_contrast\(Fl_Color, Fl_Color, Fl_Fontsize, int\)](#)

[fl_contrast_mode\(int\)](#)

13.1.3.2 Fl_Fontsize

```
typedef int Fl_Fontsize
```

Size of a font in pixels.

This is the approximate height of a font in pixels.

13.1.4 Enumeration Type Documentation

13.1.4.1 anonymous enum

```
anonymous enum
```

FD "when" conditions.

Enumerator

FL_READ	Call the callback when there is data to be read.
FL_WRITE	Call the callback when data can be written without blocking.
FL_EXCEPT	Call the callback if an exception occurs on the file.

13.1.4.2 Fl_Arrow_Type

enum [Fl_Arrow_Type](#)

Arrow types define the type of arrow drawing function.

FLTK schemes can draw several graphical elements in their particular way. One of these elements is an arrow type that can be in different GUI elements like scrollbars, choice buttons, and FLTK's [Fl_Return_Button](#).

Note

This enum is not yet stable (as of FLTK 1.4.0) and may be changed without notice as necessary.

Since

1.4.0

Enumerator

FL_ARROW_SINGLE	Single arrow, e.g. in Fl_Scrollbar .
FL_ARROW_DOUBLE	Double arrow, e.g. in Fl_Counter .
FL_ARROW_CHOICE	Dropdown box, e.g. in Fl_Choice .
FL_ARROW_RETURN	Return arrow, e.g. in Fl_Return_Button .

13.1.4.3 Fl_Boxtype

enum [Fl_Boxtype](#)

FLTK standard box types.

This enum defines the standard box types included with FLTK.

Note

The documented enum [Fl_Boxtype](#) contains some values (names) with leading underscores, e.g. `_FL_SHADOW_BOX`. This is due to technical reasons - please use the same values (names) without the leading underscore in your code! Enum values with leading underscores are reserved for internal use and subject to change without notice!

Enumerator

FL_NO_BOX	nothing is drawn at all, this box is invisible
FL_FLAT_BOX	a flat box
FL_UP_BOX	see figure Standard Box Types
FL_DOWN_BOX	see figure Standard Box Types
FL_UP_FRAME	see figure Standard Box Types
FL_DOWN_FRAME	see figure Standard Box Types
FL_THIN_UP_BOX	see figure Standard Box Types
FL_THIN_DOWN_BOX	see figure Standard Box Types
FL_THIN_UP_FRAME	see figure Standard Box Types
FL_THIN_DOWN_FRAME	see figure Standard Box Types
FL_ENGRAVED_BOX	see figure Standard Box Types

Enumerator

FL_EMBOSSED_BOX	see figure Standard Box Types
FL_ENGRAVED_FRAME	see figure Standard Box Types
FL_EMBOSSED_FRAME	see figure Standard Box Types
FL_BORDER_BOX	see figure Standard Box Types
_FL_SHADOW_BOX	see figure Standard Box Types , use FL_SHADOW_BOX
FL_BORDER_FRAME	see figure Standard Box Types
_FL_SHADOW_FRAME	see figure Standard Box Types , use FL_SHADOW_FRAME
_FL_ROUNDED_BOX	see figure Standard Box Types , use FL_ROUNDED_BOX
_FL_RSHADOW_BOX	see figure Standard Box Types , use FL_RSHADOW_BOX
_FL_ROUNDED_FRAME	see figure Standard Box Types , use FL_ROUNDED_FRAME
_FL_RFLAT_BOX	see figure Standard Box Types , use FL_RFLAT_BOX
_FL_ROUND_UP_BOX	see figure Standard Box Types , use FL_ROUND_UP_BOX
_FL_ROUND_DOWN_BOX	see figure Standard Box Types , use FL_ROUND_DOWN_BOX
_FL_DIAMOND_UP_BOX	see figure Standard Box Types , use FL_DIAMOND_UP_BOX
_FL_DIAMOND_DOWN_BOX	see figure Standard Box Types , use FL_DIAMOND_DOWN_BOX
_FL_OVAL_BOX	see figure Standard Box Types , use FL_OVAL_BOX
_FL_OSHADOW_BOX	see figure Standard Box Types , use FL_OSHADOW_BOX
_FL_OVAL_FRAME	see figure Standard Box Types , use FL_OVAL_FRAME
_FL_OFLAT_BOX	see figure Standard Box Types , use FL_OFLAT_BOX
_FL_PLASTIC_UP_BOX	plastic version of FL_UP_BOX, use FL_PLASTIC_UP_BOX
_FL_PLASTIC_DOWN_BOX	plastic version of FL_DOWN_BOX, use FL_PLASTIC_DOWN_BOX
_FL_PLASTIC_UP_FRAME	plastic version of FL_UP_FRAME, use FL_PLASTIC_UP_FRAME
_FL_PLASTIC_DOWN_FRAME	plastic version of FL_DOWN_FRAME, use FL_PLASTIC_DOWN_FRAME
_FL_PLASTIC_THIN_UP_BOX	plastic version of FL_THIN_UP_BOX, use FL_PLASTIC_THIN_UP_BOX
_FL_PLASTIC_THIN_DOWN_BOX	plastic version of FL_THIN_DOWN_BOX, use FL_PLASTIC_THIN_DOWN_BOX
_FL_PLASTIC_ROUND_UP_BOX	plastic version of FL_ROUND_UP_BOX, use FL_PLASTIC_ROUND_UP_BOX
_FL_PLASTIC_ROUND_DOWN_BOX	plastic version of FL_ROUND_DOWN_BOX, use FL_PLASTIC_ROUND_DOWN_BOX
_FL_GTK_UP_BOX	gtk+ version of FL_UP_BOX, use FL_GTK_UP_BOX
_FL_GTK_DOWN_BOX	gtk+ version of FL_DOWN_BOX, use FL_GTK_DOWN_BOX
_FL_GTK_UP_FRAME	gtk+ version of FL_UP_FRAME, use FL_GTK_UP_FRAME
_FL_GTK_DOWN_FRAME	gtk+ version of FL_DOWN_FRAME, use FL_GTK_DOWN_FRAME
_FL_GTK_THIN_UP_BOX	gtk+ version of FL_THIN_UP_BOX, use FL_GTK_THIN_UP_BOX
_FL_GTK_THIN_DOWN_BOX	gtk+ version of FL_THIN_DOWN_BOX, use FL_GTK_THIN_DOWN_BOX
_FL_GTK_THIN_UP_FRAME	gtk+ version of FL_THIN_UP_FRAME, use FL_GTK_THIN_UP_FRAME
_FL_GTK_THIN_DOWN_FRAME	gtk+ version of FL_THIN_DOWN_FRAME, use FL_GTK_THIN_DOWN_FRAME
_FL_GTK_ROUND_UP_BOX	gtk+ version of FL_ROUND_UP_BOX, use FL_GTK_ROUND_UP_BOX
_FL_GTK_ROUND_DOWN_BOX	gtk+ version of FL_ROUND_DOWN_BOX, use FL_GTK_ROUND_DOWN_BOX
_FL_GLEAM_UP_BOX	gleam version of FL_UP_BOX, use FL_GLEAM_UP_BOX
_FL_GLEAM_DOWN_BOX	gleam version of FL_DOWN_BOX, use FL_GLEAM_DOWN_BOX

Enumerator

<code>_FL_GLEAM_UP_FRAME</code>	gleam version of <code>FL_UP_FRAME</code> , use <code>FL_GLEAM_UP_FRAME</code>
<code>_FL_GLEAM_DOWN_FRAME</code>	gleam version of <code>FL_DOWN_FRAME</code> , use <code>FL_GLEAM_DOWN_FRAME</code>
<code>_FL_GLEAM_THIN_UP_BOX</code>	gleam version of <code>FL_THIN_UP_BOX</code> , use <code>FL_GLEAM_THIN_UP_BOX</code>
<code>_FL_GLEAM_THIN_DOWN_BOX</code>	gleam version of <code>FL_THIN_DOWN_BOX</code> , use <code>FL_GLEAM_THIN_DOWN_BOX</code>
<code>_FL_GLEAM_ROUND_UP_BOX</code>	gleam version of <code>FL_ROUND_UP_BOX</code> , use <code>FL_GLEAM_ROUND_UP_BOX</code>
<code>_FL_GLEAM_ROUND_DOWN_BOX</code>	gleam version of <code>FL_ROUND_DOWN_BOX</code> , use <code>FL_GLEAM_ROUND_DOWN_BOX</code>
<code>_FL_OXY_UP_BOX</code>	oxy version of <code>FL_UP_BOX</code> , use <code>FL_OXY_UP_BOX</code>
<code>_FL_OXY_DOWN_BOX</code>	oxy version of <code>FL_DOWN_BOX</code> , use <code>FL_OXY_DOWN_BOX</code>
<code>_FL_OXY_UP_FRAME</code>	oxy version of <code>FL_UP_FRAME</code> , use <code>FL_OXY_UP_FRAME</code>
<code>_FL_OXY_DOWN_FRAME</code>	oxy version of <code>FL_DOWN_FRAME</code> , use <code>FL_OXY_DOWN_FRAME</code>
<code>_FL_OXY_THIN_UP_BOX</code>	oxy version of <code>FL_THIN_UP_BOX</code> , use <code>FL_OXY_THIN_UP_BOX</code>
<code>_FL_OXY_THIN_DOWN_BOX</code>	oxy version of <code>FL_THIN_DOWN_BOX</code> , use <code>FL_OXY_THIN_DOWN_BOX</code>
<code>_FL_OXY_THIN_UP_FRAME</code>	oxy version of <code>FL_THIN_UP_FRAME</code> , use <code>FL_OXY_THIN_UP_FRAME</code>
<code>_FL_OXY_THIN_DOWN_FRAME</code>	oxy version of <code>FL_THIN_DOWN_FRAME</code> , use <code>FL_OXY_THIN_DOWN_FRAME</code>
<code>_FL_OXY_ROUND_UP_BOX</code>	oxy version of <code>FL_ROUND_UP_BOX</code> , use <code>FL_OXY_ROUND_UP_BOX</code>
<code>_FL_OXY_ROUND_DOWN_BOX</code>	oxy version of <code>FL_ROUND_DOWN_BOX</code> , use <code>FL_OXY_ROUND_DOWN_BOX</code>
<code>_FL_OXY_BUTTON_UP_BOX</code>	<code>FL_OXY_BUTTON_UP_BOX</code> (new boxtype ?), use <code>FL_OXY_BUTTON_UP_BOX</code> .
<code>_FL_OXY_BUTTON_DOWN_BOX</code>	<code>FL_OXY_BUTTON_DOWN_BOX</code> (new boxtype ?), use <code>FL_OXY_BUTTON_DOWN_BOX</code> .
<code>FL_FREE_BOXTYPE</code>	the first free box type for creation of new box types

13.1.4.4 `Fl_Callback_Reason`

enum `Fl_Callback_Reason`

These constants describe why a callback is performed.

See also

[Fl::callback_reason\(\)](#), [Fl_Widget::when\(\)](#), [Fl_When](#)

Enumerator

<code>FL_REASON_UNKNOWN</code>	unknown or unset reason
<code>FL_REASON_SELECTED</code>	an item was selected
<code>FL_REASON_DESELECTED</code>	an item was de-selected
<code>FL_REASON_RESELECTED</code>	an item was re-selected (double-clicked).
<code>FL_REASON_OPENED</code>	an item was opened
<code>FL_REASON_CLOSED</code>	an item was closed
<code>FL_REASON_DRAGGED</code>	an item was dragged into a new place
<code>FL_REASON_CANCELLED</code>	a dialog was cancelled

Enumerator

FL_REASON_CHANGED	the value of the widget was modified
FL_REASON_GOT_FOCUS	a widget received focus
FL_REASON_LOST_FOCUS	a widget lost focus
FL_REASON_RELEASED	the mouse button was released
FL_REASON_ENTER_KEY	user finished input pressing Enter
FL_REASON_USER	user defined callback reasons

13.1.4.5 Fl_Contrast_Mode

enum [Fl_Contrast_Mode](#)

Define the possible modes to calculate [fl_contrast\(\)](#).

Enumerator

FL_CONTRAST_NONE	always return foreground color
FL_CONTRAST_LEGACY	legacy (FLTK 1.3.x) contrast function
FL_CONTRAST_CIELAB	new (FLTK 1.4.0) default function
FL_CONTRAST_CUSTOM	optional custom contrast function
FL_CONTRAST_LAST	internal use only (invalid contrast mode)

13.1.4.6 Fl_Cursor

enum [Fl_Cursor](#)

The following constants define the mouse cursors that are available in FLTK.

Cursors are provided by the system when available, or bitmaps built into FLTK as a fallback.

Enumerator

FL_CURSOR_DEFAULT	the default cursor, usually an arrow:
FL_CURSOR_ARROW	an arrow pointer:
FL_CURSOR_CROSS	crosshair:
FL_CURSOR_WAIT	busy indicator (for instance hourglass): ,
FL_CURSOR_INSERT	I-beam:
FL_CURSOR_HAND	pointing hand:
FL_CURSOR_HELP	question mark pointer: ?
FL_CURSOR_MOVE	4-pointed arrow or hand: ,
FL_CURSOR_NS	up/down resize:
FL_CURSOR_WE	left/right resize:
FL_CURSOR_NWSE	diagonal resize:
FL_CURSOR_NESW	diagonal resize:
FL_CURSOR_N	upwards resize:
FL_CURSOR_NE	upwards, right resize:
FL_CURSOR_E	rightwards resize:
FL_CURSOR_SE	downwards, right resize:
FL_CURSOR_S	downwards resize:
FL_CURSOR_SW	downwards, left resize:
FL_CURSOR_W	leftwards resize:
FL_CURSOR_NW	upwards, left resize:
FL_CURSOR_NONE	invisible.

13.1.4.7 Fl_Damage

enum [Fl_Damage](#)

Damage masks.

Enumerator

FL_DAMAGE_CHILD	A child needs to be redrawn.
FL_DAMAGE_EXPOSE	The window was exposed.
FL_DAMAGE_SCROLL	The Fl_Scroll widget was scrolled. Used by other widgets for other widget specific damages.
FL_DAMAGE_OVERLAY	The overlay planes need to be redrawn.
FL_DAMAGE_USER1	First user-defined damage bit.
FL_DAMAGE_USER2	Second user-defined damage bit.
FL_DAMAGE_ALL	Everything needs to be redrawn.

13.1.4.8 Fl_Event

enum [Fl_Event](#)

Every time a user moves the mouse pointer, clicks a button, or presses a key, an event is generated and sent to your application.

Events can also come from other programs like the window manager.

Events are identified by the integer argument passed to the [Fl_Widget::handle\(\)](#) virtual method. Other information about the most recent event is stored in static locations and acquired by calling the `Fl::event_*` methods. This static information remains valid until the next event is read from the window system, so it is ok to look at it outside of the `handle()` method.

Event numbers can be converted to their actual names using the [fl_eventnames\[\]](#) array defined in `#include <FL/names.h>`

See also

[Fl::event_text\(\)](#), [Fl::event_key\(\)](#), class `Fl::`

Enumerator

FL_NO_EVENT	No event.
FL_PUSH	A mouse button has gone down with the mouse pointing at this widget. You can find out what button by calling Fl::event_button() . You find out the mouse position by calling Fl::event_x() and Fl::event_y() . A widget indicates that it "wants" the mouse click by returning non-zero from its Fl_Widget::handle() method. It will then become the Fl::pushed() widget and will get FL_DRAG and the matching FL_RELEASE events. If Fl_Widget::handle() returns zero then FLTK will try sending the FL_PUSH to another widget.
FL_RELEASE	A mouse button has been released. You can find out what button by calling Fl::event_button() . In order to receive the FL_RELEASE event, the widget must return non-zero when handling FL_PUSH.
FL_ENTER	The mouse has been moved to point at this widget. This can be used for highlighting feedback. If a widget wants to highlight or otherwise track the mouse, it indicates this by returning non-zero from its <code>handle()</code> method. It then becomes the Fl::belowmouse() widget and will receive FL_MOVE and FL_LEAVE events.

Enumerator

FL_LEAVE	The mouse has moved out of the widget. In order to receive the FL_LEAVE event, the widget must return non-zero when handling FL_ENTER.
FL_DRAG	The mouse has moved with a button held down. The current button state is in Fl::event_state() . The mouse position is in Fl::event_x() and Fl::event_y() . In order to receive FL_DRAG events, the widget must return non-zero when handling FL_PUSH.
FL_FOCUS	This indicates an <i>attempt</i> to give a widget the keyboard focus. If a widget wants the focus, it should change itself to display the fact that it has the focus, and return non-zero from its <code>handle()</code> method. It then becomes the Fl::focus() widget and gets FL_KEYDOWN, FL_KEYUP, and FL_UNFOCUS events. The focus will change either because the window manager changed which window gets the focus, or because the user tried to navigate using tab, arrows, or other keys. You can check Fl::event_key() to figure out why it moved. For navigation it will be the key pressed and for interaction with the window manager it will be zero.
FL_UNFOCUS	This event is sent to the previous Fl::focus() widget when another widget gets the focus or the window loses focus.
FL_KEYDOWN	A key was pressed (FL_KEYDOWN) or released (FL_KEYUP). FL_KEYBOARD is a synonym for FL_KEYDOWN. The key can be found in Fl::event_key() . The text that the key should insert can be found with Fl::event_text() and its length is in Fl::event_length() . If you use the key <code>handle()</code> should return 1. If you return zero then FLTK assumes you ignored the key and will then attempt to send it to a parent widget. If none of them want it, it will change the event into a FL_SHORTCUT event. To receive FL_KEYBOARD events you must also respond to the FL_FOCUS and FL_UNFOCUS events. If you are writing a text-editing widget you may also want to call the Fl::compose() function to translate individual keystrokes into non-ASCII characters. FL_KEYUP events are sent to the widget that currently has focus. This is not necessarily the same widget that received the corresponding FL_KEYDOWN event because focus may have changed between events.
FL_KEYBOARD	Equivalent to FL_KEYDOWN. See also FL_KEYDOWN
FL_KEYUP	Key release event. See also FL_KEYDOWN
FL_CLOSE	The user clicked the close button of a window. This event is used internally only to trigger the callback of Fl_Window derived classed. The default callback closes the window calling Fl_Window::hide() .

Enumerator

FL_MOVE	The mouse has moved without any mouse buttons held down. This event is sent to the Fl::belowmouse() widget. In order to receive FL_MOVE events, the widget must return non-zero when handling FL_ENTER.
FL_SHORTCUT	If the Fl::focus() widget is zero or ignores an FL_KEYBOARD event then FLTK tries sending this event to every widget it can, until one of them returns non-zero. FL_SHORTCUT is first sent to the Fl::belowmouse() widget, then its parents and siblings, and eventually to every widget in the window, trying to find an object that returns non-zero. FLTK tries really hard to not to ignore any keystrokes! You can also make "global" shortcuts by using Fl::add_handler() . A global shortcut will work no matter what windows are displayed or which one has the focus.
FL_DEACTIVATE	This widget is no longer active, due to Fl_Widget::deactivate() being called on it or one of its parents. Fl_Widget::active() may still be true after this, the widget is only active if Fl_Widget::active() is true on it and all its parents (use Fl_Widget::active_r() to check this).
FL_ACTIVATE	This widget is now active, due to Fl_Widget::activate() being called on it or one of its parents.
FL_HIDE	This widget is no longer visible, due to Fl_Widget::hide() being called on it or one of its parents, or due to a parent window being minimized. Fl_Widget::visible() may still be true after this, but the widget is visible only if visible() is true for it and all its parents (use Fl_Widget::visible_r() to check this).
FL_SHOW	This widget is visible again, due to Fl_Widget::show() being called on it or one of its parents, or due to a parent window being restored. Child Fl_Windows respond to this by actually creating the window if not done already, so if you subclass a window, be sure to pass FL_SHOW to the base class Fl_Widget::handle() method!
FL_PASTE	You should get this event some time after you call Fl::paste() . The contents of Fl::event_text() is the text to insert and the number of characters is in Fl::event_length() .
FL_SELECTIONCLEAR	The Fl::selection_owner() will get this event before the selection is moved to another widget. This indicates that some other widget or program has claimed the selection. Motif programs used this to clear the selection indication. Most modern programs ignore this.
FL_MOUSEWHEEL	The user has moved the mouse wheel. The Fl::event_dx() and Fl::event_dy() methods can be used to find the amount to scroll horizontally and vertically.
FL_DND_ENTER	The mouse has been moved to point at this widget. A widget that is interested in receiving drag'n'drop data must return 1 to receive FL_DND_DRAG, FL_DND_LEAVE and FL_DND_RELEASE events.
FL_DND_DRAG	The mouse has been moved inside a widget while dragging data. A widget that is interested in receiving drag'n'drop data should indicate the possible drop position.
FL_DND_LEAVE	The mouse has moved out of the widget.
FL_DND_RELEASE	The user has released the mouse button dropping data into the widget. If the widget returns 1, it will receive the data in the immediately following FL_PASTE event.

Enumerator

FL_SCREEN_CONFIGURATION_CHANGED	The screen configuration (number, positions) was changed. Use Fl::add_handler() to be notified of this event.
FL_FULLSCREEN	The fullscreen state of the window has changed. This event is sent to the window's handle method.
FL_ZOOM_GESTURE	The user has made a zoom/pinch/magnification gesture (Mac OS platform only). The Fl::event_dy() method can be used to find magnification amount, Fl::event_x() and Fl::event_y() are set as well. This event is sent to the window's handle method.
FL_ZOOM_EVENT	A zoom event (ctrl/+/-/0/ or cmd/+/-/0/) was processed. Use Fl::add_handler() to be notified of this event.

13.1.4.9 Fl_Labeltype

enum [Fl_Labeltype](#)

The [labeltype\(\)](#) method sets the type of the label.

Note

The documented enum [Fl_Labeltype](#) contains some values (names) with leading underscores, e.g. `↔ _FL_IMAGE_LABEL`. This is due to technical reasons - please use the same values (names) without the leading underscore in your code! Enum values with leading underscores are reserved for internal use and subject to change without notice!

The following standard label types are included:

Enumerator

FL_NORMAL_LABEL	draws the text (0)
FL_NO_LABEL	does nothing
_FL_SHADOW_LABEL	draws a drop shadow under the text
_FL_ENGRAVED_LABEL	draws edges as though the text is engraved
_FL_EMBOSSSED_LABEL	draws edges as though the text is raised
_FL_MULTI_LABEL	draws a composite label See also Fl_Multi_Label
_FL_ICON_LABEL	draws the icon associated with the text
_FL_IMAGE_LABEL	the label displays an "icon" based on a Fl_Image
FL_FREE_LABELTYPE	first free labeltype to use for creating own labeltypes

13.1.4.10 Fl_Orientation

enum [Fl_Orientation](#)

[Fl_Orientation](#) describes the orientation of a GUI element.

FLTK schemes can draw several graphical elements, for instance arrows, pointing at different directions. This enum defines the direction to use for drawing a particular GUI element.

The definition of this enum was chosen such that the enum value can be multiplied by 45 to get a rotation angle in degrees starting at the horizontal axis (0 = right, 1 = NE, 2 = up, ...) that can be used with [fl_rotate\(\)](#). Note: angle is counter-clockwise in degrees.

The 'unspecified' value **FL_ORIENT_NONE** shall be used for elements that would usually not be rotated, like the return arrow of the [Fl_Return_Button](#). It can still be used as an angle though since it is the same value as `FL_↔ ORIENT_RIGHT` (0 degrees).

Note

This enum is not yet stable (as of FLTK 1.4.0) and may be changed without notice as necessary.

Since

1.4.0

Enumerator

FL_ORIENT_NONE	GUI element direction is unspecified.
FL_ORIENT_RIGHT	GUI element pointing right (0°)
FL_ORIENT_NE	GUI element pointing NE (45°)
FL_ORIENT_UP	GUI element pointing up (90°)
FL_ORIENT_NW	GUI element pointing NW (135°)
FL_ORIENT_LEFT	GUI element pointing left (180°)
FL_ORIENT_SW	GUI element pointing SW (225°)
FL_ORIENT_DOWN	GUI element pointing down (270°)
FL_ORIENT_SE	GUI element pointing SE (315°)

13.1.4.11 Fl_When

enum [Fl_When](#)

These constants determine when a callback is performed.

Fl_When is a bit field. Some values are merely shortcuts for common bit combinations. New flags may be added in the future, so it's important to mask the required bit when reading via `when()`.

Note

Some widgets may not fully support FL_WHEN_... flags.

See also

[Fl_Widget::when\(\)](#), [Fl::callback_reason\(\)](#), [Fl_Callback_Reason](#), [Fl_Widget::do_callback\(\)](#)

Enumerator

FL_WHEN_NEVER	Never call the callback.
FL_WHEN_CHANGED	Do the callback only when the widget value changes.
FL_WHEN_NOT_CHANGED	Do the callback whenever the user interacts with the widget.
FL_WHEN_RELEASE	Do the callback when the button or key is released and the value changes.
FL_WHEN_RELEASE_ALWAYS	Do the callback when the button or key is released, even if the value doesn't change.
FL_WHEN_ENTER_KEY	Do the callback when the user presses the ENTER key and the value changes.
FL_WHEN_ENTER_KEY_ALWAYS	Do the callback when the user presses the ENTER key, even if the value doesn't change.
FL_WHEN_ENTER_KEY_CHANGED	Do callbacks whether the value changed or not, and when the ENTER key is pressed.
FL_WHEN_CLOSED	Do the callback when a child of Fl_Tabs is closed.

13.1.5 Function Documentation

13.1.5.1 fl_box()

```
Fl_Boxtype fl_box (
    Fl_Boxtype b ) [inline]
```

Get the filled version of a frame.

If no filled version of a given frame exists, the behavior of this function is undefined and some random box or frame is returned.

13.1.5.2 fl_color_cube()

```
Fl_Color fl_color_cube (
    int r,
    int g,
    int b ) [inline]
```

Returns a color out of the color cube.

r must be in the range 0 to FL_NUM_RED (5) minus 1, *g* must be in the range 0 to FL_NUM_GREEN (8) minus 1, *b* must be in the range 0 to FL_NUM_BLUE (5) minus 1.

To get the closest color to a 8-bit set of R,G,B values use:

```
fl_color_cube(R * (FL_NUM_RED - 1) / 255,
    G * (FL_NUM_GREEN - 1) / 255,
    B * (FL_NUM_BLUE - 1) / 255);
```

13.1.5.3 fl_define_FL_EMBOSED_LABEL()

```
Fl_Labeltype fl_define_FL_EMBOSED_LABEL ( ) [extern]
```

Initializes the internal table entry for FL_EMBOSED_LABEL and returns its internal value.

Internal use only.

13.1.5.4 fl_define_FL_ENGRAVED_LABEL()

```
Fl_Labeltype fl_define_FL_ENGRAVED_LABEL ( ) [extern]
```

Initializes the internal table entry for FL_ENGRAVED_LABEL and returns its internal value.

Internal use only.

13.1.5.5 fl_define_FL_ICON_LABEL()

```
Fl_Labeltype fl_define_FL_ICON_LABEL ( ) [extern]
```

Initializes the internal table entry for FL_ICON_LABEL and returns its internal value.

Internal use only.

13.1.5.6 fl_define_FL_IMAGE_LABEL()

```
Fl_Labeltype fl_define_FL_IMAGE_LABEL ( ) [extern]
```

Initializes the internal table entry for FL_IMAGE_LABEL and returns its internal value.

Internal use only.

13.1.5.7 fl_define_FL_MULTI_LABEL()

```
Fl_Labeltype fl_define_FL_MULTI_LABEL ( ) [extern]
```

Initializes the internal table entry for FL_MULTI_LABEL and returns its internal value.

Internal use only.

13.1.5.8 fl_define_FL_SHADOW_LABEL()

```
Fl_Labeltype fl_define_FL_SHADOW_LABEL ( ) [extern]
```

Initializes the internal table entry for FL_SHADOW_LABEL and returns its internal value.

Internal use only.

13.1.5.9 fl_down()

```
Fl_Boxtype fl_down (
    Fl_Boxtype b ) [inline]
```

Get the "pressed" or "down" version of a box.

If no "down" version of a given box exists, the behavior of this function is undefined and some random box or frame is returned.

13.1.5.10 fl_frame()

```
Fl_Boxtype fl_frame (
    Fl_Boxtype b ) [inline]
```

Get the unfilled, frame only version of a box.

If no frame version of a given box exists, the behavior of this function is undefined and some random box or frame is returned.

13.1.5.11 fl_gray_ramp()

```
Fl_Color fl_gray_ramp (
    int i ) [inline]
```

Returns a gray color value from black ($i == 0$) to white ($i == \text{FL_NUM_GRAY} - 1$).

`FL_NUM_GRAY` is defined to be 24 in the current FLTK release. To get the closest FLTK gray value to an 8-bit grayscale color 'I' use:

```
fl_gray_ramp(I * (FL_NUM_GRAY - 1) / 255)
```

13.1.6 Variable Documentation

13.1.6.1 FL_ALIGN_LEFT

```
const Fl_Align FL_ALIGN_LEFT = 0x0004
```

Align the label at the left of the widget.

Inside labels appear left-justified starting at the left side of the widget, outside labels are right-justified and drawn to the left of the widget.

13.1.6.2 FL_ALIGN_TOP

```
const Fl_Align FL_ALIGN_TOP = 0x0001
```

Align the label at the top of the widget.

Inside labels appear below the top, outside labels are drawn on top of the widget.

13.1.6.3 FL_NORMAL_SIZE

```
Fl_Fontsize FL_NORMAL_SIZE [extern]
```

normal font size

normal font size

13.2 Enumerations.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // Enumerations for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2024 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
```

```

00021 #ifndef FL_Enumerations_H
00022 #define FL_Enumerations_H
00023
00024 /*
00025 *****
00026 * FL_ABI_VERSION is defined by configure or CMake since FLTK 1.3.4.
00027 * It is written to FL/fl_config.h and #included here.
00028 *****
00029 * For more informations on FL_ABI_VERSION see README.abi-version.txt.
00030 *****
00031 */
00032
00033 #include <FL/fl_config.h>
00034
00035 # include "Fl_Export.H"
00036 # include "fl_types.h"
00037 # include <FL/platform_types.h> // for FL_COMMAND and FL_CONTROL
00038
00052 #define FL_MAJOR_VERSION      1
00053
00059 #define FL_MINOR_VERSION      4
00060
00066 #define FL_PATCH_VERSION      0
00067
00089 #define FL_VERSION            ( (double)FL_MAJOR_VERSION + \
00090                               (double)FL_MINOR_VERSION * 0.01 + \
00091                               (double)FL_PATCH_VERSION * 0.0001 )
00092
00111 #define FL_API_VERSION (FL_MAJOR_VERSION*10000 + FL_MINOR_VERSION*100 + FL_PATCH_VERSION)
00112
00143 #ifndef FL_ABI_VERSION
00144 #define FL_ABI_VERSION (FL_MAJOR_VERSION*10000 + FL_MINOR_VERSION*100)
00145 #endif
00146
00147 /*
00148  Check if FL_ABI_VERSION is out of allowed range; redefine if necessary.
00149
00150  This is done to prevent users from defining an illegal ABI version.
00151
00152  Rule: FL_MAJOR_VERSION * 10000 + FL_MINOR_VERSION * 100
00153        <= FL_ABI_VERSION <= FL_API_VERSION.
00154
00155  Example (FLTK 1.3.4):
00156
00157        10300 <= FL_ABI_VERSION <= 10304
00158
00159  Note: configure + CMake can be used to define FL_ABI_VERSION, but they
00160  do not check validity. This is done here.
00161 */
00162
00163 #if FL_ABI_VERSION < FL_MAJOR_VERSION*10000 + FL_MINOR_VERSION*100
00164
00165 # undef FL_ABI_VERSION
00166 # define FL_ABI_VERSION (FL_MAJOR_VERSION*10000 + FL_MINOR_VERSION*100)
00167
00168 #elif FL_ABI_VERSION > FL_API_VERSION
00169
00170 # undef FL_ABI_VERSION
00171 # define FL_ABI_VERSION FL_API_VERSION
00172
00173 #endif
00174
// group: Version Numbers 00176
00195 // DEV NOTE: Keep this list in sync with FL/names.h
00196 enum Fl_Event { // events
00198     FL_NO_EVENT      = 0,
00199
00211     FL_PUSH          = 1,
00212
00219     FL_RELEASE       = 2,
00220
00228     FL_ENTER         = 3,
00229
00234     FL_LEAVE         = 4,
00235
00243     FL_DRAG          = 5,
00244
00258     FL_FOCUS         = 6,
00259
00263     FL_UNFOCUS       = 7,
00264
00285     FL_KEYDOWN       = 8,
00286
00290     FL_KEYBOARD      = 8,
00291
00295     FL_KEYUP         = 9,
00296

```

```

00302 FL_CLOSE           = 10,
00303
00310 FL_MOVE           = 11,
00311
00324 FL_SHORTCUT       = 12,
00325
00331 FL_DEACTIVATE     = 13,
00332
00336 FL_ACTIVATE       = 14,
00337
00344 FL_HIDE           = 15,
00345
00352 FL_SHOW           = 16,
00353
00358 FL_PASTE         = 17,
00359
00365 FL_SELECTIONCLEAR = 18,
00366
00370 FL_MOUSEWHEEL     = 19,
00371
00376 FL_DND_ENTER     = 20,
00377
00382 FL_DND_DRAG       = 21,
00383
00386 FL_DND_LEAVE     = 22,
00387
00392 FL_DND_RELEASE    = 23,
00396 FL_SCREEN_CONFIGURATION_CHANGED = 24,
00400 FL_FULLSCREEN      = 25,
00406 FL_ZOOM_GESTURE    = 26,
00410 FL_ZOOM_EVENT     = 27
00411 // DEV NOTE: Keep this list in sync with FL/names.h
00412 };
00413
00426 enum Fl_When { // Fl_Widget::when():
00427     FL_WHEN_NEVER           = 0,
00428     FL_WHEN_CHANGED        = 1,
00429     FL_WHEN_NOT_CHANGED    = 2,
00430     FL_WHEN_RELEASE        = 4,
00431     FL_WHEN_RELEASE_ALWAYS = 6,
00432     FL_WHEN_ENTER_KEY     = 8,
00433     FL_WHEN_ENTER_KEY_ALWAYS = 10,
00434     FL_WHEN_ENTER_KEY_CHANGED = 11,
00435     FL_WHEN_CLOSED        = 16
00436 };
// group: When Conditions 00438
00439
00446 enum Fl_Callback_Reason {
00447     FL_REASON_UNKNOWN=0,
00448     FL_REASON_SELECTED,
00449     FL_REASON_DESELECTED,
00450     FL_REASON_RESELECTED,
00451     FL_REASON_OPENED,
00452     FL_REASON_CLOSED,
00453     FL_REASON_DRAGGED,
00454     FL_REASON_CANCELLED,
00455     FL_REASON_CHANGED,
00456     FL_REASON_GOT_FOCUS,
00457     FL_REASON_LOST_FOCUS,
00458     FL_REASON_RELEASED,
00459     FL_REASON_ENTER_KEY,
00460     FL_REASON_USER = 32
00461 };
// group: Callback Reasons 00463
00464
00475 // FIXME: These codes collide with valid Unicode keys
00476
00477 #define FL_Button           0xfee8
00478 #define FL_BackSpace       0xff08
00479 #define FL_Tab             0xff09
00480 #define FL_Iso_Key        0xff0c
00481 #define FL_Enter          0xff0d
00482 #define FL_Pause          0xff13
00483 #define FL_Scroll_Lock    0xff14
00484 #define FL_Escape         0xff1b
00485 #define FL_Kana           0xff2e
00486 #define FL_Eisu          0xff2f
00487 #define FL_Yen            0xff30
00488 #define FL_JIS_Underscore 0xff31
00489 #define FL_Home           0xff50
00490 #define FL_Left           0xff51
00491 #define FL_Up             0xff52
00492 #define FL_Right          0xff53
00493 #define FL_Down           0xff54
00494 #define FL_Page_Up        0xff55
00495 #define FL_Page_Down      0xff56
00496 #define FL_End            0xff57

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00497 #define FL_Print      0xff61
00498 #define FL_Insert     0xff63
00499 #define FL_Menu      0xff67
00500 #define FL_Help       0xff68
00501 #define FL_Num_Lock   0xff7f
00502 #define FL_KP        0xff80
00503 #define FL_KP_Enter   0xff8d
00504 #define FL_KP_Last    0xffbd
00505 #define FL_F          0xffbd
00506 #define FL_F_Last     0xfe0
00507 #define FL_Shift_L    0xfe1
00508 #define FL_Shift_R    0xfe2
00509 #define FL_Control_L   0xfe3
00510 #define FL_Control_R   0xfe4
00511 #define FL_Caps_Lock  0xfe5
00512 #define FL_Meta_L     0xfe7
00513 #define FL_Meta_R     0xfe8
00514 #define FL_Alt_L     0xfe9
00515 #define FL_Alt_R     0xfea
00516 #define FL_Delete     0xffff
00517
00518 // These use the Private Use Area (PUA) of the Basic Multilingual Plane
00519 // of Unicode. Guaranteed not to conflict with a proper Unicode character.
00520
00521 // These primarily map to the XFree86 keysym range
00522 #define FL_Volume_Down  0xEF11
00523 #define FL_Volume_Mute  0xEF12
00524 #define FL_Volume_Up    0xEF13
00525 #define FL_Media_Play   0xEF14
00526 #define FL_Media_Stop   0xEF15
00527 #define FL_Media_Prev   0xEF16
00528 #define FL_Media_Next   0xEF17
00529 #define FL_Home_Page    0xEF18
00530 #define FL_Mail         0xEF19
00531 #define FL_Search       0xEF1B
00532 #define FL_Back         0xEF26
00533 #define FL_Forward      0xEF27
00534 #define FL_Stop         0xEF28
00535 #define FL_Refresh      0xEF29
00536 #define FL_Sleep        0xEF2F
00537 #define FL_Favorites    0xEF30
00538
// group: Non-ASCII key names 00540
00550 #define FL_LEFT_MOUSE  1
00551 #define FL_MIDDLE_MOUSE 2
00552 #define FL_RIGHT_MOUSE 3
00553
// group: Mouse Buttons 00555
00556
// group: Event States 00563
00564 // FIXME: it would be nice to have the modifiers in the upper 8 bit so that
00565 // a unicode key (24bit) can be sent as an unsigned with the modifiers.
00566
00567 #define FL_SHIFT      0x00010000
00568 #define FL_CAPS_LOCK  0x00020000
00569 #define FL_CTRL       0x00040000
00570 #define FL_ALT        0x00080000
00571 #define FL_NUM_LOCK   0x00100000
00572
00573 #define FL_META        0x00400000 // most X servers do this?
00574 // correct for XFree86
00575 #define FL_SCROLL_LOCK 0x00800000
00576 // correct for XFree86
00577 #define FL_BUTTON1    0x01000000
00578 #define FL_BUTTON2    0x02000000
00579 #define FL_BUTTON3    0x04000000
00580 #define FL_BUTTONS    0x7f000000
00581 #define FL_BUTTON(n)  (0x00800000<<(n))
00582
00583 #define FL_KEY_MASK 0x0000ffff
00584 // FIXME: Unicode needs 24 bits!
00585
// group: Event States 00587
// group: Box Types 00614
00626 enum Fl_Boxtype { // boxtypes (if you change these you must also change fl_boxttype.cxx):
00627
00628     FL_NO_BOX = 0,
00629     FL_FLAT_BOX,
00630     FL_UP_BOX,
00631     FL_DOWN_BOX,
00632     FL_UP_FRAME,
00633     FL_DOWN_FRAME,
00634     FL_THIN_UP_BOX,
00635     FL_THIN_DOWN_BOX,
00636     FL_THIN_UP_FRAME,
00637     FL_THIN_DOWN_FRAME,
00638     FL_ENGRAVED_BOX,

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00639 FL_EMBOSSED_BOX,
00640 FL_ENGRAVED_FRAME,
00641 FL_EMBOSSED_FRAME,
00642 FL_BORDER_BOX,
00643 _FL_SHADOW_BOX,
00644 FL_BORDER_FRAME,
00645 _FL_SHADOW_FRAME,
00646 _FL_ROUNDED_BOX,
00647 _FL_RSHADOW_BOX,
00648 _FL_ROUNDED_FRAME,
00649 _FL_RFLAT_BOX,
00650 _FL_ROUND_UP_BOX,
00651 _FL_ROUND_DOWN_BOX,
00652 _FL_DIAMOND_UP_BOX,
00653 _FL_DIAMOND_DOWN_BOX,
00654 _FL_OVAL_BOX,
00655 _FL_OSHADOW_BOX,
00656 _FL_OVAL_FRAME,
00657 _FL_OFLAT_BOX,
00658 _FL_PLASTIC_UP_BOX,
00659 _FL_PLASTIC_DOWN_BOX,
00660 _FL_PLASTIC_UP_FRAME,
00661 _FL_PLASTIC_DOWN_FRAME,
00662 _FL_PLASTIC_THIN_UP_BOX,
00663 _FL_PLASTIC_THIN_DOWN_BOX,
00664 _FL_PLASTIC_ROUND_UP_BOX,
00665 _FL_PLASTIC_ROUND_DOWN_BOX,
00666 _FL_GTK_UP_BOX,
00667 _FL_GTK_DOWN_BOX,
00668 _FL_GTK_UP_FRAME,
00669 _FL_GTK_DOWN_FRAME,
00670 _FL_GTK_THIN_UP_BOX,
00671 _FL_GTK_THIN_DOWN_BOX,
00672 _FL_GTK_THIN_UP_FRAME,
00673 _FL_GTK_THIN_DOWN_FRAME,
00674 _FL_GTK_ROUND_UP_BOX,
00675 _FL_GTK_ROUND_DOWN_BOX,
00676 _FL_GLEAM_UP_BOX,
00677 _FL_GLEAM_DOWN_BOX,
00678 _FL_GLEAM_UP_FRAME,
00679 _FL_GLEAM_DOWN_FRAME,
00680 _FL_GLEAM_THIN_UP_BOX,
00681 _FL_GLEAM_THIN_DOWN_BOX,
00682 _FL_GLEAM_ROUND_UP_BOX,
00683 _FL_GLEAM_ROUND_DOWN_BOX,
00684 _FL_OXY_UP_BOX,
00685 _FL_OXY_DOWN_BOX,
00686 _FL_OXY_UP_FRAME,
00687 _FL_OXY_DOWN_FRAME,
00688 _FL_OXY_THIN_UP_BOX,
00689 _FL_OXY_THIN_DOWN_BOX,
00690 _FL_OXY_THIN_UP_FRAME,
00691 _FL_OXY_THIN_DOWN_FRAME,
00692 _FL_OXY_ROUND_UP_BOX,
00693 _FL_OXY_ROUND_DOWN_BOX,
00694 _FL_OXY_BUTTON_UP_BOX,
00695 _FL_OXY_BUTTON_DOWN_BOX,
00696 FL_FREE_BOXTYPE
00697 };
00698
00699 #ifndef FL_DOXYGEN
00700
00701 extern FL_EXPORT Fl_Boxtype fl_define_FL_ROUND_UP_BOX();
00702 #define FL_ROUND_UP_BOX fl_define_FL_ROUND_UP_BOX()
00703 #define FL_ROUND_DOWN_BOX (Fl_Boxtype)(fl_define_FL_ROUND_UP_BOX()+1)
00704 extern FL_EXPORT Fl_Boxtype fl_define_FL_SHADOW_BOX();
00705 #define FL_SHADOW_BOX fl_define_FL_SHADOW_BOX()
00706 #define FL_SHADOW_FRAME (Fl_Boxtype)(fl_define_FL_SHADOW_BOX()+2)
00707 extern FL_EXPORT Fl_Boxtype fl_define_FL_ROUNDED_BOX();
00708 #define FL_ROUNDED_BOX fl_define_FL_ROUNDED_BOX()
00709 #define FL_ROUNDED_FRAME (Fl_Boxtype)(fl_define_FL_ROUNDED_BOX()+2)
00710 extern FL_EXPORT Fl_Boxtype fl_define_FL_RFLAT_BOX();
00711 #define FL_RFLAT_BOX fl_define_FL_RFLAT_BOX()
00712 extern FL_EXPORT Fl_Boxtype fl_define_FL_RSHADOW_BOX();
00713 #define FL_RSHADOW_BOX fl_define_FL_RSHADOW_BOX()
00714 extern FL_EXPORT Fl_Boxtype fl_define_FL_DIAMOND_BOX();
00715 #define FL_DIAMOND_UP_BOX fl_define_FL_DIAMOND_BOX()
00716 #define FL_DIAMOND_DOWN_BOX (Fl_Boxtype)(fl_define_FL_DIAMOND_BOX()+1)
00717 extern FL_EXPORT Fl_Boxtype fl_define_FL_OVAL_BOX();
00718 #define FL_OVAL_BOX fl_define_FL_OVAL_BOX()
00719 #define FL_OSHADOW_BOX (Fl_Boxtype)(fl_define_FL_OVAL_BOX()+1)
00720 #define FL_OVAL_FRAME (Fl_Boxtype)(fl_define_FL_OVAL_BOX()+2)
00721 #define FL_OFLAT_BOX (Fl_Boxtype)(fl_define_FL_OVAL_BOX()+3)
00722
00723 extern FL_EXPORT Fl_Boxtype fl_define_FL_PLASTIC_UP_BOX();
00724 #define FL_PLASTIC_UP_BOX fl_define_FL_PLASTIC_UP_BOX()
00725 #define FL_PLASTIC_DOWN_BOX (Fl_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+1)

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00726 #define FL_PLASTIC_UP_FRAME (Fl_Boxtype) (fl_define_FL_PLASTIC_UP_BOX()+2)
00727 #define FL_PLASTIC_DOWN_FRAME (Fl_Boxtype) (fl_define_FL_PLASTIC_UP_BOX()+3)
00728 #define FL_PLASTIC_THIN_UP_BOX (Fl_Boxtype) (fl_define_FL_PLASTIC_UP_BOX()+4)
00729 #define FL_PLASTIC_THIN_DOWN_BOX (Fl_Boxtype) (fl_define_FL_PLASTIC_UP_BOX()+5)
00730 #define FL_PLASTIC_ROUND_UP_BOX (Fl_Boxtype) (fl_define_FL_PLASTIC_UP_BOX()+6)
00731 #define FL_PLASTIC_ROUND_DOWN_BOX (Fl_Boxtype) (fl_define_FL_PLASTIC_UP_BOX()+7)
00732
00733 extern FL_EXPORT Fl_Boxtype fl_define_FL_GTK_UP_BOX();
00734 #define FL_GTK_UP_BOX fl_define_FL_GTK_UP_BOX()
00735 #define FL_GTK_DOWN_BOX (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+1)
00736 #define FL_GTK_UP_FRAME (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+2)
00737 #define FL_GTK_DOWN_FRAME (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+3)
00738 #define FL_GTK_THIN_UP_BOX (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+4)
00739 #define FL_GTK_THIN_DOWN_BOX (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+5)
00740 #define FL_GTK_THIN_UP_FRAME (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+6)
00741 #define FL_GTK_THIN_DOWN_FRAME (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+7)
00742 #define FL_GTK_ROUND_UP_BOX (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+8)
00743 #define FL_GTK_ROUND_DOWN_BOX (Fl_Boxtype) (fl_define_FL_GTK_UP_BOX()+9)
00744
00745 extern FL_EXPORT Fl_Boxtype fl_define_FL_GLEAM_UP_BOX();
00746 #define FL_GLEAM_UP_BOX fl_define_FL_GLEAM_UP_BOX()
00747 #define FL_GLEAM_DOWN_BOX (Fl_Boxtype) (fl_define_FL_GLEAM_UP_BOX()+1)
00748 #define FL_GLEAM_UP_FRAME (Fl_Boxtype) (fl_define_FL_GLEAM_UP_BOX()+2)
00749 #define FL_GLEAM_DOWN_FRAME (Fl_Boxtype) (fl_define_FL_GLEAM_UP_BOX()+3)
00750 #define FL_GLEAM_THIN_UP_BOX (Fl_Boxtype) (fl_define_FL_GLEAM_UP_BOX()+4)
00751 #define FL_GLEAM_THIN_DOWN_BOX (Fl_Boxtype) (fl_define_FL_GLEAM_UP_BOX()+5)
00752 #define FL_GLEAM_ROUND_UP_BOX (Fl_Boxtype) (fl_define_FL_GLEAM_UP_BOX()+6)
00753 #define FL_GLEAM_ROUND_DOWN_BOX (Fl_Boxtype) (fl_define_FL_GLEAM_UP_BOX()+7)
00754
00755 extern FL_EXPORT Fl_Boxtype fl_define_FL_OXY_UP_BOX();
00756 #define FL_OXY_UP_BOX fl_define_FL_OXY_UP_BOX()
00757 #define FL_OXY_DOWN_BOX (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+1)
00758 #define FL_OXY_UP_FRAME (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+2)
00759 #define FL_OXY_DOWN_FRAME (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+3)
00760 #define FL_OXY_THIN_UP_BOX (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+4)
00761 #define FL_OXY_THIN_DOWN_BOX (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+5)
00762 #define FL_OXY_THIN_UP_FRAME (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+6)
00763 #define FL_OXY_THIN_DOWN_FRAME (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+7)
00764 #define FL_OXY_ROUND_UP_BOX (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+8)
00765 #define FL_OXY_ROUND_DOWN_BOX (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+9)
00766 #define FL_OXY_BUTTON_UP_BOX (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+10)
00767 #define FL_OXY_BUTTON_DOWN_BOX (Fl_Boxtype) (fl_define_FL_OXY_UP_BOX()+11)
00768
00769 #endif // ! FL_DOXYGEN
00770
00771 // conversions of box types to other boxtypes:
00772 inline Fl_Boxtype fl_box(Fl_Boxtype b) {
00773     return (Fl_Boxtype) ((b<FL_UP_BOX|b%4>1)?b:(b-2));
00774 }
00775 inline Fl_Boxtype fl_down(Fl_Boxtype b) {
00776     return (Fl_Boxtype) ((b<FL_UP_BOX)?b:(b|1));
00777 }
00778 inline Fl_Boxtype fl_frame(Fl_Boxtype b) {
00779     return (Fl_Boxtype) ((b%4<2)?b:(b+2));
00780 }
00781
00782 // back-compatibility box types:
00783 #define FL_FRAME FL_ENGRAVED_FRAME
00784 #define FL_FRAME_BOX FL_ENGRAVED_BOX
00785 #define FL_CIRCLE_BOX FL_ROUND_DOWN_BOX
00786 #define FL_DIAMOND_BOX FL_DIAMOND_DOWN_BOX
00787
00788 // group: Box Types 00804
00789 enum Fl_Labeltype { // labeltypes:
00790     FL_NORMAL_LABEL = 0,
00791     FL_NO_LABEL,
00792     FL_SHADOW_LABEL,
00793     FL_ENGRAVED_LABEL,
00794     FL_EMBOSSSED_LABEL,
00795     FL_MULTI_LABEL,
00796     FL_ICON_LABEL,
00797     FL_IMAGE_LABEL,
00798     FL_FREE_LABELTYPE
00799 };
00800
00801 #define FL_SYMBOL_LABEL FL_NORMAL_LABEL
00802 extern Fl_Labeltype FL_EXPORT fl_define_FL_SHADOW_LABEL();
00803 #define FL_SHADOW_LABEL fl_define_FL_SHADOW_LABEL()
00804
00805 extern Fl_Labeltype FL_EXPORT fl_define_FL_ENGRAVED_LABEL();
00806 #define FL_ENGRAVED_LABEL fl_define_FL_ENGRAVED_LABEL()
00807
00808 extern Fl_Labeltype FL_EXPORT fl_define_FL_EMBOSSSED_LABEL();
00809 #define FL_EMBOSSSED_LABEL fl_define_FL_EMBOSSSED_LABEL()
00810
00811 extern Fl_Labeltype FL_EXPORT fl_define_FL_MULTI_LABEL();

```

```

00880 #define FL_MULTI_LABEL fl_define_FL_MULTI_LABEL()
00881
00886 extern Fl_Labeltype FL_EXPORT fl_define_FL_ICON_LABEL();
00890 #define FL_ICON_LABEL fl_define_FL_ICON_LABEL()
00891
00896 extern Fl_Labeltype FL_EXPORT fl_define_FL_IMAGE_LABEL();
00903 #define FL_IMAGE_LABEL fl_define_FL_IMAGE_LABEL()
00904
00967 typedef unsigned Fl_Align;
00968
00970 const Fl_Align FL_ALIGN_CENTER      = 0x0000;
00971
00974 const Fl_Align FL_ALIGN_TOP        = 0x0001;
00975
00977 const Fl_Align FL_ALIGN_BOTTOM     = 0x0002;
00978
00982 const Fl_Align FL_ALIGN_LEFT       = 0x0004;
00983
00985 const Fl_Align FL_ALIGN_RIGHT      = 0x0008;
00986
00988 const Fl_Align FL_ALIGN_INSIDE     = 0x0010;
00989
00991 const Fl_Align FL_ALIGN_TEXT_OVER_IMAGE = 0x0020;
00992
00994 const Fl_Align FL_ALIGN_IMAGE_OVER_TEXT = 0x0000;
00995
00997 const Fl_Align FL_ALIGN_CLIP       = 0x0040;
00998
01000 const Fl_Align FL_ALIGN_WRAP       = 0x0080;
01001
01003 const Fl_Align FL_ALIGN_IMAGE_NEXT_TO_TEXT = 0x0100;
01004
01006 const Fl_Align FL_ALIGN_TEXT_NEXT_TO_IMAGE = 0x0120;
01007
01009 const Fl_Align FL_ALIGN_IMAGE_BACKDROP = 0x0200;
01010
01011 const Fl_Align FL_ALIGN_TOP_LEFT   = FL_ALIGN_TOP | FL_ALIGN_LEFT;
01012 const Fl_Align FL_ALIGN_TOP_RIGHT  = FL_ALIGN_TOP | FL_ALIGN_RIGHT;
01013 const Fl_Align FL_ALIGN_BOTTOM_LEFT = FL_ALIGN_BOTTOM | FL_ALIGN_LEFT;
01014 const Fl_Align FL_ALIGN_BOTTOM_RIGHT = FL_ALIGN_BOTTOM | FL_ALIGN_RIGHT;
01015
01017 const Fl_Align FL_ALIGN_LEFT_TOP   = 0x0007;
01018
01020 const Fl_Align FL_ALIGN_RIGHT_TOP  = 0x000b;
01021
01023 const Fl_Align FL_ALIGN_LEFT_BOTTOM = 0x000d;
01024
01026 const Fl_Align FL_ALIGN_RIGHT_BOTTOM = 0x000e;
01027
01029 const Fl_Align FL_ALIGN_NOWRAP     = 0x0000;
01030
01032 const Fl_Align FL_ALIGN_POSITION_MASK = 0x000f;
01033
01035 const Fl_Align FL_ALIGN_IMAGE_MASK  = 0x0320;
01044 typedef int Fl_Font;
01045
01046 const Fl_Font FL_HELVETICA          = 0;
01047 const Fl_Font FL_HELVETICA_BOLD     = 1;
01048 const Fl_Font FL_HELVETICA_ITALIC   = 2;
01049 const Fl_Font FL_HELVETICA_BOLD_ITALIC = 3;
01050 const Fl_Font FL_COURIER            = 4;
01051 const Fl_Font FL_COURIER_BOLD       = 5;
01052 const Fl_Font FL_COURIER_ITALIC     = 6;
01053 const Fl_Font FL_COURIER_BOLD_ITALIC = 7;
01054 const Fl_Font FL_TIMES              = 8;
01055 const Fl_Font FL_TIMES_BOLD         = 9;
01056 const Fl_Font FL_TIMES_ITALIC       = 10;
01057 const Fl_Font FL_TIMES_BOLD_ITALIC  = 11;
01058 const Fl_Font FL_SYMBOL              = 12;
01059 const Fl_Font FL_SCREEN              = 13;
01060 const Fl_Font FL_SCREEN_BOLD        = 14;
01061 const Fl_Font FL_ZAPF_DINGBATS      = 15;
01062
01063 const Fl_Font FL_FREE_FONT           = 16;
01064 const Fl_Font FL_BOLD                = 1;
01065 const Fl_Font FL_ITALIC              = 2;
01066 const Fl_Font FL_BOLD_ITALIC        = 3;
01067
01073 typedef int Fl_Fontsize;
01074
01075 extern FL_EXPORT Fl_Fontsize FL_NORMAL_SIZE;
01076
01101 typedef unsigned int Fl_Color;
01102
01103 // Standard colors. These are used as default colors in widgets and altered as necessary
01104 const Fl_Color FL_FOREGROUND_COLOR = 0;
01105 const Fl_Color FL_BACKGROUND2_COLOR = 7;

```

```

01106 const Fl_Color FL_INACTIVE_COLOR = 8;
01107 const Fl_Color FL_SELECTION_COLOR = 15;
01108
01109 // boxtypes generally limit themselves to these colors so
01110 // the whole ramp is not allocated:
01111
01112 const Fl_Color FL_GRAY0 = 32; // 'A'
01113 const Fl_Color FL_DARK3 = 39; // 'H'
01114 const Fl_Color FL_DARK2 = 45; // 'N'
01115 const Fl_Color FL_DARK1 = 47; // 'P'
01117 const Fl_Color FL_BACKGROUND_COLOR = 49; // 'R' default background color
01118 const Fl_Color FL_LIGHT1 = 50; // 'S'
01119 const Fl_Color FL_LIGHT2 = 52; // 'U'
01120 const Fl_Color FL_LIGHT3 = 54; // 'W'
01121
01122 // FLTK provides a 5x8x5 color cube that is used with colormap visuals
01123
01124 const Fl_Color FL_BLACK = 56;
01125 const Fl_Color FL_RED = 88;
01126 const Fl_Color FL_GREEN = 63;
01127 const Fl_Color FL_YELLOW = 95;
01128 const Fl_Color FL_BLUE = 216;
01129 const Fl_Color FL_MAGENTA = 248;
01130 const Fl_Color FL_CYAN = 223;
01131 const Fl_Color FL_DARK_RED = 72;
01132
01133 const Fl_Color FL_DARK_GREEN = 60;
01134 const Fl_Color FL_DARK_YELLOW = 76;
01135 const Fl_Color FL_DARK_BLUE = 136;
01136 const Fl_Color FL_DARK_MAGENTA = 152;
01137 const Fl_Color FL_DARK_CYAN = 140;
01138
01139 const Fl_Color FL_WHITE = 255;
01140
01143 #define FL_FREE_COLOR (Fl_Color)16
01144 #define FL_NUM_FREE_COLOR 16
01145 #define FL_GRAY_RAMP (Fl_Color)32
01146 #define FL_NUM_GRAY 24
01147 #define FL_GRAY FL_BACKGROUND_COLOR
01148 #define FL_COLOR_CUBE (Fl_Color)56
01149 #define FL_NUM_RED 5
01150 #define FL_NUM_GREEN 8
01151 #define FL_NUM_BLUE 5
01152
01153 FL_EXPORT Fl_Color fl_inactive(Fl_Color c);
01154
01174 typedef Fl_Color (Fl_Contrast_Function)(Fl_Color, Fl_Color, Fl_Fontsize, int);
01175
01176 FL_EXPORT void fl_contrast_function(Fl_Contrast_Function *f);
01177
01181 enum Fl_Contrast_Mode {
01182     FL_CONTRAST_NONE = 0,
01183     FL_CONTRAST_LEGACY,
01184     FL_CONTRAST_CIELAB,
01185     FL_CONTRAST_CUSTOM,
01186     FL_CONTRAST_LAST
01187 };
01188
01189 // The following functions are defined and documented in src/fl_contrast.cxx
01190
01191 FL_EXPORT void fl_contrast_level(int level);
01192 FL_EXPORT int fl_contrast_level();
01193 FL_EXPORT void fl_contrast_mode(int mode);
01194 FL_EXPORT int fl_contrast_mode();
01195
01196 FL_EXPORT Fl_Color fl_contrast(Fl_Color fg, Fl_Color bg, Fl_Fontsize fs = 0, int context = 0);
01197
01198 FL_EXPORT double fl_lightness(Fl_Color color);
01199 FL_EXPORT double fl_luminance(Fl_Color color);
01200
01201 // Other color functions are defined and documented in src/fl_color.cxx
01202
01203 FL_EXPORT Fl_Color fl_color_average(Fl_Color c1, Fl_Color c2, float weight);
01204
01206 inline Fl_Color fl_lighter(Fl_Color c) { return fl_color_average(c, FL_WHITE, .67f); }
01207
01209 inline Fl_Color fl_darker(Fl_Color c) { return fl_color_average(c, FL_BLACK, .67f); }
01210
01212 inline Fl_Color fl_rgb_color(uchar r, uchar g, uchar b) {
01213     if (!r && !g && !b) return FL_BLACK;
01214     else return (Fl_Color)((((r < 8) | g) < 8) | b) < 8);
01215 }
01216
01218 inline Fl_Color fl_rgb_color(uchar g) {
01219     if (!g) return FL_BLACK;
01220     else return (Fl_Color)((((g < 8) | g) < 8) | g) < 8);
01221 }

```



```

01222
01231 inline Fl_Color fl_gray_ramp(int i) {return (Fl_Color)(i+FL_GRAY_RAMP);}
01232
01247 inline Fl_Color fl_color_cube(int r, int g, int b) {
01248     return (Fl_Color)((b*FL_NUM_RED + r) * FL_NUM_GREEN + g + FL_COLOR_CUBE);}
01249
// group: Colors 01251
01260 /* FIXME: We should renumber these, but that will break the ABI */
01261 enum Fl_Cursor {
01262     FL_CURSOR_DEFAULT    = 0, // U+2196
01263     FL_CURSOR_ARROW     = 35, // U+2196
01264     FL_CURSOR_CROSS    = 66, // U+FF0B
01265     FL_CURSOR_WAIT     = 76, // U+231A, U+231B
01266     FL_CURSOR_INSERT   = 77, // U+2336
01267     FL_CURSOR_HAND     = 31, // U+261C
01268     FL_CURSOR_HELP     = 47,
01269     FL_CURSOR_MOVE     = 27, // U+2725, U+270B
01270
01271     /* Resize indicators */
01272     FL_CURSOR_NS       = 78, // U+21D5
01273     FL_CURSOR_WE       = 79, // U+21D4
01274     FL_CURSOR_NWSE    = 80, // U+2921
01275     FL_CURSOR_NESW    = 81, // U+2922
01276     FL_CURSOR_N       = 70, // U+2912
01277     FL_CURSOR_NE      = 69, // U+2197
01278     FL_CURSOR_E       = 49, // U+21E5
01279     FL_CURSOR_SE      = 8, // U+21F2
01280     FL_CURSOR_S       = 9, // U+2913
01281     FL_CURSOR_SW      = 7, // U+2199
01282     FL_CURSOR_W       = 36, // U+21E4
01283     FL_CURSOR_NW      = 68, // U+21F1
01284
01285     FL_CURSOR_NONE    = 255
01286 };
// group: Cursors 01288
01290 enum { // values for "when" passed to Fl::add_fd()
01291     FL_READ    = 1,
01292     FL_WRITE   = 4,
01293     FL_EXCEPT = 8
01294 };
01295
01297 enum Fl_Mode {
01298     FL_RGB        = 0,
01299     FL_INDEX     = 1,
01300     FL_SINGLE    = 0,
01301     FL_DOUBLE    = 2,
01302     FL_ACCUM     = 4,
01303     FL_ALPHA     = 8,
01304     FL_DEPTH     = 16,
01305     FL_STENCIL   = 32,
01306     FL_RGB8     = 64,
01307     FL_MULTISAMPLE = 128,
01308     FL_STEREO    = 256,
01309     FL_FAKE_SINGLE = 512, // Fake single buffered windows using double-buffer
01310     FL_OPENGL3   = 1024
01311 };
01312
01313 // image alpha blending
01314
01315 #define FL_IMAGE_WITH_ALPHA 0x40000000
01316
01318 enum Fl_Damage {
01319     FL_DAMAGE_CHILD    = 0x01,
01320     FL_DAMAGE_EXPOSE   = 0x02,
01321     FL_DAMAGE_SCROLL   = 0x04,
01322     FL_DAMAGE_OVERLAY  = 0x08,
01323     FL_DAMAGE_USER1    = 0x10,
01324     FL_DAMAGE_USER2    = 0x20,
01325     FL_DAMAGE_ALL      = 0x80
01326 };
01327
01328 // FLTK 1.0.x compatibility definitions (FLTK_1_0_COMPAT) dropped in 1.4.0
01329
01342 enum Fl_Arrow_Type {
01343     FL_ARROW_SINGLE = 0x01,
01344     FL_ARROW_DOUBLE = 0x02,
01345     FL_ARROW_CHOICE = 0x03,
01346     FL_ARROW_RETURN = 0x04
01347 };
01348
01371 enum Fl_Orientation {
01372     FL_ORIENT_NONE = 0x00,
01373     FL_ORIENT_RIGHT = 0x00,
01374     FL_ORIENT_NE = 0x01,
01375     FL_ORIENT_UP = 0x02,
01376     FL_ORIENT_NW = 0x03,
01377     FL_ORIENT_LEFT = 0x04,

```

```

01378  FL_ORIENT_SW      = 0x05,
01379  FL_ORIENT_DOWN    = 0x06,
01380  FL_ORIENT_SE      = 0x07
01381 };
01382
01383 #endif

```

13.3 filename.H File Reference

File names and URI utility functions.

```

#include "Fl_Export.H"
#include <FL/platform_types.h>

```

Macros

- `#define FL_PATH_MAX 2048`
all path buffers should use this length

Typedefs

- typedef int() `Fl_File_Sort_F`(struct dirent **, struct dirent **)
File sorting function.

Functions

- void `fl_decode_uri` (char *uri)
Decodes a URL-encoded string.
- int `fl_filename_absolute` (char *to, int tolen, const char *from)
Makes a filename absolute from a relative filename to the current working directory.
- int `fl_filename_absolute` (char *to, int tolen, const char *from, const char *cwd)
Concatenate the absolute path base with from to form the new absolute path in to.
- int `fl_filename_expand` (char *to, int tolen, const char *from)
Expands a filename containing shell variables and tilde (~).
- const char * `fl_filename_ext` (const char *buf)
Gets the extension of a filename.
- void `fl_filename_free_list` (struct dirent **l, int n)
Free the list of filenames that is generated by fl_filename_list().
- int `fl_filename_isdir` (const char *name)
Determines if a file exists and is a directory from its filename.
- int `fl_filename_list` (const char *d, struct dirent **l, `Fl_File_Sort_F` *s=`fl_numericsort`)
Portable and const-correct wrapper for the scandir() function.
- int `fl_filename_match` (const char *name, const char *pattern)
Checks if a string s matches a pattern p.
- const char * `fl_filename_name` (const char *filename)
Gets the file name from a path.
- int `fl_filename_relative` (char *to, int tolen, const char *from)
Makes a filename relative to the current working directory.
- int `fl_filename_relative` (char *to, int tolen, const char *from, const char *cwd)
Makes a filename relative to any other directory.
- char * `fl_filename_setext` (char *to, int tolen, const char *ext)
Replaces the extension in buf of max.
- int `fl_open_uri` (const char *uri, char *msg, int msglen)
Opens the specified Uniform Resource Identifier (URI).

13.3.1 Detailed Description

File names and URI utility functions.

13.4 filename.H

[Go to the documentation of this file.](#)

```

00001 /*
00002  * Filename header file for the Fast Light Tool Kit (FLTK).
00003  *
00004  * Copyright 1998-2023 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  *     https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *
00014  *     https://www.fltk.org/bugs.php
00015  */
00016
00017 /*
00018  * Note to devs:
00019  * Under Windows, we include filename.H from numericstort.c; this should probably change.
00020  * This implies that we need C-style comments and '#ifdef __cplusplus ... #endif'
00021  */
00022
00027 #ifndef FL_FILENAME_H
00028 # define FL_FILENAME_H
00029
00030 #include "Fl_Export.H"
00031 #include <FL/platform_types.h>
00032
00033 #ifdef __cplusplus
00034
00035 // The following include is not (yet) used in FLTK 1.4
00036 // In FLTK 1.5 or 4.0 using std::string would be default.
00037 // #include <string>
00038
00039 #endif /* __cplusplus */
00040
00045 # define FL_PATH_MAX 2048
00061 FL_EXPORT const char *fl_filename_name(const char * filename);
00062 FL_EXPORT const char *fl_filename_ext(const char *buf);
00063 FL_EXPORT char *fl_filename_setext(char *to, int tolen, const char *ext);
00064 FL_EXPORT int fl_filename_expand(char *to, int tolen, const char *from);
00065 FL_EXPORT int fl_filename_absolute(char *to, int tolen, const char *from);
00066 FL_EXPORT int fl_filename_relative(char *to, int tolen, const char *from);
00067 FL_EXPORT int fl_filename_match(const char *name, const char *pattern);
00068 FL_EXPORT int fl_filename_isdir(const char *name);
00069
00070 # if defined(__cplusplus)
00071
00072 FL_EXPORT int fl_filename_absolute(char *to, int tolen, const char *from, const char *cwd);
00073 FL_EXPORT int fl_filename_relative(char *to, int tolen, const char *from, const char *cwd);
00074
00075
00076 // FIXME: We can't do this in 1.4.x - enable this block in 1.5 or higher.
00077 // See fluid/fluid_filename.{h|cxx} for an implementation using Fl_String.
00078
00079 // FL_EXPORT std::string fl_filename_name(const std::string &filename);
00080 // FL_EXPORT std::string fl_filename_path(const std::string &filename);
00081 // FL_EXPORT std::string fl_filename_ext(const std::string &filename);
00082 // FL_EXPORT std::string fl_filename_setext(const std::string &filename, const std::string
&new_extension);
00083 // FL_EXPORT std::string fl_filename_expand(const std::string &from);
00084 // FL_EXPORT std::string fl_filename_absolute(const std::string &from);
00085 // FL_EXPORT std::string fl_filename_absolute(const std::string &from, const std::string &base);
00086 // FL_EXPORT std::string fl_filename_relative(const std::string &from);
00087 // FL_EXPORT std::string fl_filename_relative(const std::string &from, const std::string &base);
00088 // FL_EXPORT std::string fl_getcwd();
00089
00090 # endif /* defined(__cplusplus) */
00091
00092 # if defined(__cplusplus) && !defined(FL_DOXYGEN)
00093 /*
00094  * Under Windows, we include filename.H from numericstort.c; this should probably change...
00095  */
00096
00097 inline char *fl_filename_setext(char *to, const char *ext) { return fl_filename_setext(to,
FL_PATH_MAX, ext); }

```

```

00098 inline int fl_filename_expand(char *to, const char *from) { return fl_filename_expand(to, FL_PATH_MAX,
    from); }
00099 inline int fl_filename_absolute(char *to, const char *from) { return fl_filename_absolute(to,
    FL_PATH_MAX, from); }
00100 inline int fl_filename_relative(char *to, const char *from) { return fl_filename_relative(to,
    FL_PATH_MAX, from); }
00101 # endif /* __cplusplus */
00102
00103 # if defined (__cplusplus)
00104 extern "C" {
00105 # endif /* __cplusplus */
00106
00107 # if !defined(FL_DOXYGEN)
00108 FL_EXPORT int fl_alphasort(struct dirent **, struct dirent **);
00109 FL_EXPORT int fl_casealphasort(struct dirent **, struct dirent **);
00110 FL_EXPORT int fl_casenumERICsort(struct dirent **, struct dirent **);
00111 FL_EXPORT int fl_numericSORT(struct dirent **, struct dirent **);
00112 # endif
00113
00114 typedef int (Fl_File_Sort_F)(struct dirent **, struct dirent **);
00116 # if defined(__cplusplus)
00117 }
00118
00119 /*
00120 * Portable "scandir" function. Ugly but necessary...
00121 */
00122
00123 FL_EXPORT int fl_filename_list(const char *d, struct dirent ***l,
    Fl_File_Sort_F *s = fl_numericSORT);
00124
00125 FL_EXPORT void fl_filename_free_list(struct dirent ***l, int n);
00126
00127 /*
00128 * Generic function to open a Uniform Resource Identifier (URI) using a
00129 * system-defined program (added in FLTK 1.1.8)
00130 */
00131
00132 FL_EXPORT int fl_open_uri(const char *uri, char *msg = (char *)0,
    int msglen = 0);
00133
00134
00135 FL_EXPORT void fl_decode_uri(char *uri);
00136
00137 # endif /* __cplusplus */
00138
00139 /*
00140 * Note: FLTK 1.0.x compatibility definitions (FLTK_1_0_COMPAT) dropped in 1.4.0
00141 */
00142
00143 #endif /* FL_FILENAME_H */
00144

```

13.5 FL.H File Reference

Fl static class.

```

#include <FL/fl_config.h>
#include <FL/Fl_Export.H>
#include <FL/platform_types.h>
#include <FL/fl_casts.H>
#include <FL/Fl_Cairo.H>
#include "fl_utf8.h"
#include "Enumerations.H"
#include <string.h>

```

Classes

- class [Fl](#)

The [Fl](#) is the FLTK global (static) class containing state information and global methods for the current application.

- class [Fl_Widget_Tracker](#)

This class should be used to control safe widget deletion.

Macros

- #define [Fl_Object Fl_Widget](#)

for back compatibility - use `FI_Widget!`

Typedefs

- typedef void(* **FI_Abort_Handler**) (const char *format,...)
Signature of set_abort functions passed as parameters.
- typedef int(* **FI_Args_Handler**) (int argc, char **argv, int &i)
Signature of args functions passed as parameters.
- typedef void(* **FI_Atclose_Handler**) ([FI_Window](#) *window, void *data)
Signature of set_atclose functions passed as parameters.
- typedef void(* **FI_Awake_Handler**) (void *data)
Signature of some wakeup callback functions passed as parameters.
- typedef void() **FI_Box_Draw_F**(int x, int y, int w, int h, [FI_Color](#) color)
Signature of some box drawing functions passed as parameters.
- typedef void(* **FI_Clipboard_Notify_Handler**) (int source, void *data)
Signature of add_clipboard_notify functions passed as parameters.
- typedef int(* **FI_Event_Dispatch**) (int event, [FI_Window](#) *w)
Signature of event_dispatch functions passed as parameters.
- typedef int(* **FI_Event_Handler**) (int event)
Signature of add_handler functions passed as parameters.
- typedef void(* **FI_FD_Handler**) ([FL_SOCKET](#) fd, void *data)
Signature of add_fd functions passed as parameters.
- typedef void(* **FI_Idle_Handler**) (void *data)
Signature of add_idle callback functions passed as parameters.
- typedef void() **FI_Label_Draw_F**(const [FI_Label](#) *label, int x, int y, int w, int h, [FI_Align](#) align)
Signature of some label drawing functions passed as parameters.
- typedef void() **FI_Label_Measure_F**(const [FI_Label](#) *label, int &width, int &height)
Signature of some label measurement functions passed as parameters.
- typedef void(* **FI_Old_Idle_Handler**) ()
Signature of set_idle callback functions passed as parameters.
- typedef int(* **FI_System_Handler**) (void *event, void *data)
Signature of add_system_handler functions passed as parameters.
- typedef void(* **FI_Timeout_Handler**) (void *data)
Signature of timeout callback functions passed as parameters.

Variables

- const char * **fl_local_alt**
string pointer used in shortcuts, you can change it to another language
- const char * **fl_local_ctrl**
string pointer used in shortcuts, you can change it to another language
- const char * **fl_local_meta**
string pointer used in shortcuts, you can change it to another language
- const char * **fl_local_shift**
string pointer used in shortcuts, you can change it to another language

13.5.1 Detailed Description

[FI](#) static class.

13.6 Fl.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Main header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00021 #ifndef Fl_H
00022 # define Fl_H
00023
00024 #include <FL/fl_config.h> // build configuration
00025 #include <FL/Fl_Export.H>
00026 #include <FL/platform_types.h> // for FL_SOCKET
00027 #include <FL/fl_casts.H> // experimental
00028
00029 #ifdef FLTK_HAVE_CAIRO
00030 # include <FL/Fl_Cairo.H>
00031 #endif
00032
00033 # include "fl_utf8.h"
00034 # include "Enumerations.H"
00035 # ifndef Fl_Object
00036 #     define Fl_Object Fl_Widget
00037 # endif
00038
00039 # ifdef check
00040 #     undef check
00041 # endif
00042
00043 # ifdef BSD
00044 #     undef BSD
00045 # endif
00046
00047 #include <string.h> // FIXME: Fl::is_scheme(): strcmp needs string.h
00048
00049 class Fl_Widget;
00050 class Fl_Window;
00051 class Fl_Image;
00052 struct Fl_Label;
00053 class Fl_Screen_Driver;
00054 class Fl_System_Driver;
00055
00056 // Pointers you can use to change FLTK to another language.
00057 // Note: Similar pointers are defined in FL/fl_ask.H and src/fl_ask.cxx
00058
00059 extern FL_EXPORT const char* fl_local_alt;
00060 extern FL_EXPORT const char* fl_local_ctrl;
00061 extern FL_EXPORT const char* fl_local_meta;
00062 extern FL_EXPORT const char* fl_local_shift;
00063
00083 typedef void (Fl_Label_Draw_F)(const Fl_Label *label, int x, int y, int w, int h, Fl_Align align);
00084
00086 typedef void (Fl_Label_Measure_F)(const Fl_Label *label, int &width, int &height);
00087
00089 typedef void (Fl_Box_Draw_F)(int x, int y, int w, int h, Fl_Color color);
00090
00094 typedef void (*Fl_Timeout_Handler)(void *data);
00095
00097 typedef void (*Fl_Awake_Handler)(void *data);
00098
00100 typedef void (*Fl_Idle_Handler)(void *data);
00101
00103 typedef void (*Fl_Old_Idle_Handler)();
00104
00106 typedef void (*Fl_FD_Handler)(FL_SOCKET fd, void *data);
00107
00109 typedef int (*Fl_Event_Handler)(int event);
00110
00112 typedef int (*Fl_System_Handler)(void *event, void *data);
00113
00115 typedef void (*Fl_Abort_Handler)(const char *format, ...);
00116
00118 typedef void (*Fl_Atclose_Handler)(Fl_Window *window, void *data);
00119

```

```

00121 typedef int (*Fl_Args_Handler)(int argc, char **argv, int &i);
00122
00125 typedef int (*Fl_Event_Dispatch)(int event, Fl_Window *w);
00126
00128 typedef void (*Fl_Clipboard_Notify_Handler)(int source, void *data);
00129
/* group callback_functions */ 00131
00132
00137 class FL_EXPORT Fl {
00138     friend class Fl_System_Driver;
00139     Fl() {} // no constructor!
00140
00141 private:
00142
00143     static int use_high_res_GL_;
00144     static int draw_GL_text_with_textures_;
00145     static int box_shadow_width_;
00146     static int box_border_radius_max_;
00147     static int selection_to_clipboard_;
00148
00149 public:
00150
00151     static Fl_Screen_Driver *screen_driver();
00152     static Fl_System_Driver *system_driver();
00153 #ifdef __APPLE__ // deprecated in 1.4 - only for compatibility with 1.3
00154     static void reset_marked_text();
00155     static void insertion_point_location(int x, int y, int height);
00156 #endif
00157
00158
00162     static int box_shadow_width() { return box_shadow_width_; }
00167     static void box_shadow_width(int W) { box_shadow_width_ = W < 1 ? 1 : W; }
00168
00172     static int box_border_radius_max() { return box_border_radius_max_; }
00185     static void box_border_radius_max(int R) { box_border_radius_max_ = R < 5 ? 5 : R; }
00186
00187 public: // should be private!
00188
00189 #ifndef FL_DOXYGEN
00190     static int e_number;
00191     static int e_x;
00192     static int e_y;
00193     static int e_x_root;
00194     static int e_y_root;
00195     static int e_dx;
00196     static int e_dy;
00197     static int e_state;
00198     static int e_clicks;
00199     static int e_is_click;
00200     static int e_keysym;
00201     static char* e_text;
00202     static int e_length;
00203     static void *e_clipboard_data;
00204     static const char *e_clipboard_type;
00205     static Fl_Event_Dispatch e_dispatch;
00206     static Fl_Callback_Reason callback_reason_;
00207     static Fl_Widget* belowmouse_;
00208     static Fl_Widget* pushed_;
00209     static Fl_Widget* focus_;
00210     static int damage_;
00211     static Fl_Widget* selection_owner_;
00212     static Fl_Window* modal_;
00213     static Fl_Window* grab_;
00214     static int compose_state; // used for dead keys (Windows) or marked text (MacOS)
00215     static void call_screen_init(); // recompute screen number and dimensions
00216 #endif // FL_DOXYGEN
00217
00218
00222     static void damage(int d) {damage_ = d;}
00223
00224 public:
00231     typedef enum {
00241         OPTION_ARROW_FOCUS = 0,
00242         // When switched on, FLTK will use the file chooser dialog that comes
00243         // with your operating system whenever possible. When switched off, FLTK
00244         // will present its own file chooser.
00245         // \todo implement me
00246         // OPTION_NATIVE_FILECHOOSER,
00247         // When Filechooser Preview is enabled, the FLTK or native file chooser
00248         // will show a preview of a selected file (if possible) before the user
00249         // decides to choose the file.
00250         // \todo implement me
00251         //OPTION_FILECHOOSER_PREVIEW,
00256         OPTION_VISIBLE_FOCUS,
00260         OPTION_DND_TEXT,
00264         OPTION_SHOW_TOOLTIPS,
00268         OPTION_FNFC_USES_GTK,

```

```

00272     OPTION_PRINTER_USES_GTK,
00276     OPTION_SHOW_SCALING,
00279     OPTION_FNFC_USES_ZENITY,
00280     // don't change this, leave it always as the last element
00282     OPTION_LAST
00283 } Fl_Option;
00284
00285 private:
00286     static unsigned char options_[OPTION_LAST];
00287     static unsigned char options_read_;
00288     static int program_should_quit_; // non-zero means the program was asked to cleanly terminate
00289
00290 public:
00291     /*
00292     Return a global setting for all FLTK applications, possibly overridden
00293     by a setting specifically for this application.
00294     */
00295     static bool option(Fl_Option opt);
00296
00297     /*
00298     Override an option while the application is running.
00299     */
00300     static void option(Fl_Option opt, bool val);
00301
00309     static void (*idle)();
00310
00311 #ifndef FL_DOXYGEN
00312 private:
00313     static Fl_Awake_Handler *awake_ring_;
00314     static void **awake_data_;
00315     static int awake_ring_size_;
00316     static int awake_ring_head_;
00317     static int awake_ring_tail_;
00318 public:
00319     static const char* scheme_;
00320     static Fl_Image* scheme_bg_;
00321
00322     static int e_original_keysym; // late addition
00323     static int scrollbar_size_;
00324     static int menu_linespacing_; // STR #2927
00325 #endif
00326
00327
00328     static int add_aware_handler_(Fl_Awake_Handler, void*);
00329     static int get_aware_handler_(Fl_Awake_Handler&, void*&);
00330
00331 public:
00332
00333     // API version number
00334     static double version();
00335     static int api_version();
00336
00337     // ABI version number
00338     static int abi_version();
00339
00362     static inline int abi_check(const int val = FL_ABI_VERSION) {
00363         return val == abi_version();
00364     }
00365
00366     // argument parsers:
00367     static int arg(int argc, char **argv, int& i);
00368     static int args(int argc, char **argv, int& i, Fl_Args_Handler cb = 0);
00369     static void args(int argc, char **argv);
00374     static const char* const help;
00375
00376     // things called by initialization:
00377     static void display(const char*);
00378     static int visual(int);
00388     static int gl_visual(int, int *alist=0); // platform dependent
00389     static void own_colormap();
00390     static void get_system_colors();
00391     static void foreground(uchar, uchar, uchar);
00392     static void background(uchar, uchar, uchar);
00393     static void background2(uchar, uchar, uchar);
00394
00395     // schemes:
00396     static int scheme(const char *name);
00398     static const char* scheme() {return scheme_;}
00399
00427     static int is_scheme(const char *name) {
00428         return (scheme_ && name && !strcmp(name,scheme_));
00429     }
00430
00431     static int reload_scheme(); // defined in 'src/Fl_get_system_colors.cxx'
00432
00433     static int scrollbar_size();
00434     static void scrollbar_size(int W);

```



```

00435 static int menu_linespacing();
00436 static void menu_linespacing(int H);
00437
00438 // execution:
00439 static int wait();
00440 static double wait(double time);
00441 static int check();
00442 static int ready();
00443 static int run();
00450 static int program_should_quit() {return program_should_quit_;}
00456 static void program_should_quit(int should_i) { program_should_quit_ = should_i; }
00457 static void hide_all_windows();
00458
00459 static Fl_Widget* readqueue();
00460
00461 //
00462 // cross-platform timer support
00463 //
00464
00465 static void add_timeout(double t, Fl_Timeout_Handler cb, void *data = 0);
00466 static void repeat_timeout(double t, Fl_Timeout_Handler cb, void *data = 0);
00467 static int has_timeout(Fl_Timeout_Handler cb, void *data = 0);
00468 static void remove_timeout(Fl_Timeout_Handler cb, void *data = 0);
00469
00470 static void add_check(Fl_Timeout_Handler, void* = 0);
00471 static int has_check(Fl_Timeout_Handler, void* = 0);
00472 static void remove_check(Fl_Timeout_Handler, void* = 0);
00473
00474 static Fl_Timestamp now(double offset = 0);
00475 static double seconds_since(Fl_Timestamp& then);
00476 static double seconds_between(Fl_Timestamp& back, Fl_Timestamp& further_back);
00477 static long ticks_since(Fl_Timestamp& then);
00478 static long ticks_between(Fl_Timestamp& back, Fl_Timestamp& further_back);
00479
00480 // private
00481 static void run_idle();
00482 static void run_checks();
00483 static void add_fd(int fd, int when, Fl_FD_Handler cb, void* = 0); // platform dependent
00484 static void add_fd(int fd, Fl_FD_Handler cb, void* = 0); // platform dependent
00486 static void remove_fd(int, int when); // platform dependent
00488 static void remove_fd(int); // platform dependent
00489
00490 static void add_idle(Fl_Idle_Handler cb, void* data = 0);
00491 static int has_idle(Fl_Idle_Handler cb, void* data = 0);
00492 static void remove_idle(Fl_Idle_Handler cb, void* data = 0);
00494 static int damage() {return damage_;}
00495 static void redraw();
00496 static void flush();
00517 static void (*warning)(const char*, ...);
00532 static void (*error)(const char*, ...);
00549 static void (*fatal)(const char*, ...);
00555 static Fl_Window* first_window();
00556 static void first_window(Fl_Window*);
00557 static Fl_Window* next_window(const Fl_Window*);
00558
00568 static Fl_Window* modal() {return modal_;}
00574 static Fl_Window* grab() {return grab_;}
00599 static void grab(Fl_Window*); // platform dependent
00606 // event information:
00612 static int event() {return e_number;}
00617 static int event_x() {return e_x;}
00622 static int event_y() {return e_y;}
00629 static int event_x_root() {return e_x_root;}
00636 static int event_y_root() {return e_y_root;}
00641 static int event_dx() {return e_dx;}
00646 static int event_dy() {return e_dy;}
00655 static void get_mouse(int &,int &);
00664 static int event_clicks() {return e_clicks;}
00672 static void event_clicks(int i) {e_clicks = i;}
00680 static int event_is_click() {return e_is_click;}
00687 static void event_is_click(int i) {e_is_click = i;}
00697 static int event_button() {return e_keysym-FL_Button;}
00723 static int event_state() {return e_state;}
00724
00730 static int event_state(int mask) {return e_state&mask;}
00742 static int event_key() {return e_keysym;}
00751 static int event_original_key() {return e_original_keysym;}
00791 static int event_key(int key);
00797 static int get_key(int key); // platform dependent
00812 static const char* event_text() {return e_text;}
00819 static int event_length() {return e_length;}
00820
00824 static void *event_clipboard() { return e_clipboard_data; }
00828 static const char *event_clipboard_type() {return e_clipboard_type; }
00829
00830
00831 static int compose(int &del);

```

```

00832 static void compose_reset();
00833 static int event_inside(int,int,int,int);
00834 static int event_inside(const Fl_Widget*);
00835 static int test_shortcut(Fl_Shortcut);
00836
00837 static void enable_im();
00838 static void disable_im();
00839
00840 // event destinations:
00841 static int handle(int, Fl_Window*);
00842 static int handle_(int, Fl_Window*);
00843 static Fl_Widget* belowmouse() {return belowmouse_;}
00844 static void belowmouse(Fl_Widget*);
00845 static Fl_Widget* pushed() {return pushed_;}
00846 static void pushed(Fl_Widget*);
00847 static Fl_Widget* focus() {return focus_;}
00848 static void focus(Fl_Widget*);
00849 static void add_handler(Fl_Event_Handler h);
00850 static void remove_handler(Fl_Event_Handler h);
00851 static void add_system_handler(Fl_System_Handler h, void *data);
00852 static void remove_system_handler(Fl_System_Handler h);
00853 static void event_dispatch(Fl_Event_Dispatch d);
00854 static Fl_Event_Dispatch event_dispatch();
00855 static Fl_Callback_Reason callback_reason();
00856 // cut/paste:
00857 static void copy(const char *stuff, int len, int destination = 0,
00858                const char *type = Fl::clipboard_plain_text);
00859
00860 static void selection_to_clipboard(int mode) {
00861     selection_to_clipboard_ = mode ? 1 : 0;
00862 }
00863
00864 static int selection_to_clipboard() { return selection_to_clipboard_; }
00865
00866 static void paste(Fl_Widget &receiver, int source, const char *type = Fl::clipboard_plain_text);
00867
00868 static void add_clipboard_notify(Fl_Clipboard_Notify_Handler h, void *data = 0);
00869 static void remove_clipboard_notify(Fl_Clipboard_Notify_Handler h);
00870 static int clipboard_contains(const char *type);
00871 static char const * const clipboard_plain_text;
00872 static char const * const clipboard_image;
00873
00874 static int dnd(); // platform dependent
00875
00876 // These are for back-compatibility only:
00877 static Fl_Widget* selection_owner() {return selection_owner_;}
00878 static void selection_owner(Fl_Widget*);
00879 static void selection(Fl_Widget &owner, const char*, int len);
00880 static void paste(Fl_Widget &receiver);
00881 static int x(); // via screen driver
00882 static int y(); // via screen driver
00883 static int w(); // via screen driver
00884 static int h(); // via screen driver
00885
00886 // multi-head support:
00887 static int screen_count(); // via screen driver
00888 static void screen_xywh(int &X, int &Y, int &W, int &H); // via screen driver
00889 static void screen_xywh(int &X, int &Y, int &W, int &H, int mx, int my); // via screen driver
00890 static void screen_xywh(int &X, int &Y, int &W, int &H, int n); // via screen driver
00891 static void screen_xywh(int &X, int &Y, int &W, int &H, int mx, int my, int mw, int mh); // via
screen driver
00892 static int screen_num(int x, int y); // via screen driver
00893 static int screen_num(int x, int y, int w, int h); // via screen driver
00894 static void screen_dpi(float &h, float &v, int n=0); // via screen driver
00895 static void screen_work_area(int &X, int &Y, int &W, int &H, int mx, int my); // via screen driver
00896 static void screen_work_area(int &X, int &Y, int &W, int &H, int n); // via screen driver
00897 static void screen_work_area(int &X, int &Y, int &W, int &H); // via screen driver
00898 static float screen_scale(int n); // via screen driver
00899 static void screen_scale(int n, float factor); // via screen driver
00900 static int screen_scaling_supported();
00901 static void keyboard_screen_scaling(int value);
00902
00903 // color map:
00904 static void set_color(Fl_Color, uchar, uchar, uchar);
00905 static void set_color(Fl_Color, uchar, uchar, uchar, uchar);
00906 static void set_color(Fl_Color i, unsigned c); // platform dependent
00907 static unsigned get_color(Fl_Color i);
00908 static void get_color(Fl_Color i, uchar &red, uchar &green, uchar &blue);
00909 static void get_color(Fl_Color i, uchar &red, uchar &green, uchar &blue, uchar &alpha);
00910 static void free_color(Fl_Color i, int overlay = 0); // platform dependent
00911
00912 // fonts:
00913 static const char* get_font(Fl_Font);
00914 static const char* get_font_name(Fl_Font, int* attributes = 0);
00915 static int get_font_sizes(Fl_Font, int*& sizep);
00916 static void set_font(Fl_Font, const char*);
00917 static void set_font(Fl_Font, Fl_Font);

```

```

01191 static Fl_Font set_fonts(const char* = 0); // platform dependent
01192
01199 // <Hack to re-order the 'Drawing functions' group>
01202 // labeltypes:
01203 static void set_labeltype(Fl_Labeltype, Fl_Label_Draw_F*, Fl_Label_Measure_F*);
01205 static void set_labeltype(Fl_Labeltype, Fl_Labeltype from); // is it defined?
01206
01207 // boxtypes:
01208 static Fl_Box_Draw_F *get_boxtype(Fl_Boxtype);
01209 static void set_boxtype(Fl_Boxtype, Fl_Box_Draw_F*, uchar, uchar, uchar, uchar);
01210 static void set_boxtype(Fl_Boxtype, Fl_Boxtype from);
01211 static int box_dx(Fl_Boxtype);
01212 static int box_dy(Fl_Boxtype);
01213 static int box_dw(Fl_Boxtype);
01214 static int box_dh(Fl_Boxtype);
01215
01216 static int draw_box_active();
01217 static Fl_Color box_color(Fl_Color);
01218 static void set_box_color(Fl_Color);
01219
01220 // back compatibility:
01224 static void set_abort(Fl_Abort_Handler f) {fatal = f;}
01225 static void (*atclose)(Fl_Window*, void*);
01226 static void default_atclose(Fl_Window*, void*);
01230 static void set_atclose(Fl_Atclose_Handler f) {atclose = f;}
01236 static int event_shift() {return e_state&FL_SHIFT;}
01238 static int event_ctrl() {return e_state&FL_CTRL;}
01240 static int event_command() {return e_state&FL_COMMAND;}
01242 static int event_alt() {return e_state&FL_ALT;}
01251 static int event_buttons() {return e_state&0xf000000;}
01256 static int event_button1() {return e_state&FL_BUTTON1;}
01261 static int event_button2() {return e_state&FL_BUTTON2;}
01266 static int event_button3() {return e_state&FL_BUTTON3;}
01274 static void set_idle(Fl_Old_Idle_Handler cb) {idle = cb;}
01276 static void grab(Fl_Window& win) {grab(&win);}
01280 static void release() {grab(0);}
01281
01282 // Visible focus methods...
01288 static void visible_focus(int v) {option(OPTION_VISIBLE_FOCUS, (v!=0)); }
01294 static int visible_focus() {return option(OPTION_VISIBLE_FOCUS); }
01295
01296 // Drag-n-drop text operation methods...
01303 static void dnd_text_ops(int v) {option(OPTION_DND_TEXT, (v!=0)); }
01310 static int dnd_text_ops() {return option(OPTION_DND_TEXT); }
01315 // Multithreading support:
01316 static int lock();
01317 static void unlock();
01318 static void awake(void* message = 0);
01320 static int awake(Fl_Awake_Handler cb, void* message = 0);
01327 static void* thread_message(); // platform dependent
01359 // Widget deletion:
01360 static void delete_widget(Fl_Widget *w);
01361 static void do_widget_deletion();
01362 static void watch_widget_pointer(Fl_Widget *w);
01363 static void release_widget_pointer(Fl_Widget *w);
01364 static void clear_widget_pointer(Fl_Widget const *w);
01371 static void use_high_res_GL(int val) {use_high_res_GL_ = val; }
01377 static int use_high_res_GL() {return use_high_res_GL_; }
01378
01390 static void draw_GL_text_with_textures(int val) {draw_GL_text_with_textures_ = val; }
01391
01397 static int draw_GL_text_with_textures() {return draw_GL_text_with_textures_; }
01398
01399 static int system(const char *command);
01400
01401 // Convert Windows commandline arguments to UTF-8 (documented in src/Fl.cxx)
01402 static int args_to_utf8(int argc, char ** &argv);
01403
01404 #ifndef FLTK_HAVE_CAIRO
01408 public:
01409 // Cairo support API
01410
01411 static cairo_t *cairo_make_current(Fl_Window *w);
01412
01428 static void cairo_autolink_context(bool alink) {
01429     cairo_state_.autolink(alink);
01430 }
01431
01439 static bool cairo_autolink_context() {
01440     return cairo_state_.autolink();
01441 }
01442
01444 static cairo_t *cairo_cc() {
01445     return cairo_state_.cc();
01446 }
01447
01452 static void cairo_cc(cairo_t *c, bool own=false) {

```

```

01453     cairo_state_.cc(c, own);
01454 }
01455
01489 static void cairo_flush(cairo_t *c) {
01490     // flush Cairo drawings: necessary at least for Windows
01491     cairo_surface_t *s = cairo_get_target(FL::cairo_cc());
01492     cairo_surface_flush(s);
01493 }
01494
01495 private:
01496     static cairo_t *cairo_make_current(void *gc);
01497     static cairo_t *cairo_make_current(void *gc, int W, int H);
01498     static FL_Cairo_State cairo_state_;
01499
01500 public:
01503 #endif // FLTK_HAVE_CAIRO
01504
01505 };
01506
01549 class FL_EXPORT Fl_Widget_Tracker {
01550
01551     Fl_Widget* wp_;
01552
01553 public:
01554
01555     Fl_Widget_Tracker(Fl_Widget *wi);
01556     ~Fl_Widget_Tracker();
01557
01563     Fl_Widget *widget() {return wp_;}
01564
01574     int deleted() {return wp_ == 0;}
01575
01585     int exists() {return wp_ != 0;}
01586
01587 };
01588
01594 #endif // !Fl_H

```

13.7 Fl_Adjuster.H

```

00001 //
00002 // Adjuster widget header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Adjuster widget . */
00019
00020 // 3-button "slider", made for Nuke
00021
00022 #ifndef Fl_Adjuster_H
00023 #define Fl_Adjuster_H
00024
00025 #ifndef Fl_Valuator_H
00026 #include "Fl_Valuator.H"
00027 #endif
00028
00041 class FL_EXPORT Fl_Adjuster : public Fl_Valuator {
00042     int drag;
00043     int ix;
00044     int soft_;
00045 protected:
00046     void draw() FL_OVERRIDE;
00047     int handle(int) FL_OVERRIDE;
00048     void value_damage() FL_OVERRIDE;
00049 public:
00050     Fl_Adjuster(int X,int Y,int W,int H,const char *l=0);
00057     void soft(int s) {soft_ = s;}
00064     int soft() const {return soft_;}
00065 };
00066
00067 #endif

```

13.8 Fl_Anim_GIF_Image.H

```

00001 //
00002 // Fl_Anim_GIF_Image class header for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2016-2023 by Christian Grabner <wcout@gmx.net>.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 #ifndef Fl_Anim_Gif_Image_H
00018 #define Fl_Anim_Gif_Image_H
00019 //
00020 // forward declarations
00021 class Fl_Image;
00022 class Fl_Widget;
00023 //
00024 #include <FL/Fl_GIF_Image.H>
00025 //
00026 // Load and display animated GIF images
00027 class FL_EXPORT Fl_Anim_GIF_Image : public Fl_GIF_Image {
00028 //
00029     class FrameInfo; // internal helper class
00030 //
00031 public:
00032 //
00033     enum Flags {
00034         DONT_START = 1,
00035         DONT_RESIZE_CANVAS = 2,
00036         DONT_SET_AS_IMAGE = 4,
00037         OPTIMIZE_MEMORY = 8,
00038         LOG_FLAG = 64,
00039         DEBUG_FLAG = 128
00040     };
00041 // -- constructors and destructor
00042 Fl_Anim_GIF_Image(const char *filename, Fl_Widget *canvas = 0, unsigned short flags = 0);
00043 Fl_Anim_GIF_Image(const char* imagename, const unsigned char *data,
00044                 const size_t length, Fl_Widget *canvas = 0,
00045                 unsigned short flags = 0);
00046 Fl_Anim_GIF_Image();
00047 ~Fl_Anim_GIF_Image() FL_OVERRIDE;
00048 // -- file handling
00049 bool load(const char *name, const unsigned char *imgdata=NULL, size_t imglength=0);
00050 bool valid() const;
00051 // -- getters and setters
00052 void frame_uncache(bool uncache);
00053 bool frame_uncache() const;
00054 double delay(int frame_) const;
00055 void delay(int frame, double delay);
00056 void canvas(Fl_Widget *canvas, unsigned short flags = 0);
00057 Fl_Widget *canvas() const;
00058 int canvas_w() const;
00059 int canvas_h() const;
00060 bool is_animated() const;
00061 const char *name() const;
00062 void speed(double speed);
00063 double speed() const;
00064 // -- animation
00065 int frames() const;
00066 void frame(int frame);
00067 int frame() const;
00068 Fl_Image *image() const;
00069 Fl_Image *image(int frame) const;
00070 bool start();
00071 bool stop();
00072 bool next();
00073 bool playing() const { return valid() && Fl::has_timeout(cb_animate, (void *)this); }
00074 // -- image data
00075 Fl_Anim_GIF_Image& resize(int w, int h);
00076 Fl_Anim_GIF_Image& resize(double scale);
00077 int frame_x(int frame) const;
00078 int frame_y(int frame) const;
00079 int frame_w(int frame) const;

```

```

00127 int frame_h(int frame) const;
00128
00129 // -- overridden methods
00130 void color_average(Fl_Color c, float i) FL_OVERRIDE;
00131 Fl_Image *copy(int W, int H) const FL_OVERRIDE;
00132 Fl_Image *copy() const { return Fl_Pixmap::copy(); }
00133 void desaturate() FL_OVERRIDE;
00134 void draw(int x, int y, int w, int h, int cx = 0, int cy = 0) FL_OVERRIDE;
00135 void uncache() FL_OVERRIDE;
00136
00137 // -- debugging and logging
00138 int debug() const;
00139
00140 // -- static methods
00141 static int frame_count(const char *name, const unsigned char *imgdata = NULL, size_t imglength = 0);
00142
00151 static bool loop;
00152
00159 static double min_delay;
00160
00161 protected:
00162
00163 bool next_frame();
00164 void clear_frames();
00165 void set_frame(int frame);
00166
00167 static void cb_animate(void *d);
00168 void scale_frame();
00169 void set_frame();
00170 void on_frame_data(Fl_GIF_Image::GIF_FRAME &f) FL_OVERRIDE;
00171 void on_extension_data(Fl_GIF_Image::GIF_FRAME &f) FL_OVERRIDE;
00172
00173 private:
00174
00175 char *name_;
00176 unsigned short flags_;
00177 Fl_Widget *canvas_;
00178 bool uncache_;
00179 bool valid_;
00180 int frame_; // current frame
00181 double speed_;
00182 FrameInfo *fi_;
00183 };
00184
00185 #endif // Fl_Anim_Gif_Image_H

```

13.9 fl_ask.H File Reference

API for common dialogs.

```

#include <FL/Enumerations.H>
#include <FL/fl_attr.h>

```

Enumerations

- enum [Fl_Beep](#) {
 - [FL_BEEP_DEFAULT](#) = 0, [FL_BEEP_MESSAGE](#), [FL_BEEP_ERROR](#), [FL_BEEP_QUESTION](#),
 - [FL_BEEP_PASSWORD](#), [FL_BEEP_NOTIFICATION](#) }

Defines the different system beeps available.

Functions

- void void [fl_alert](#) (const char *,...) [__fl_attr\(\(__format__\(__printf__](#)
- void void int [fl_ask](#) (const char *,...) [__fl_attr\(\(__format__\(__printf__](#)
- void [fl_beep](#) (int type=[FL_BEEP_DEFAULT](#))
 - Emits a system beep.*
- int [fl_choice](#) (const char *q, const char *b0, const char *b1, const char *b2,...) [__fl_attr\(\(__format__\(__↵
printf__](#)
- int const char const char int [fl_choice_n](#) (const char *q, const char *b0, const char *b1, const char *b2,...) [__fl_attr\(\(__format__\(__printf__](#)
- int const char * [fl_input](#) (const char *label, const char *deflt=0,...) [__fl_attr\(\(__format__\(__printf__](#)

- int const char const char int const char * **fl_input** (int maxchar, const char *label, const char *deflt=0,...) `__fl_attr((__format__(__printf__`
- void **fl_message** (const char *,...) `__fl_attr((__format__(__printf__`
- void **fl_message_font** ([FL_Font](#) f, [FL_Fontsize](#) s)
- void **fl_message_hotspot** (int enable)

Sets whether or not to move the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#) to follow the mouse pointer.
- int **fl_message_hotspot** (void)

Gets whether or not to move the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#) to follow the mouse pointer.
- int const char const char int const char const char [FL_Widget](#) * **fl_message_icon** ()

Gets the [FL_Box](#) icon container of the current default dialog used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).
- void **fl_message_icon_label** (const char *str)

Sets the icon label of the dialog window used in many common dialogs.
- void **fl_message_position** (const int x, const int y, const int center=0)

Sets the preferred position for the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).
- void **fl_message_position** ([FL_Widget](#) &widget)
- void **fl_message_position** ([FL_Widget](#) *widget)

Sets the preferred position for the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).
- int **fl_message_position** (int *x=0, int *y=0)

Gets the preferred position for the message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).
- void **fl_message_title** (const char *title)

Sets the title of the dialog window used in many common dialogs.
- void **fl_message_title_default** (const char *title)

Sets the default title of the dialog window used in many common dialogs.
- int const char const char * **fl_password** (const char *label, const char *deflt=0,...) `__fl_attr((__format__(__printf__`
- int const char const char int const char const char * **fl_password** (int maxchar, const char *label, const char *deflt=0,...) `__fl_attr((__format__(__printf__`

Variables

- void void int **__deprecated__**
- const char * **fl_cancel**

string pointer used in common dialogs, you can change it to another language
- const char * **fl_close**

string pointer used in common dialogs, you can change it to another language
- [FL_Font](#) **fl_message_font_**
- [FL_Fontsize](#) **fl_message_size_**
- const char * **fl_no**

string pointer used in common dialogs, you can change it to another language
- const char * **fl_ok**

string pointer used in common dialogs, you can change it to another language
- const char * **fl_yes**

string pointer used in common dialogs, you can change it to another language

13.9.1 Detailed Description

API for common dialogs.

13.9.2 Enumeration Type Documentation

13.9.2.1 Fl_Beep

enum [Fl_Beep](#)

Defines the different system beeps available.

Some systems may play different sounds or use different sound volume depending on the `Fl_Beep` value. The implementation is platform dependent.

See also

[fl_beep\(int\)](#)

Enumerator

<code>FL_BEEP_DEFAULT</code>	Default beep.
<code>FL_BEEP_MESSAGE</code>	Message beep.
<code>FL_BEEP_ERROR</code>	Error beep.
<code>FL_BEEP_QUESTION</code>	Question beep.
<code>FL_BEEP_PASSWORD</code>	Password beep.
<code>FL_BEEP_NOTIFICATION</code>	Notification beep.

13.9.3 Function Documentation

13.9.3.1 fl_message_position()

```
void fl_message_position (
    Fl_Widget & widget ) [inline]
```

See also

[fl_message_position\(Fl_Widget *widget\).](#)

13.10 fl_ask.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // Standard dialog header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00021 #ifndef _FL_fl_ask_H_
00022 #define _FL_fl_ask_H_
00023
00024 #include <FL/Enumerations.H>
00025 #include <FL/fl_attr.h>
00026
00027 #if (FLTK_USE_STD)
00028 #include <string>
00029 #endif
00030
00031 class Fl_Widget;
00032
00040 enum Fl_Beep {
00041     FL_BEEP_DEFAULT = 0,
00042     FL_BEEP_MESSAGE,
00043     FL_BEEP_ERROR,
```



```

00044 FL_BEEP_QUESTION,
00045 FL_BEEP_PASSWORD,
00046 FL_BEEP_NOTIFICATION
00047 };
00048
00049 FL_EXPORT void fl_bEEP(int type = FL_BEEP_DEFAULT);
00050 FL_EXPORT void fl_message(const char *, ...) __fl_attr((__format__ (__printf__, 1, 2)));
00051 FL_EXPORT void fl_alert(const char *, ...) __fl_attr((__format__ (__printf__, 1, 2)));
00052
00053 // fl_ask() is deprecated since it uses "Yes" and "No" for the buttons,
00054 // which does not conform to the current FLTK Human Interface Guidelines.
00055 // Use fl_choice() or fl_choice_n() with the appropriate verbs instead.
00056
00057 FL_EXPORT int fl_ask(const char *, ...) __fl_attr((__format__ (__printf__, 1, 2), __deprecated__));
00058
00059 FL_EXPORT int fl_choice(const char *q, const char *b0, const char *b1, const char *b2, ...)
00060     __fl_attr((__format__ (__printf__, 1, 5)));
00061 FL_EXPORT const char *fl_input(const char *label, const char *deflt = 0, ...)
00062     __fl_attr((__format__ (__printf__, 1, 3)));
00063 FL_EXPORT const char *fl_password(const char *label, const char *deflt = 0, ...)
00064     __fl_attr((__format__ (__printf__, 1, 3)));
00065 // since FLTK 1.3.8:
00066 // - fl_choice_n() with extended return value (-2, -1, 0, 1, 2)
00067
00068 FL_EXPORT int fl_choice_n(const char *q, const char *b0, const char *b1, const char *b2, ...)
00069     __fl_attr((__format__ (__printf__, 1, 5)));
00070
00071 // since FLTK 1.4.0: with 'maxchar' to limit input size
00072
00073 FL_EXPORT const char *fl_input(int maxchar, const char *label, const char *deflt = 0, ...)
00074     __fl_attr((__format__ (__printf__, 2, 4)));
00075
00076 FL_EXPORT const char *fl_password(int maxchar, const char *label, const char *deflt = 0, ...)
00077     __fl_attr((__format__ (__printf__, 2, 4)));
00078
00079 // since FLTK 1.4.0 -- only with option FLTK_USE_STD
00080
00081 // - fl_input_str() with limited input size, returns std::string
00082 // - fl_password_str() with limited input size, returns std::string
00083
00084 #if (FLTK_USE_STD)
00085
00086 FL_EXPORT std::string fl_input_str(int maxchar, const char *label, const char *deflt = 0, ...)
00087     __fl_attr((__format__ (__printf__, 2, 4)));
00088
00089 FL_EXPORT std::string fl_input_str(int &ret, int maxchar, const char *label, const char *deflt = 0,
00090     ...)
00091     __fl_attr((__format__ (__printf__, 3, 5)));
00092
00093 FL_EXPORT std::string fl_password_str(int maxchar, const char *label, const char *deflt = 0, ...)
00094     __fl_attr((__format__ (__printf__, 2, 4)));
00095
00096 FL_EXPORT std::string fl_password_str(int &ret, int maxchar, const char *label, const char *deflt = 0,
00097     ...)
00098     __fl_attr((__format__ (__printf__, 3, 5)));
00099
00100 #endif
00101 FL_EXPORT Fl_Widget *fl_message_icon();
00102 extern FL_EXPORT Fl_Font fl_message_font_;
00103 extern FL_EXPORT Fl_Fontsize fl_message_size_;
00104 inline void fl_message_font(Fl_Font f, Fl_Fontsize s) {
00105     fl_message_font_ = f;
00106     fl_message_size_ = s;
00107 }
00108 FL_EXPORT void fl_message_hotspot(int enable);
00109 FL_EXPORT int fl_message_hotspot(void);
00110
00111 // since FLTK 1.4.0: fl_message_position()
00112
00113 FL_EXPORT void fl_message_position(const int x, const int y, const int center = 0);
00114 FL_EXPORT void fl_message_position(Fl_Widget *widget);
00115 FL_EXPORT int fl_message_position(int *x = 0, int *y = 0);
00116
00117 inline void fl_message_position(Fl_Widget &widget) {
00118     fl_message_position(&widget);
00119 }
00120
00121
00122 FL_EXPORT void fl_message_title(const char *title);
00123 FL_EXPORT void fl_message_title_default(const char *title);
00124
00125 FL_EXPORT void fl_message_icon_label(const char *str);
00126
00127 // pointers you can use to change FLTK to another language:
00128 extern FL_EXPORT const char *fl_no;

```

```

00129 extern FL_EXPORT const char *fl_yes;
00130 extern FL_EXPORT const char *fl_ok;
00131 extern FL_EXPORT const char *fl_cancel;
00132 extern FL_EXPORT const char *fl_close;
00133
00134 #endif // !_FL_fl_ask_H_

```

13.11 fl_attr.h File Reference

This file defines compiler-specific macros.

Macros

- `#define __fl_attr(x)`
This section lists macros for Doxygen documentation only.
- `#define FL_DEPRECATED(msg, func)`
Enclosing a function or method in FL_DEPRECATED marks it as no longer recommended.
- `#define FL_OVERRIDE` override
This macro makes it safe to use the C++11 keyword `override` with older compilers.

13.11.1 Detailed Description

This file defines compiler-specific macros.

13.11.2 Macro Definition Documentation

13.11.2.1 __fl_attr

```

#define __fl_attr(
    x )

```

This section lists macros for Doxygen documentation only.

The next section will define the actual macros based on the compiler used and based on the capabilities of the version of that compiler. To be used in prototypes with a variable list of arguments. This macro helps detection of mismatches between format string and argument list at compilation time.

Usage example: [FL/fl_ask.H](#)

13.11.2.2 FL_DEPRECATED

```

#define FL_DEPRECATED(
    msg,
    func )

```

Value:

```

/##### \deprecated msg ###/ \
func

```

Enclosing a function or method in FL_DEPRECATED marks it as no longer recommended.

This macro syntax can not be used if the return type contains a comma, which is not the case in FLTK.

```

FL_DEPRECATED("Outdated, don't use", int position()) { return position_; }

```

13.12 fl_attr.h

[Go to the documentation of this file.](#)

```

00001 /*
00002  * Function attribute declarations for the Fast Light Tool Kit (FLTK).
00003  *
00004  * Copyright 1998-2023 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  *     https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *

```

```

00014 *      https://www.fltk.org/bugs.php
00015 */
00016
00022 #ifndef _FL_fl_attr_h_
00023 #define _FL_fl_attr_h_
00024
00025
00031 #ifdef FL_DOXYGEN
00032
00033
00040 #define __fl_attr(x)
00041
00046 #define FL_OVERRIDE override
00047
00057 #define FL_DEPRECATED(msg, func) \
00058     /##*##* \deprecated msg *##/ \
00059     func
00060
00061
00062 #else /* FL_DOXYGEN */
00063
00064 #ifdef __cplusplus
00065
00066 /*
00067     Declare macros specific to Visual Studio.
00068
00069     Visual Studio defines __cplusplus = '199711L' in all its versions which is
00070     not helpful for us here. For VS version number encoding see:
00071     https://learn.microsoft.com/en-us/cpp/preprocessor/predefined-macros
00072
00073     This document specifies that the macro _MSVC_LANG is defined since
00074     "Visual Studio 2015 Update 3" as 201402L (default) and undefined in
00075     earlier versions. It can be used to determine the C++ standard as
00076     specified by the /std:c++ compiler option:
00077
00078     - /std:c++14      201402L (also if /std:c++ is not used)
00079     - /std:c++17      201703L
00080     - /std:c++20      202002L
00081     - /std:c++latest a "higher, unspecified value" (docs of VS 2022)
00082
00083     As of this writing (02/2023) _MSVC_LANG is not yet used in this file
00084     but it is documented for future use.
00085 */
00086
00087 #if defined(_MSC_VER)
00088
00089 #if (_MSC_VER >= 1900) // Visual Studio 2015 (14.0)
00090 #ifndef FL_OVERRIDE
00091 #define FL_OVERRIDE override
00092 #endif
00093 #endif // Visual Studio 2015 (14.0)
00094
00095 #if (_MSC_VER >= 1400) // Visual Studio 2005 (8.0)
00096 #ifndef FL_DEPRECATED
00097 #define FL_DEPRECATED(msg, func) __declspec(deprecated(msg)) func
00098 #endif
00099 #endif // Visual Studio 2005 (8.0)
00100
00101 #if (_MSC_VER >= 1310) // Visual Studio .NET 2003 (7.1)
00102 #ifndef FL_DEPRECATED
00103 #define FL_DEPRECATED(msg, func) __declspec(deprecated) func
00104 #endif
00105 #endif // Visual Studio .NET 2003 (7.1)
00106
00107 #endif // Visual Studio
00108
00109
00110 /*
00111     Declare macros specific to the C++ standard used.
00112
00113     Macros may have been declared already in previous sections.
00114 */
00115 #if (__cplusplus >= 202002L) // C++20
00116 #endif // C++20
00117
00118 #if (__cplusplus >= 201703L) // C++17
00119 #endif // C++17
00120
00121 #if (__cplusplus >= 201402L) // C++14
00122 #ifndef FL_DEPRECATED
00123 #define FL_DEPRECATED(msg, func) [[deprecated(msg)]] func
00124 #endif
00125 #endif // C++14
00126
00127 #if (__cplusplus >= 201103L) // C++11
00128 #ifndef FL_OVERRIDE
00129 #define FL_OVERRIDE override

```

```

00130 #endif
00131 #endif // C+11
00132
00133 #if (__cplusplus >= 199711L) // C++89
00134 #endif // C++89
00135
00136 #endif // __cplusplus
00137
00138 /*
00139  Declare macros specific to clang
00140
00141  Macros may have been declared already in previous sections.
00142  */
00143 #if defined(__clang__)
00144
00145 #define FL_CLANG_VERSION (__clang_major__ * 10000 + __clang_minor__ * 100 + __clang_patchlevel__)
00146
00147 // -- nothing yet --
00148
00149 #endif // __clang__
00150
00151
00152 /*
00153  Declare macros specific to gcc.
00154
00155  Macros may have been declared already in previous sections.
00156  */
00157 #if defined(__GNUC__)
00158
00159 #define FL_GCC_VERSION (__GNUC__ * 10000 + __GNUC_MINOR__ * 100 + __GNUC_PATCHLEVEL__)
00160
00161 #ifndef __fl_attr
00162 #define __fl_attr(x) __attribute__(x)
00163 #endif
00164
00165 #if FL_GCC_VERSION > 40500 // gcc 4.5.0
00166 #ifndef FL_DEPRECATED
00167 #define FL_DEPRECATED(msg, func) func __attribute__((deprecated(msg)))
00168 #endif
00169 #endif // gcc 4.5.0
00170
00171 #if FL_GCC_VERSION > 30100 // gcc 3.1.0
00172 #ifndef FL_DEPRECATED
00173 #define FL_DEPRECATED(msg, func) func __attribute__((deprecated))
00174 #endif
00175 #endif // gcc 3.1.0
00176
00177 #endif // __GNUC__
00178
00179
00180 /*
00181  If a macro was not defined in any of the sections above, set it to no-op here.
00182  */
00183
00184 #ifndef __fl_attr
00185 #define __fl_attr(x)
00186 #endif
00187
00188 #ifndef FL_OVERRIDE
00189 #define FL_OVERRIDE
00190 #endif
00191
00192 #ifndef FL_DEPRECATED
00193 #define FL_DEPRECATED(msg, func) func
00194 #endif
00195
00196
00197 #endif /* FL_DOXYGEN */
00198
00199
00200 #endif /* !_FL_fl_attr_h_ */

```

13.13 FI_Bitmap.H

```

00001 //
00002 // Bitmap header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2017 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //

```

```

00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Bitmap widget . */
00019
00020 #ifndef Fl_Bitmap_H
00021 #define Fl_Bitmap_H
00022 #include "Fl_Image.H"
00023 #include "Fl_Widget.H" // for fl_uintptr_t
00024
00025 class Fl_Widget;
00026 struct Fl_Menu_Item;
00027
00032 class FL_EXPORT Fl_Bitmap : public Fl_Image {
00033     friend class Fl_Graphics_Driver;
00034 public:
00036     const uchar *array;
00038     int alloc_array;
00039
00040 private:
00042     fl_uintptr_t id;
00043     int cache_w_, cache_h_; // size of bitmap when cached
00044
00045 public:
00048     Fl_Bitmap(const uchar *bits, int W, int H) :
00049         Fl_Image(W,H,0), array(bits), alloc_array(0), id_(0), cache_w_(0),cache_h_(0) {data((const char
**) &array, 1);}
00052     Fl_Bitmap(const char *bits, int W, int H) :
00053         Fl_Image(W,H,0), array((const uchar *)bits), alloc_array(0), id_(0), cache_w_(0),cache_h_(0)
{data((const char **) &array, 1);}
00054     Fl_Bitmap(const uchar *bits, int bits_length, int W, int H);
00055     Fl_Bitmap(const char *bits, int bits_length, int W, int H);
00056     virtual ~Fl_Bitmap();
00057     Fl_Image *copy(int W, int H) const FL_OVERRIDE;
00058     Fl_Image *copy() const { return Fl_Image::copy(); }
00059     void draw(int X, int Y, int W, int H, int cx=0, int cy=0) FL_OVERRIDE;
00060     void draw(int X, int Y) {draw(X, Y, w(), h(), 0, 0);}
00061     void label(Fl_Widget*w) FL_OVERRIDE;
00062     void label(Fl_Menu_Item*m) FL_OVERRIDE;
00063     void uncache() FL_OVERRIDE;
00064     int cache_w() {return cache_w_;}
00065     int cache_h() {return cache_h_;}
00066 };
00067
00068 #endif

```

13.14 Fl_BMP_Image.H

```

00001 //
00002 // BMP image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_BMP_Image widget . */
00019
00020 #ifndef Fl_BMP_Image_H
00021 #define Fl_BMP_Image_H
00022 #include "Fl_Image.H"
00023
00028 class FL_EXPORT Fl_BMP_Image : public Fl_RGB_Image {
00029
00030 public:
00031
00032     Fl_BMP_Image(const char* filename);
00033     Fl_BMP_Image(const char* imagename, const unsigned char *data, const long length = -1);
00034
00035 protected:
00036
00037     void load_bmp_(class Fl_Image_Reader &rdr, int ico_height = 0, int ico_width = 0);
00038

```

```
00039 };
00040
00041 #endif
```

13.15 Fl_Box.H File Reference

[Fl_Box](#) widget.

```
#include "Fl_Widget.H"
```

Classes

- class [Fl_Box](#)

This widget simply draws its box, and possibly its label.

13.15.1 Detailed Description

[Fl_Box](#) widget.

13.16 Fl_Box.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // Box header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00021 #ifndef Fl_Box_H
00022 #define Fl_Box_H
00023
00024 #ifndef Fl_Widget_H
00025 #include "Fl_Widget.H"
00026 #endif
00027
00033 class FL_EXPORT Fl_Box : public Fl_Widget {
00034 protected:
00035     void draw() FL_OVERRIDE;
00036 public:
00045     Fl_Box(int X, int Y, int W, int H, const char *l=0);
00046
00048     Fl_Box(Fl_Boxtype b, int X, int Y, int W, int H, const char *l);
00049
00050     int handle(int) FL_OVERRIDE;
00051 };
00052
00053 #endif
```

13.17 Fl_Browser.H

```
00001 //
00002 // Browser header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
```

```

00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Browser widget . */
00019
00020 // Forms-compatible browser.  Probably useful for other
00021 // lists of textual data.  Notice that the line numbers
00022 // start from 1, and 0 means "no line".
00023
00024 #ifndef Fl_Browser_H
00025 #define Fl_Browser_H
00026
00027 #include "Fl_Browser_.H"
00028 #include "Fl_Image.H"
00029
00030 struct FL_BLINE;
00031
00086 class FL_EXPORT Fl_Browser : public Fl_Browser_ {
00087
00088     FL_BLINE *first;           // the array of lines
00089     FL_BLINE *last;
00090     FL_BLINE *cache;
00091     int cacheline;           // line number of cache
00092     int lines;               // Number of lines
00093     int full_height_;
00094     const int* column_widths_;
00095     char format_char_;       // alternative to @-sign
00096     char column_char_;       // alternative to tab
00097
00098 protected:
00099
00100     // required routines for Fl_Browser_ subclass:
00101     void* item_first() const FL_OVERRIDE;
00102     void* item_next(void* item) const FL_OVERRIDE;
00103     void* item_prev(void* item) const FL_OVERRIDE;
00104     void* item_last() const FL_OVERRIDE;
00105     int item_selected(void* item) const FL_OVERRIDE;
00106     void item_select(void* item, int val) FL_OVERRIDE;
00107     int item_height(void* item) const FL_OVERRIDE;
00108     int item_width(void* item) const FL_OVERRIDE;
00109     void item_draw(void* item, int X, int Y, int W, int H) const FL_OVERRIDE;
00110     int full_height() const FL_OVERRIDE;
00111     int incr_height() const FL_OVERRIDE;
00112     const char *item_text(void *item) const FL_OVERRIDE;
00118     void item_swap(void *a, void *b) FL_OVERRIDE { swap((FL_BLINE*)a, (FL_BLINE*)b); }
00124     void *item_at(int line) const FL_OVERRIDE { return (void*)find_line(line); }
00125
00126     FL_BLINE* find_line(int line) const ;
00127     FL_BLINE* _remove(int line) ;
00128     void insert(int line, FL_BLINE* item);
00129     int lineno(void *item) const ;
00130     void swap(FL_BLINE *a, FL_BLINE *b);
00131
00132 public:
00133
00134     void remove(int line);
00135     void add(const char* newtext, void* d = 0);
00136     void insert(int line, const char* newtext, void* d = 0);
00137     void move(int to, int from);
00138     int load(const char* filename);
00139     void swap(int a, int b);
00140     void clear();
00141
00147     int size() const { return lines; }
00148     void size(int W, int H) { Fl_Widget::size(W, H); }
00149
00153     Fl_Fontsize textsize() const { return Fl_Browser_::textsize(); }
00154
00155     /*
00156      Sets the default text size for the lines in the browser to newSize.
00157      Defined and documented in Fl_Browser.cxx
00158     */
00159     void textsize(Fl_Fontsize newSize);
00160
00161     int topline() const ;
00163     enum Fl_Line_Position { TOP, BOTTOM, MIDDLE };
00164     void lineposition(int line, Fl_Line_Position pos);
00171     void topline(int line) { lineposition(line, TOP); }
00178     void bottomline(int line) { lineposition(line, BOTTOM); }
00185     void middleline(int line) { lineposition(line, MIDDLE); }
00186
00187     int select(int line, int val=1);
00188     int selected(int line) const ;
00189     void show(int line);
00191     void show() FL_OVERRIDE { Fl_Widget::show(); }
00192     void hide(int line);

```

```

00194 void hide() FL_OVERRIDE { Fl_Widget::hide(); }
00195 int visible(int line) const ;
00196
00197 int value() const ;
00203 void value(int line) { select(line); }
00204 const char* text(int line) const ;
00205 void text(int line, const char* newtext);
00206 void* data(int line) const ;
00207 void data(int line, void* d);
00208
00209 Fl_Browser(int X, int Y, int W, int H, const char *L = 0);
00213 ~Fl_Browser() { clear(); }
00214
00246 char format_char() const { return format_char_; }
00252 void format_char(char c) { format_char_ = c; }
00258 char column_char() const { return column_char_; }
00265 void column_char(char c) { column_char_ = c; }
00289 const int* column_widths() const { return column_widths_; }
00294 void column_widths(const int* arr) { column_widths_ = arr; }
00295
00305 int displayed(int line) const { return Fl_Browser_::displayed(find_line(line)); }
00306
00314 void make_visible(int line) {
00315     if (line < 1) Fl_Browser_::display(find_line(1));
00316     else if (line > lines) Fl_Browser_::display(find_line(lines));
00317     else Fl_Browser_::display(find_line(line));
00318 }
00319
00320 // icon support
00321 void icon(int line, Fl_Image* icon);
00322 Fl_Image* icon(int line) const;
00323 void remove_icon(int line);
00324
00326 void replace(int a, const char* b) { text(a, b); }
00327 void display(int line, int val=1);
00328 };
00329
00330 #endif

```

13.18 Fl_Browser_.H

```

00001 //
00002 // Common browser header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2016 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Browser_ widget . */
00019
00020 // Yes, I know this should be a template...
00021
00022 #ifndef Fl_Browser_H
00023 #define Fl_Browser_H
00024
00025 #ifndef Fl_Group_H
00026 #include "Fl_Group.H"
00027 #endif
00028 #include "Fl_Scrollbar.H"
00029 #include <FL/Fl.H> // Fl::scrollbar_size()
00030
00031 #define FL_NORMAL_BROWSER      0
00032 #define FL_SELECT_BROWSER     1
00033 #define FL_HOLD_BROWSER       2
00034 #define FL_MULTI_BROWSER      3
00036 #define FL_SORT_ASCENDING     0
00037 #define FL_SORT_DESCENDING    1
00038 #define FL_SORT_CASEINSENSITIVE 0x2
00083 class FL_EXPORT Fl_Browser_ : public Fl_Group {
00084     int position_; // where user wants it scrolled to
00085     int real_position_; // the current vertical scrolling position
00086     int hposition_; // where user wants it panned to
00087     int real_hposition_; // the current horizontal scrolling position
00088     int offset_; // how far down top_ item the real_position is
00089     int max_width_; // widest object seen so far

```



```

00090  uchar has_scrollbar_; // which scrollbars are enabled
00091  Fl_Font textfont_;
00092  Fl_Fontsize textsize_;
00093  Fl_Color textcolor_;
00094  void* top_; // which item scrolling position is in
00095  void* selection_; // which is selected (except for FL_MULTI_BROWSER)
00096  void *redraw1,*redraw2; // minimal update pointers
00097  void* max_width_item; // which item has max_width_
00098  int scrollbar_size_; // size of scrollbar trough
00099  int linespacing_;
00100
00101  void update_top();
00102
00103 protected:
00104
00105  // All of the following must be supplied by the subclass:
00111  virtual void *item_first() const = 0;
00117  virtual void *item_next(void *item) const = 0;
00123  virtual void *item_prev(void *item) const = 0;
00129  virtual void *item_last() const { return 0L; }
00138  virtual int item_height(void *item) const = 0;
00146  virtual int item_width(void *item) const = 0;
00147  virtual int item_quick_height(void *item) const ;
00152  virtual void item_draw(void *item,int X,int Y,int W,int H) const = 0;
00158  virtual const char *item_text(void *item) const { (void)item; return 0L; }
00164  virtual void item_swap(void *a,void *b) { (void)a; (void)b; }
00171  virtual void *item_at(int index) const { (void)index; return 0L; }
00172  // you don't have to provide these but it may help speed it up:
00173  virtual int full_width() const ; // current width of all items
00174  virtual int full_height() const ; // current height of all items
00175  virtual int incr_height() const ; // average height of an item
00176  // These only need to be done by subclass if you want a multi-browser:
00177  virtual void item_select(void *item,int val=1);
00178  virtual int item_selected(void *item) const ;
00179
00180  // things the subclass may want to call:
00184  void *top() const { return top_; }
00192  void *selection() const { return selection_; }
00193  void new_list(); // completely clobber all data, as though list replaced
00194  void deleting(void *item); // get rid of any pointers to item
00195  void replacing(void *a,void *b); // change a pointers to b
00196  void swapping(void *a,void *b); // exchange pointers a and b
00197  void inserting(void *a,void *b); // insert b near a
00198  int displayed(void *item) const ; // true if this item is visible
00199  void redraw_line(void *item); // minimal update, no change in size
00204  void redraw_lines() { damage(FL_DAMAGE_SCROLL); } // redraw all of them
00205  void bbox(int &X,int &Y,int &W,int &H) const;
00206  int leftedge() const; // x position after scrollbar & border
00207  void *find_item(int ypos); // item under mouse
00208
00209  void draw() FL_OVERRIDE;
00210  Fl_Browser_(int X,int Y,int W,int H,const char *L=0);
00211
00212 public:
00213
00229  Fl_Scrollbar scrollbar;
00233  Fl_Scrollbar hscrollbar;
00234
00235  int handle(int event) FL_OVERRIDE;
00236  void resize(int X,int Y,int W,int H) FL_OVERRIDE;
00237
00238  int select(void *item,int val=1,int docallbacks=0);
00239  int select_only(void *item,int docallbacks=0);
00240  int deselect(int docallbacks=0);
00248  int vposition() const { return position_; }
00249  FL_DEPRECATED("in 1.4.0 - use vposition() instead",
00250  int position() const) { return vposition(); }
00251
00252  void vposition(int pos); // scroll to here
00253  FL_DEPRECATED("in 1.4.0 - use vposition(pos) instead",
00254  void position(int pos) { return vposition(pos); }
00255  void position(int x, int y) { Fl_Group::position(x, y); }
00256
00264  int hposition() const { return hposition_; }
00265  void hposition(int); // pan to here
00266  void display(void *item); // scroll so this item is shown
00267
00277  enum { // values for has_scrollbar()
00278  HORIZONTAL = 1,
00279  VERTICAL = 2,
00280  BOTH = 3,
00281  ALWAYS_ON = 4,
00282  HORIZONTAL_ALWAYS = 5,
00283  VERTICAL_ALWAYS = 6,
00284  BOTH_ALWAYS = 7
00285  };
00289  uchar has_scrollbar() const { return has_scrollbar_; }

```

```

00312 void has_scrollbar(uchar mode) { has_scrollbar_ = mode; }
00313
00318 Fl_Font textfont() const { return textfont_; }
00322 void textfont(Fl_Font font) { textfont_ = font; }
00323
00327 Fl_Fontsize textsize() const { return textsize_; }
00331 void textsize(Fl_Fontsize newSize) { textsize_ = newSize; }
00332
00336 Fl_Color textcolor() const { return textcolor_; }
00340 void textcolor(Fl_Color col) { textcolor_ = col; }
00341
00351 int scrollbar_size() const {
00352     return(scrollbar_size_);
00353 }
00373 void scrollbar_size(int newSize) {
00374     scrollbar_size_ = newSize;
00375 }
00381 int scrollbar_width() const {
00382     return(Fl::scrollbar_size());
00383 }
00389 void scrollbar_width(int width) {
00390     Fl::scrollbar_size(width);
00391     scrollbar_size_ = 0;
00392 }
00397 void scrollbar_right() { scrollbar.align(FL_ALIGN_RIGHT); }
00402 void scrollbar_left() { scrollbar.align(FL_ALIGN_LEFT); }
00403 void sort(int flags=0);
00404
00409 void linespacing(int pixels) { linespacing_ = pixels; }
00410
00414 int linespacing() const { return linespacing_; }
00415 };
00416
00417 #endif

```

13.19 Fl_Button.H

```

00001 //
00002 // Button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2014 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Button widget . */
00019
00020 #ifndef Fl_Button_H
00021 #define Fl_Button_H
00022
00023 #ifndef Fl_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026
00027 // values for type()
00028 #define FL_NORMAL_BUTTON      0
00030 #define FL_TOGGLE_BUTTON     1
00031 #define FL_RADIO_BUTTON      (FL_RESERVED_TYPE+2)
00034 #define FL_HIDDEN_BUTTON     3
00035
00036 extern FL_EXPORT Fl_Shortcut fl_old_shortcut(const char*);
00037
00038 class Fl_Widget_Tracker;
00039
00076 class FL_EXPORT Fl_Button : public Fl_Widget {
00077
00078     int shortcut_;
00079     char value_;
00080     char oldval;
00081     uchar down_box_;
00082     uchar compact_;
00083
00084 protected:
00085
00086     static Fl_Widget_Tracker *key_release_tracker;
00087     static void key_release_timeout(void*);

```

```

00088 void simulate_key_action();
00089
00090 void draw() FL_OVERRIDE;
00091
00092 public:
00093
00094 int handle(int) FL_OVERRIDE;
00095
00096 Fl_Button(int X, int Y, int W, int H, const char *L = 0);
00097
00098 int value(int v);
00099
00103 char value() const {return value_;}
00104
00109 int set() {return value(1);}
00110
00115 int clear() {return value(0);}
00116
00117 void setonly(); // this should only be called on FL_RADIO_BUTTONS
00118
00123 int shortcut() const {return shortcut_;}
00124
00144 void shortcut(int s) {shortcut_ = s;}
00145
00150 Fl_Boxtype down_box() const {return (Fl_Boxtype)down_box_;}
00151
00161 void down_box(Fl_Boxtype b) {down_box_ = b;}
00162
00164 void shortcut(const char *s) {shortcut(fl_old_shortcut(s));}
00165
00167 Fl_Color down_color() const {return selection_color();}
00168
00170 void down_color(unsigned c) {selection_color(c);}
00171
00172 // handle flag for compact buttons, documentation in source code
00173 void compact(uchar v);
00174
00178 uchar compact() { return compact_; }
00179 };
00180
00181 #endif

```

13.20 Fl_Cairo.H File Reference

Cairo is currently supported for the following platforms: Windows, macOS, Unix/Linux (X11 + Wayland).

```
#include <FL/Fl.H>
#include <cairo.h>
```

Classes

- class [Fl_Cairo_State](#)

Contains all the necessary info on the current cairo context.

13.20.1 Detailed Description

Cairo is currently supported for the following platforms: Windows, macOS, Unix/Linux (X11 + Wayland).

Note

In FLTK 1.3.x this header file ([Fl_Cairo.H](#)) included the platform specific Cairo headers. This is no longer true since 1.4.0.

This header file is platform agnostic. If you need platform specific Cairo headers you need to `#include` them in your source file.

To use FLTK's builtin Cairo support you need to `#include <FL/Fl.H>` **before** you include any other FLTK header which is officially required anyway. Since FLTK 1.4.0 the preprocessor constants `FLTK_HAVE_CAIRO` and/or `FLTK_HAVE_CAIROEXT` are defined in `<FL/Fl.H>` by including `<FL/fl_config.h>`.

13.21 Fl_Cairo.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Main Cairo support header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00033 #ifndef FL_CAIRO_H
00034 #define FL_CAIRO_H
00035
00036 #include <FL/Fl.H>
00037
00038 # ifdef FLTK_HAVE_CAIRO
00039
00040 # include <cairo.h>
00041
00056 class FL_EXPORT Fl_Cairo_State {
00057 public:
00058     Fl_Cairo_State()
00059         : cc_(0)
00060         , own_cc_(false)
00061         , autolink_(false)
00062         , window_(0)
00063         , gc_(0) {}
00064
00065     // access attributes
00066     cairo_t *cc() const { return cc_; }
00067     bool autolink() const { return autolink_; }
00076     void cc(cairo_t *c, bool own = true) {
00077         if (cc_ && own_cc_)
00078             cairo_destroy(cc_);
00079         cc_ = c;
00080         if (!cc_)
00081             window_ = 0;
00082         own_cc_ = own;
00083     }
00084     void autolink(bool b);
00085     void window(void *w) { window_ = w; }
00086     void *window() const { return window_; }
00087     void gc(void *c) { gc_ = c; }
00088     void *gc() const { return gc_; }
00089
00090 private:
00091     cairo_t *cc_;           // contains the unique autoupdated cairo context
00092     bool own_cc_;         // indicates whether we must delete the cc, useful for internal cleanup
00093     bool autolink_;      // false by default, prevents the automatic cairo mapping on fltk windows
00094     // for custom cairo implementations.
00095     void *window_, *gc_; // for keeping track internally of last win+gc treated
00096 };
00097
00100 #endif // FLTK_HAVE_CAIRO
00101 #endif // FL_CAIRO_H

```

13.22 Fl_Cairo_Window.H File Reference

[Fl_Cairo_Window](#), an FLTK window incorporating a Cairo draw callback.

```

#include <FL/fl_config.h>
#include <FL/Fl.H>
#include <FL/Fl_Double_Window.H>

```

Classes

- class [Fl_Cairo_Window](#)

This defines an FLTK window with Cairo support.

13.22.1 Detailed Description

[Fl_Cairo_Window](#), an FLTK window incorporating a Cairo draw callback.

13.23 Fl_Cairo_Window.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Fl_Cairo_Window header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00021 #ifndef FL_CAIRO_WINDOW_H
00022 # define FL_CAIRO_WINDOW_H
00023 //
00024 #include <FL/fl_config.h>
00025 //
00026 # ifdef FLTK_HAVE_CAIRO
00027 //
00028 // Cairo is currently supported for the following platforms:
00029 // Win32, Apple Quartz, X11, Wayland
00030 //
00031 # include <FL/Fl.H>
00032 # include <FL/Fl_Double_Window.H>
00033 //
00089 class FL_EXPORT Fl_Cairo_Window : public Fl_Double_Window {
00090 //
00091 public:
00092     Fl_Cairo_Window(int W, int H, const char *L = 0)
00093         : Fl_Double_Window(W, H, L), draw_cb_(0) {}
00094     Fl_Cairo_Window(int X, int Y, int W, int H, const char *L = 0)
00095         : Fl_Double_Window(X, Y, W, H, L), draw_cb_(0) {}
00096 //
00097 protected:
00098     void draw() FL_OVERRIDE {
00099         Fl_Double_Window::draw();
00100         if (draw_cb_) { // call the Cairo draw callback
00101             // manual method ? if yes explicitly get a cairo_context here
00102             if (!Fl::cairo_autolink_context())
00103                 Fl::cairo_make_current(this);
00104             draw_cb_(this, Fl::cairo_cc());
00105             // flush Cairo drawings: necessary at least for Windows
00106             Fl::cairo_flush(Fl::cairo_cc());
00107         }
00108     }
00109 //
00110 //
00111 public:
00112     typedef void (*cairo_draw_cb) (Fl_Cairo_Window* self, cairo_t* def);
00113     void set_draw_cb(cairo_draw_cb cb) { draw_cb_ = cb; }
00114 //
00115 private:
00116     cairo_draw_cb draw_cb_;
00117 };
00118 #endif // FLTK_HAVE_CAIRO
00119 #endif // FL_CAIRO_WINDOW_H

```

13.24 fl_callback_macros.H File Reference

This file provides macros for easy function and method callbacks with multiple type safe arguments.

```
#include <stdlib.h>
```

Macros

- #define [FL_FUNCTION_CALLBACK_3](#)(WIDGET, FUNC, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2)
Declare a C function callback with custom parameters.
- #define [FL_INLINE_CALLBACK_2](#)(WIDGET, TYPE0, NAME0, VALUE0, TYPE1, NAME1, VALUE1, LAMBDA)

Creates code to declare a callback function in line with instantiating a widget.

- `#define FL_METHOD_CALLBACK_1(WIDGET, CLASS, SELF, METH, TYPE0, VALUE0)`

Declare a non-static class method callback with custom parameters.

13.24.1 Detailed Description

This file provides macros for easy function and method callbacks with multiple type safe arguments.

13.24.2 Macro Definition Documentation

13.24.2.1 FL_FUNCTION_CALLBACK_3

```
#define FL_FUNCTION_CALLBACK_3(
    WIDGET,
    FUNC,
    TYPE0,
    VALUE0,
    TYPE1,
    VALUE1,
    TYPE2,
    VALUE2 )
```

Declare a C function callback with custom parameters.

You can declare a plain C function callback or a static method callback with custom parameters using this macro. It simplifies the process of calling arbitrary functions with up to five custom parameters. The macro generates code that ensures type safety and expands FLTK's standard callbacks, which are limited to a single `void*` or `long` argument.

To use the macro, you provide the widget that will handle the callback as the first argument. The second argument can be either a regular function or a static method in any class.

Following these arguments, you can include up to five pairs, where each pair consists of a type and a value. For example, `int, 3` specifies an integer parameter with a value of 3. If you need to pass two arguments, you can use two pairs, like this: `int, 3, int, 4`. The last digit of the macro name must be the same as the number of pairs (0..5)

Whenever the code generated by the macro is called, the custom parameters are duplicated and marked for automatic deallocation using `delete` when the callback widget is destroyed.

```
#include <FL/fl_callback_macros.H>
...
Fl_Button *btn1 = new Fl_Button(10, 10, 100, 20, "Beep");
FL_FUNCTION_CALLBACK_0(btn1, fl_beep);
...
Fl_Button *btn2 = new Fl_Button(10, 40, 100, 20, "Hello");
FL_FUNCTION_CALLBACK_5(btn2,
    fl_message,
    const char *, text, "Hello\n%d %d %d %d",
    int, a, 1, int, b, 2, int, c, 3, int, d, 4
);
```

You can find a small demonstration program showcasing the usage of `FL*_CALLBACK_*` in the `examples/callbacks.cxx` file.

Parameters

<code>WIDGET</code>	the widget that will call the callback
<code>FUNC</code>	a C/C++ function or a static class method
<code>TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2</code>	a list of zero to five type/value pairs, all separated by commas

See also

[FL_METHOD_CALLBACK_1](#), [FL_INLINE_CALLBACK_2](#)

13.24.2.2 FL_INLINE_CALLBACK_2

```
#define FL_INLINE_CALLBACK_2(
    WIDGET,
```

```

    TYPE0,
    NAME0,
    VALUE0,
    TYPE1,
    NAME1,
    VALUE1,
    LAMBDA )

```

Creates code to declare a callback function in line with instantiating a widget.

You can use this macro to create a function as a callback, allowing you to define the callback function right where the widget and callback are declared, similar to a Lambda function.

The first argument of the macro specifies the widget that will handle the callback. Next, you can include up to five triplets, where each triplet consists of a type, a parameter name, and a value. For example, `int, x, 3` specifies an integer parameter with a value of 3. If you need to pass two arguments, you can use two triplets, such as `int, x, 3, int, y, 4`. The last digit of the macro name must be the same as the number of triplets (0..5).

The last argument is the actual function body itself.

The function body is limited to a syntax that the macro preprocessor can handle. It should include the leading '{' and trailing '}' and may contain local variable declarations, use global variables and functions, and use also the variables listed and initialized in the argument triples of the macro. Very large function bodies should be avoided because they may exceed the admissible size of a macro argument.

Whenever the code generated by the macro is called, the custom parameters are duplicated and marked for automatic deallocation using `delete` when the callback widget is destroyed.

```

#include <FL/fl_callback_macros.H>
...
Fl_Button *btn = new Fl_Button(10, 10, 100, 20, "Test");
FL_INLINE_CALLBACK_1(btn,
    const char *, name, btn->label(),
    {
        fl_message("Greetings from the %s button", name);
    }
);

```

You can find a small demonstration program showcasing the usage of `FL*_CALLBACK_*` in the `examples/callbacks.cxx` file.

Parameters

<i>WIDGET</i>	the widget that will call the callback
<i>TYPE0</i>	the type of the first parameter in the function call
<i>NAME0</i>	an arbitrary variable name that can be used as a parameter in the function body
<i>VALUE0</i>	a constant value or a variable; the value of the variable is copied when the callback is created
<i>TYPE1,NAME1,VALUE1</i>	as above; there are six macros that support 0 to 5 parameters
<i>LAMBDA</i>	the function body within the limits of the C macro preprocessor

See also

[FL_METHOD_CALLBACK_1](#), [FL_FUNCTION_CALLBACK_3](#)

13.24.2.3 FL_METHOD_CALLBACK_1

```

#define FL_METHOD_CALLBACK_1(
    WIDGET,
    CLASS,
    SELF,
    METH,
    TYPE0,
    VALUE0 )

```

Declare a non-static class method callback with custom parameters.

You can declare a callback for a non-static class method with custom parameters using this macro. It provides a convenient way to call arbitrary methods in any class, overcoming FLTK's limitation of passing only a single `void*` or `long` argument. Furthermore, it ensures type safety.

The first argument of the macro specifies the widget that will handle the callback. The second argument indicates the class type to be called. The third argument must be a pointer to an instance of that class. The fourth argument is the name of the method within the class. That method must be public and should not be static.

Following these arguments, you can include up to five pairs, where each pair consists of a type and a value. For example, `int, 3` specifies an integer parameter with a value of 3. If you need to pass two arguments, you can use two pairs, like this: `int, 3, int, 4`. The last digit of the macro name must be the same as the number of pairs (0..5)

Whenever the code generated by the macro is called, the custom parameters are duplicated and marked for automatic deallocation using `delete` when the callback widget is destroyed.

```
#include <FL/fl_callback_macros.H>
```

```
...
```

```
Fl_Button *btn = new Fl_Button(10, 10, 100, 20, "Test");
FL_METHOD_CALLBACK_1(btn, Fl_Button, btn, color, Fl_Color, FL_GREEN);
```

You can find a small demonstration program showcasing the usage of `FL*_CALLBACK_*` in the `examples/callbacks.cxx` file.

Parameters

<i>WIDGET</i>	the widget that will call the callback
<i>CLASS</i>	the class type
<i>SELF</i>	a pointer to an instance of the class
<i>METH</i>	a C++ class method that must be public and not static
<i>TYPE0, VALUE0</i>	a list of zero to five type/value pairs, all separated by commas

See also

[FL_FUNCTION_CALLBACK_3](#), [FL_INLINE_CALLBACK_2](#)

13.25 fl_callback_macros.H

[Go to the documentation of this file.](#)

```
00001 /*
00002  * Macros for easy callbacks for the Fast Light Tool Kit (FLTK).
00003  *
00004  * Copyright 2023 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  *   https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *
00014  *   https://www.fltk.org/bugs.php
00015  */
00016
00017 #ifndef _FL_FL_CALLBACK_MACROS_H_
00018 #define _FL_FL_CALLBACK_MACROS_H_
00019
00020 #include <stdlib.h>
00021
00022 #ifndef FL_DOXYGEN
00023
00024 #define FL_FUNCTION_CALLBACK_3(WIDGET, FUNC, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2)
00025
00026 #define FL_METHOD_CALLBACK_1(WIDGET, CLASS, SELF, METH, TYPE0, VALUE0)
00027
00028 #define FL_INLINE_CALLBACK_2(WIDGET, TYPE0, NAME0, VALUE0, TYPE1, NAME1, VALUE1, LAMBDA)
00029
00030 #else // FL_DOXYGEN
00031
00032 #define FL_FUNCTION_CALLBACK_3(WIDGET, FUNC, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2)
00033
00034 #define FL_METHOD_CALLBACK_1(WIDGET, CLASS, SELF, METH, TYPE0, VALUE0)
00035
00036 #define FL_INLINE_CALLBACK_2(WIDGET, TYPE0, NAME0, VALUE0, TYPE1, NAME1, VALUE1, LAMBDA)
00037
00038 #endif
00039
00040 /*
00041  * These two macros make it possible to call macros with names that are created
00042  * by concatenating the name in x and (in this context) the number in y.
00043  */
00044 #define _FL_CBD_CONCAT_IMPL(x, y) x##y
00045 #define _FL_CBD_CONCAT(x, y) _FL_CBD_CONCAT_IMPL(x, y)
00046
00047 /*
00048  * Create a unique name for the derived class based on the current source code
00049  * line number.
00050  */
```



```

00189  */
00190 #define _FL_CBD_CLASS_NAME _FL_CBD_CONCAT(Fl_Callback_User_Data_,__LINE__)
00191
00192
00193 /*
00194 These macros create boilerplate code for callbacks to functions and
00195 static class methods with up to five arguments.
00196
00197 This macro invocation for example
00198 ```
00199 FL_FUNCTION_CALLBACK_2( func_cb_btn_2, hello_2_args_cb,
00200                        const char *, text, "FLTK",
00201                        int, number, 2 );
00202 ```
00203 will generate the following code:
00204 ```
00205
00206 do {
00207     class Fl_Callback_User_Data_92 : public Fl_Callback_User_Data {
00208     public:
00209         const char * p0_;
00210         int p1_;
00211         static void cb(Fl_Widget *w, void *user_data) {
00212             Fl_Callback_User_Data_92 *d = (Fl_Callback_User_Data_92*)user_data;
00213             hello_2_args_cb(d->p0_, d->p1_);
00214         };
00215         Fl_Callback_User_Data_92(const char * p0, int p1)
00216             : p0_(p0),
00217               p1_(p1)
00218             { }
00219     };
00220     func_cb_btn_2->callback(Fl_Callback_User_Data_92::cb,
00221                           new Fl_Callback_User_Data_92("FLTK", 2),
00222                           true);
00223 } while(0)
00224 ```
00225
00226 Clicking the Fl_Button `func_cb_btn_2` will call `hello_2_args_cb("FLTK", 2)`.
00227 Deleting the button will also delete the data that was created in our
00228 boilerplate code.
00229 */
00230 #define FL_FUNCTION_CALLBACK_5(WIDGET, FUNC, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2, TYPE3,
00231 VALUE3, TYPE4, VALUE4) \
00232 do { \
00233     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00234     public: \
00235         TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; TYPE3 p3_; TYPE4 p4_; \
00236         static void cb(Fl_Widget *w, void *user_data) { \
00237             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00238             FUNC(d->p0_, d->p1_, d->p2_, d->p3_, d->p4_); \
00239         }; \
00240         _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1, TYPE2 p2, TYPE3 p3, TYPE4 p4) \
00241             : p0_(p0), p1_(p1), p2_(p2), p3_(p3), p4_(p4) { }; \
00242     }; \
00243     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1, VALUE2, VALUE3,
00244 VALUE4), true); \
00245 } while(0)
00246
00247 #define FL_FUNCTION_CALLBACK_4(WIDGET, FUNC, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2, TYPE3,
00248 VALUE3) \
00249 do { \
00250     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00251     public: \
00252         TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; TYPE3 p3_; \
00253         static void cb(Fl_Widget *w, void *user_data) { \
00254             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00255             FUNC(d->p0_, d->p1_, d->p2_, d->p3_); \
00256         }; \
00257         _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1, TYPE2 p2, TYPE3 p3) \
00258             : p0_(p0), p1_(p1), p2_(p2), p3_(p3) { }; \
00259     }; \
00260     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1, VALUE2, VALUE3),
00261 true); \
00262 } while(0)
00263
00264 #define FL_FUNCTION_CALLBACK_3(WIDGET, FUNC, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2) \
00265 do { \
00266     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00267     public: \
00268         TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; \
00269         static void cb(Fl_Widget *w, void *user_data) { \
00270             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00271             FUNC(d->p0_, d->p1_, d->p2_); \
00272         }; \
00273         _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1, TYPE2 p2) \
00274             : p0_(p0), p1_(p1), p2_(p2) { }; \
00275     }; \

```

```

00272     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1, VALUE2), true); \
00273 } while(0)
00274
00275 #define FL_FUNCTION_CALLBACK_2(WIDGET, FUNC, TYPE0, VALUE0, TYPE1, VALUE1) \
00276 do { \
00277     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00278     public: \
00279         TYPE0 p0_; TYPE1 p1_; \
00280         static void cb(Fl_Widget *w, void *user_data) { \
00281             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00282             FUNC(d->p0_, d->p1_); \
00283         }; \
00284         _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1) \
00285         : p0_(p0), p1_(p1) { }; \
00286     }; \
00287     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1), true); \
00288 } while(0)
00289
00290 #define FL_FUNCTION_CALLBACK_1(WIDGET, FUNC, TYPE0, VALUE0) \
00291 do { \
00292     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00293     public: \
00294         TYPE0 p0_; \
00295         static void cb(Fl_Widget *w, void *user_data) { \
00296             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00297             FUNC(d->p0_); \
00298         }; \
00299         _FL_CBD_CLASS_NAME(TYPE0 p0) \
00300         : p0_(p0) { }; \
00301     }; \
00302     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0), true); \
00303 } while(0)
00304
00305 #define FL_FUNCTION_CALLBACK_0(WIDGET, FUNC) \
00306 do { \
00307     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00308     public: \
00309         static void cb(Fl_Widget *w, void *user_data) { \
00310             FUNC(); \
00311         }; \
00312         _FL_CBD_CLASS_NAME() { }; \
00313     }; \
00314     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(), true); \
00315 } while(0)
00316
00317 /*
00318 These macros create boilerplate code for callbacks to class methods
00319 with up to five arguments.
00320
00321 This macro invocation for example
00322 ```
00323 FL_METHOD_CALLBACK_4(btn,
00324                     MyWindow, win, resize,
00325                     int, test_x+10,
00326                     int, test_y+10,
00327                     int, 320,
00328                     int, 400);
00329 ```
00330 will generate the following code:
00331 ```
00332 ```
00333 do {
00334     class Fl_Callback_User_Data_73 : public Fl_Callback_User_Data {
00335     public:
00336         int p0_;
00337         int p1_;
00338         int p2_;
00339         int p3_;
00340         MyWindow *self_;
00341         static void cb(Fl_Widget *w, void *user_data) {
00342             Fl_Callback_User_Data_73 *d = (Fl_Callback_User_Data_73*)user_data;
00343             d->self_->resize(d->p0_, d->p1_, d->p2_, d->p3_);
00344         };
00345         Fl_Callback_User_Data_73(MyWindow *self, int p0, int p1, int p2, int p3)
00346         : self_(self), p0_(p0), p1_(p1), p2_(p2), p3_(p3) { }
00347     };
00348     btn->callback(Fl_Callback_User_Data_73::cb,
00349                 new Fl_Callback_User_Data_73(win, test_x+10, test_y+10, 320, 400),
00350                 true);
00351 } while(0);
00352 ```
00353
00354 Clicking the Fl_Button `btn` will call
00355 `win->resize(test_x+10, test_y+10, 320, 400);`.
00356 Deleting the button will also delete the data that was created in our
00357 boilerplate code.
00358 */

```

```

00359
00360 #define FL_METHOD_CALLBACK_5(WIDGET, CLASS, SELF, METHOD, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2,
00361   TYPE3, VALUE3, TYPE4, VALUE4) \
00362   do { \
00363     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00364     public: \
00365       CLASS *self_; \
00366       TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; TYPE3 p3_; TYPE4 p4_; \
00367       static void cb(Fl_Widget *w, void *user_data) { \
00368         _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00369         d->self_->METHOD(d->p0_, d->p1_, d->p2_, d->p3_, d->p4_); \
00370       }; \
00371       _FL_CBD_CLASS_NAME(CLASS *self, TYPE0 p0, TYPE1 p1, TYPE2 p2, TYPE3 p3, TYPE4 p4) \
00372       : self_(self), p0_(p0), p1_(p1), p2_(p2), p3_(p3), p4_(p4) { }; \
00373     }; \
00374     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(SELF, VALUE0, VALUE1, VALUE2,
00375   VALUE3, VALUE4), true); \
00376   } while(0)
00377
00378 #define FL_METHOD_CALLBACK_4(WIDGET, CLASS, SELF, METHOD, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2,
00379   TYPE3, VALUE3) \
00380   do { \
00381     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00382     public: \
00383       CLASS *self_; \
00384       TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; TYPE3 p3_; \
00385       static void cb(Fl_Widget *w, void *user_data) { \
00386         _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00387         d->self_->METHOD(d->p0_, d->p1_, d->p2_, d->p3_); \
00388       }; \
00389       _FL_CBD_CLASS_NAME(CLASS *self, TYPE0 p0, TYPE1 p1, TYPE2 p2, TYPE3 p3) \
00390       : self_(self), p0_(p0), p1_(p1), p2_(p2), p3_(p3) { }; \
00391     }; \
00392     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(SELF, VALUE0, VALUE1, VALUE2,
00393   VALUE3), true); \
00394   } while(0)
00395
00396 #define FL_METHOD_CALLBACK_3(WIDGET, CLASS, SELF, METHOD, TYPE0, VALUE0, TYPE1, VALUE1, TYPE2, VALUE2)
00397 \
00398   do { \
00399     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00400     public: \
00401       CLASS *self_; \
00402       TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; \
00403       static void cb(Fl_Widget *w, void *user_data) { \
00404         _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00405         d->self_->METHOD(d->p0_, d->p1_, d->p2_); \
00406       }; \
00407       _FL_CBD_CLASS_NAME(CLASS *self, TYPE0 p0, TYPE1 p1, TYPE2 p2) \
00408       : self_(self), p0_(p0), p1_(p1), p2_(p2) { }; \
00409     }; \
00410     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(SELF, VALUE0, VALUE1, VALUE2),
00411   true); \
00412   } while(0)
00413
00414 #define FL_METHOD_CALLBACK_2(WIDGET, CLASS, SELF, METHOD, TYPE0, VALUE0, TYPE1, VALUE1) \
00415   do { \
00416     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00417     public: \
00418       CLASS *self_; \
00419       TYPE0 p0_; TYPE1 p1_; \
00420       static void cb(Fl_Widget *w, void *user_data) { \
00421         _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00422         d->self_->METHOD(d->p0_, d->p1_); \
00423       }; \
00424       _FL_CBD_CLASS_NAME(CLASS *self, TYPE0 p0, TYPE1 p1) \
00425       : self_(self), p0_(p0), p1_(p1) { }; \
00426     }; \
00427     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(SELF, VALUE0, VALUE1), true); \
00428   } while(0)
00429
00430 #define FL_METHOD_CALLBACK_1(WIDGET, CLASS, SELF, METHOD, TYPE0, VALUE0) \
00431   do { \
00432     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00433     public: \
00434       CLASS *self_; \
00435       TYPE0 p0_; \
00436       static void cb(Fl_Widget *w, void *user_data) { \
00437         _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00438         d->self_->METHOD(d->p0_); \
00439       }; \
00440       _FL_CBD_CLASS_NAME(CLASS *self, TYPE0 p0) \
00441       : self_(self), p0_(p0) { }; \
00442     }; \
00443     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(SELF, VALUE0), true); \
00444   } while(0)

```

```

00440 #define FL_METHOD_CALLBACK_0(WIDGET, CLASS, SELF, METHOD) \
00441 do { \
00442     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00443     public: \
00444         CLASS *self_; \
00445         static void cb(Fl_Widget *w, void *user_data) { \
00446             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00447             d->self_->METHOD(); \
00448         }; \
00449         _FL_CBD_CLASS_NAME(CLASS *self) \
00450         : self_(self) { }; \
00451     }; \
00452     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(SELF), true); \
00453 } while(0)
00454
00455 /*
00456 These macros create boilerplate code for callback functions inlined into
00457 the widget creation code (similar to lambda functions in C++11 and up)
00458 with up to five arguments.
00459
00460 This macro invocation for example
00461 ```
00462 FL_INLINE_CALLBACK_2(           // callback has two parameters
00463     btn,                       // attach callback to this button
00464     const char *, text, "FLTK", // first parameter (type, name, value)
00465     int, number, 2,            // second parameter
00466     {                          // function body
00467         fl_message("We received the message %s with %d!", text, number);
00468     }
00469 );
00470 ```
00471 will generate the following code:
00472 ```
00473 do {
00474     class Fl_Callback_User_Data_133 : public Fl_Callback_User_Data {
00475     public:
00476         const char * p0_;           // store first parameter here
00477         int p1_;                   // store second parameter here
00478         // lambda style function
00479         static void fn(const char * text, int number ) {
00480             fl_message("We received the message %s with %d!", text, number);
00481         };
00482         // FLTK style callback
00483         static void cb(Fl_Widget *w, void *user_data) {
00484             Fl_Callback_User_Data_133 *d = (Fl_Callback_User_Data_133*)user_data;
00485             fn(d->p0_, d->p1_);
00486         };
00487         // class constructor
00488         Fl_Callback_User_Data_133(const char * p0, int p1)
00489         : p0_(p0),                 // copy parameter 0
00490           p1_(p1)                 // copy parameter 1
00491         { }                       // constructor body
00492     };
00493     // connect our class to the widget callback
00494     btn->callback(Fl_Callback_User_Data_133::cb,
00495                 new Fl_Callback_User_Data_133("FLTK", 2),
00496                 true);
00497 } while(0);                       // user code adds semicolon
00498 ```
00499
00500 Clicking the Fl_Button `btn` will call
00501 `fl_message("We received the message %s with %d!", "FLTK", 2);`.
00502 Deleting the button will also delete the data that was created in our
00503 boilerplate code.
00504 */
00505
00506 #define FL_INLINE_CALLBACK_5(WIDGET, TYPE0, NAME0, VALUE0, TYPE1, NAME1, VALUE1, TYPE2, NAME2, VALUE2,
TYPE3, NAME3, VALUE3, TYPE4, NAME4, VALUE4, LAMBDA) \
00507 do { \
00508     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00509     public: \
00510         TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; TYPE3 p3_; TYPE4 p4_; \
00511         static void fn(TYPE0 NAME0, TYPE1 NAME1, TYPE2 NAME2, TYPE3 NAME3, TYPE4 NAME4) \
00512             LAMBDA; \
00513         static void cb(Fl_Widget *w, void *user_data) { \
00514             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00515             _FL_CBD_CLASS_NAME::fn(d->p0_, d->p1_, d->p2_, d->p3_, d->p4_); \
00516         }; \
00517         _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1, TYPE2 p2, TYPE3 p3, TYPE4 p4) \
00518         : p0_(p0), p1_(p1), p2_(p2), p3_(p3), p4_(p4) { }; \
00519     }; \
00520     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1, VALUE2, VALUE3,
VALUE4), true); \
00521 } while(0)
00522
00523 #define FL_INLINE_CALLBACK_4(WIDGET, TYPE0, NAME0, VALUE0, TYPE1, NAME1, VALUE1, TYPE2, NAME2, VALUE2,
TYPE3, NAME3, VALUE3, LAMBDA) \

```

```

00524 do { \
00525     class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00526     public: \
00527         TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; TYPE3 p3_; \
00528         static void fn(TYPE0 NAME0, TYPE1 NAME1, TYPE2 NAME2, TYPE3 NAME3) \
00529             LAMBDA; \
00530         static void cb(Fl_Widget *w, void *user_data) { \
00531             _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00532             _FL_CBD_CLASS_NAME::fn(d->p0_, d->p1_, d->p2_, d->p3_); \
00533         }; \
00534         _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1, TYPE2 p2, TYPE3 p3) \
00535             : p0_(p0), p1_(p1), p2_(p2), p3_(p3) { }; \
00536     }; \
00537     WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1, VALUE2, VALUE3),
true); \
00538     } while(0)
00539
00540 #define FL_INLINE_CALLBACK_3(WIDGET, TYPE0, NAME0, VALUE0, TYPE1, NAME1, VALUE1, TYPE2, NAME2, VALUE2,
LAMBDA) \
00541     do { \
00542         class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00543         public: \
00544             TYPE0 p0_; TYPE1 p1_; TYPE2 p2_; \
00545             static void fn(TYPE0 NAME0, TYPE1 NAME1, TYPE2 NAME2) \
00546                 LAMBDA; \
00547             static void cb(Fl_Widget *w, void *user_data) { \
00548                 _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00549                 _FL_CBD_CLASS_NAME::fn(d->p0_, d->p1_, d->p2_); \
00550             }; \
00551             _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1, TYPE2 p2) \
00552                 : p0_(p0), p1_(p1), p2_(p2) { }; \
00553         }; \
00554         WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1, VALUE2), true); \
00555     } while(0)
00556
00557 #define FL_INLINE_CALLBACK_2(WIDGET, TYPE0, NAME0, VALUE0, TYPE1, NAME1, VALUE1, LAMBDA) \
00558     do { \
00559         class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00560         public: \
00561             TYPE0 p0_; TYPE1 p1_; \
00562             static void fn(TYPE0 NAME0, TYPE1 NAME1) \
00563                 LAMBDA; \
00564             static void cb(Fl_Widget *w, void *user_data) { \
00565                 _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00566                 _FL_CBD_CLASS_NAME::fn(d->p0_, d->p1_); \
00567             }; \
00568             _FL_CBD_CLASS_NAME(TYPE0 p0, TYPE1 p1) \
00569                 : p0_(p0), p1_(p1) { }; \
00570         }; \
00571         WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0, VALUE1), true); \
00572     } while(0)
00573
00574 #define FL_INLINE_CALLBACK_1(WIDGET, TYPE0, NAME0, VALUE0, LAMBDA) \
00575     do { \
00576         class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00577         public: \
00578             TYPE0 p0_; \
00579             static void fn(TYPE0 NAME0) \
00580                 LAMBDA; \
00581             static void cb(Fl_Widget *w, void *user_data) { \
00582                 _FL_CBD_CLASS_NAME *d = (_FL_CBD_CLASS_NAME*)user_data; \
00583                 _FL_CBD_CLASS_NAME::fn(d->p0_); \
00584             }; \
00585             _FL_CBD_CLASS_NAME(TYPE0 p0) \
00586                 : p0_(p0) { }; \
00587         }; \
00588         WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(VALUE0), true); \
00589     } while(0)
00590
00591 #define FL_INLINE_CALLBACK_0(WIDGET, LAMBDA) \
00592     do { \
00593         class _FL_CBD_CLASS_NAME : public Fl_Callback_User_Data { \
00594         public: \
00595             static void fn() \
00596                 LAMBDA; \
00597             static void cb(Fl_Widget *w, void *user_data) { \
00598                 _FL_CBD_CLASS_NAME::fn(); \
00599             }; \
00600             _FL_CBD_CLASS_NAME() { }; \
00601         }; \
00602         WIDGET->callback(_FL_CBD_CLASS_NAME::cb, new _FL_CBD_CLASS_NAME(), true); \
00603     } while(0)
00604
00605 #endif // FL_DOXYGEN
00606
00607 #endif /* !_FL_FL_CALLBACK_MACROS_H_ */

```

13.26 fl_casts.H

```

00001 //
00002 // Experimental inline "cast functions" for the Fast Light Toolkit (FLTK).
00003 // See also issue #109: "VS2017 warnings when building fltk 1.4.x"
00004 //
00005 // Copyright 1998-2021 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00018 #ifndef _FL_fl_casts_H_
00019 #define _FL_fl_casts_H_
00020
00021 #include <FL/platform_types.h>
00022
00023 inline char fl_char(void *v)           { return (char)(fl_intptr_t)v; }
00024 inline int  fl_int(void *v)            { return (int)(fl_intptr_t)v; }
00025 inline long fl_long(void *v)          { return (long)(fl_intptr_t)v; }
00026
00027 inline unsigned char fl_uchar(void *v) { return (unsigned char)(fl_uintptr_t)v; }
00028 inline unsigned int  fl_uint(void *v)  { return (unsigned int)(fl_uintptr_t)v; }
00029 inline unsigned long fl_ulong(void *v) { return (unsigned long)(fl_uintptr_t)v; }
00030
00031 // the following conversions can be used to silence MSVC warning C4312:
00032 // 'type cast': conversion from '<type>' to 'void *' of greater size
00033
00034 inline void *fl_voidptr(int v)         { return (void *) (fl_intptr_t)v; }
00035 inline void *fl_voidptr(unsigned int v) { return (void *) (fl_uintptr_t)v; }
00036 inline void *fl_voidptr(long v)        { return (void *) (fl_intptr_t)v; }
00037 inline void *fl_voidptr(unsigned long v) { return (void *) (fl_uintptr_t)v; }
00038
00039 #endif /* _FL_fl_casts_H_ */

```

13.27 Fl_Chart.H File Reference

[Fl_Chart](#) widget.

```
#include "Fl_Widget.H"
```

Classes

- class [Fl_Chart](#)
Fl_Chart displays simple charts.
- struct [FL_CHART_ENTRY](#)
For internal use only.

Macros

- #define [FL_BAR_CHART](#) 0
type() for Bar Chart variant
- #define [FL_CHART_LABEL_MAX](#) 18
max label length for entry
- #define [FL_CHART_MAX](#) 128
max entries per chart
- #define [FL_FILL_CHART](#) 3
type() for Fill Line Chart variant
- #define [FL_FILLED_CHART](#) [FL_FILL_CHART](#)
for compatibility
- #define [FL_HORBAR_CHART](#) 1
type() for Horizontal Bar Chart variant

- `#define FL_LINE_CHART 2`
type() for Line Chart variant
- `#define FL_PIE_CHART 5`
type() for Pie Chart variant
- `#define FL_SPECIALPIE_CHART 6`
type() for Special Pie Chart variant
- `#define FL_SPIKE_CHART 4`
type() for Spike Chart variant

13.27.1 Detailed Description

[Fl_Chart](#) widget.

13.28 Fl_Chart.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Fl_Chart widget header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00021 #ifndef Fl_Chart_H
00022 #define Fl_Chart_H
00023
00024 #ifndef Fl_Widget_H
00025 #include "Fl_Widget.H"
00026 #endif
00027
00028 // values for type()
00029 #define FL_BAR_CHART           0
00030 #define FL_HORBAR_CHART      1
00031 #define FL_LINE_CHART        2
00032 #define FL_FILL_CHART        3
00033 #define FL_SPIKE_CHART       4
00034 #define FL_PIE_CHART         5
00035 #define FL_SPECIALPIE_CHART  6
00036
00037 #define FL_FILLED_CHART FL_FILL_CHART
00038
00039 #define FL_CHART_MAX          128
00040 #define FL_CHART_LABEL_MAX   18
00041
00043 struct FL_CHART_ENTRY {
00044     float val;
00045     unsigned col;
00046     char str[FL_CHART_LABEL_MAX + 1];
00047 };
00048
00071 class FL_EXPORT Fl_Chart : public Fl_Widget {
00072     int numb;
00073     int maxnumb;
00074     int sizenumb;
00075     FL_CHART_ENTRY *entries;
00076     double min, max;
00077     uchar autosize_;
00078     Fl_Font textfont_;
00079     Fl_Fontsize textsize_;
00080     Fl_Color textcolor_;
00081
00082 protected:
00083     void draw() FL_OVERRIDE;
00084
00085     // (static) protected draw methods (STR 2022)
00086     // these methods are documented in src/Fl_Chart.cxx
00087
00088     static void draw_barchart(int x, int y, int w, int h, int numb, FL_CHART_ENTRY entries[],

```

```

00089             double min, double max, int autosize, int maxnumb, Fl_Color textcolor);
00090
00091 static void draw_horbarchart(int x, int y, int w, int h, int numb, FL_CHART_ENTRY entries[],
00092             double min, double max, int autosize, int maxnumb,
00093             Fl_Color textcolor);
00094
00095 static void draw_linechart(int type, int x, int y, int w, int h, int numb,
00096             FL_CHART_ENTRY entries[], double min, double max, int autosize,
00097             int maxnumb, Fl_Color textcolor);
00098
00099 static void draw_piechart(int x, int y, int w, int h, int numb, FL_CHART_ENTRY entries[],
00100             int special, Fl_Color textcolor);
00101
00102 public:
00103 Fl_Chart(int X, int Y, int W, int H, const char *L = 0);
00104
00105 ~Fl_Chart();
00106
00107 void clear();
00108
00109 void add(double val, const char *str = 0, unsigned col = 0);
00110
00111 void insert(int ind, double val, const char *str = 0, unsigned col = 0);
00112
00113 void replace(int ind, double val, const char *str = 0, unsigned col = 0);
00114
00119 void bounds(double *a, double *b) const {
00120     *a = min;
00121     *b = max;
00122 }
00123
00124 void bounds(double a, double b);
00125
00129 int size() const { return numb; }
00130
00138 void size(int W, int H) { Fl_Widget::size(W, H); }
00139
00143 int maxsize() const { return maxnumb; }
00144
00145 void maxsize(int m);
00146
00148 Fl_Font textfont() const { return textfont_; }
00149
00151 void textfont(Fl_Font s) { textfont_ = s; }
00152
00154 Fl_Fontsize textsize() const { return textsize_; }
00155
00157 void textsize(Fl_Fontsize s) { textsize_ = s; }
00158
00160 Fl_Color textcolor() const { return textcolor_; }
00161
00163 void textcolor(Fl_Color n) { textcolor_ = n; }
00164
00169 uchar autosize() const { return autosize_; }
00170
00175 void autosize(uchar n) { autosize_ = n; }
00176 };
00177
00178 #endif

```

13.29 Fl_Check_Browser.H

```

00001 //
00002 // Fl_Check_Browser header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2020 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Check_Browser widget . */
00019
00020 #ifndef Fl_Check_Browser_H
00021 #define Fl_Check_Browser_H
00022
00023 #include "Fl.H"

```



```

00024 #include "Fl_Browser_.H"
00025
00030 class FL_EXPORT Fl_Check_Browser : public Fl_Browser_ {
00031
00032 protected:
00033     /* required routines for Fl_Browser_ subclass: */
00034     void *item_first() const FL_OVERRIDE;
00035     void *item_next(void *) const FL_OVERRIDE;
00036     void *item_prev(void *) const FL_OVERRIDE;
00037     int item_height(void *) const FL_OVERRIDE;
00038     int item_width(void *) const FL_OVERRIDE;
00039     void item_draw(void *, int, int, int, int) const FL_OVERRIDE;
00040     void item_select(void *, int) FL_OVERRIDE;
00041     int item_selected(void *) const FL_OVERRIDE;
00042     const char *item_text(void *item) const FL_OVERRIDE;
00043
00044 public:
00045     void *item_at(int index) const FL_OVERRIDE;
00046     void item_swap(int ia, int ib);
00047     void item_swap(void *a, void *b) FL_OVERRIDE;
00048
00049     /* private data */
00050
00051 public: // IRIX 5.3 C++ compiler doesn't support private structures...
00052
00053 #ifndef FL_DOXYGEN
00054     struct cb_item {
00055         cb_item *next;
00056         cb_item *prev;
00057         char checked;
00058         char selected;
00059         char *text;
00060     };
00061 #endif // !FL_DOXYGEN
00062
00063 private:
00064     cb_item *first;
00065     cb_item *last;
00066     cb_item *cache;
00067     int cached_item;
00068     int nitems_;
00069     int nchecked_;
00070     cb_item *find_item(int) const;
00071     int lineno(cb_item *) const;
00072
00073 public:
00074     Fl_Check_Browser(int x, int y, int w, int h, const char *l = 0);
00075     ~Fl_Check_Browser() { clear(); }
00076     int add(char *s); // add an (unchecked) item
00077     int add(char *s, int b); // add an item and set checked
00078     // both return the new nitems()
00079     int remove(int item); // delete an item. Returns nitems()
00080
00081 // inline const char * methods to avoid breaking binary compatibility...
00082 int add(const char *s) { return add((char *)s); }
00083 int add(const char *s, int b) { return add((char *)s, b); }
00084
00085 void clear(); // delete all items
00086 int nitems() const { return nitems_; }
00087 int nchecked() const { return nchecked_; }
00088 int checked(int item) const;
00089 void checked(int item, int b);
00090 void set_checked(int item) { checked(item, 1); }
00091 void check_all();
00092 void check_none();
00093 int value() const; // currently selected item
00094 char *text(int item) const; // returns pointer to internal buffer
00095
00096 protected:
00097     int handle(int) FL_OVERRIDE;
00098 };
00099
00100 #endif // Fl_Check_Browser_H

```

13.30 Fl_Check_Button.H

```

00001 //
00002 // Check button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2014 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //

```

```

00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Check_Button_H
00018 #define Fl_Check_Button_H
00019
00020 #include "Fl_Light_Button.H"
00021
00022 /*
00023   class: Fl_Check_Button.
00024
00025   A button with a "checkmark" to show its status.
00026 */
00027
00028 class FL_EXPORT Fl_Check_Button : public Fl_Light_Button {
00029 public:
00030   Fl_Check_Button(int X, int Y, int W, int H, const char *L = 0);
00031 };
00032
00033 #endif

```

13.31 Fl_Choice.H

```

00001 //
00002 // Choice header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018   Fl_Choice widget . */
00019
00020 #ifndef Fl_Choice_H
00021 #define Fl_Choice_H
00022
00023 #include "Fl_Menu_.H"
00024
00104 class FL_EXPORT Fl_Choice : public Fl_Menu_ {
00105 protected:
00106   void draw() FL_OVERRIDE;
00107 public:
00108   int handle(int) FL_OVERRIDE;
00109
00110   Fl_Choice(int X, int Y, int W, int H, const char *L = 0);
00111
00116   int value() const {return Fl_Menu_::value();}
00117
00118   int value(int v);
00119
00120   int value(const Fl_Menu_Item* v);
00121 };
00122
00123 #endif

```

13.32 Fl_Clock.H

```

00001 //
00002 // Clock header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2017 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:

```

```

00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Clock, Fl_Clock_Output widgets . */
00019
00020 #ifndef Fl_Clock_H
00021 #define Fl_Clock_H
00022
00023 #ifndef Fl_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026
00027 // Values for type():
00028 // Please change doxygen documentation below (class Fl_Clock_Output)
00029 // accordingly as well when changing the following type values:
00030
00031 #define FL_SQUARE_CLOCK      0
00032 #define FL_ROUND_CLOCK      1
00033 #define FL_ANALOG_CLOCK     FL_SQUARE_CLOCK
00034 #define FL_DIGITAL_CLOCK    FL_SQUARE_CLOCK
00036 // fabien: Please keep the horizontal formatting of both images in class desc,
00037 // don't lose vertical space for nothing!
00038
00065 class FL_EXPORT Fl_Clock_Output : public Fl_Widget {
00066     int hour_, minute_, second_;
00067     ulong value_;
00068     int shadow_; // draw shadows of hands
00069     void drawhands(Fl_Color, Fl_Color); // part of draw
00070 protected:
00071     void draw() FL_OVERRIDE;
00072     void draw(int X, int Y, int W, int H);
00073 public:
00074
00075     Fl_Clock_Output(int X, int Y, int W, int H, const char *L = 0);
00076
00077     void value(ulong v); // set to this Unix time
00078
00079     void value(int H, int m, int s);
00080
00086     ulong value() const {return value_;}
00087
00092     int hour() const {return hour_;}
00093
00098     int minute() const {return minute_;}
00099
00104     int second() const {return second_;}
00105
00113     int shadow() const {return shadow_;}
00114
00127     void shadow(int mode) { shadow_ = mode ? 1 : 0; }
00128 };
00129
00130 // a Fl_Clock displays the current time always by using a timeout:
00131
00152 class FL_EXPORT Fl_Clock : public Fl_Clock_Output {
00153 public:
00154     int handle(int) FL_OVERRIDE;
00155
00156     Fl_Clock(int X, int Y, int W, int H, const char *L = 0);
00157
00158     Fl_Clock(uchar t, int X, int Y, int W, int H, const char *L);
00159
00160     ~Fl_Clock();
00161 };
00162
00163 #endif

```

13.33 Fl_Color_Chooser.H File Reference

[Fl_Color_Chooser](#) widget .

```

#include <FL/Fl_Group.H>
#include <FL/Fl_Box.H>
#include <FL/Fl_Return_Button.H>
#include <FL/Fl_Choice.H>
#include <FL/Fl_Value_Input.H>

```

Classes

- class [Fl_Color_Chooser](#)

The [Fl_Color_Chooser](#) widget provides a standard RGB color chooser.

13.33.1 Detailed Description

[Fl_Color_Chooser](#) widget .

13.34 Fl_Color_Chooser.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Color chooser header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2019 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00020 // The color chooser object and the color chooser popup. The popup
00021 // is just a window containing a single color chooser and some boxes
00022 // to indicate the current and cancelled color.
00023
00024 #ifndef Fl_Color_Chooser_H
00025 #define Fl_Color_Chooser_H
00026
00027 #include <FL/Fl_Group.H>
00028 #include <FL/Fl_Box.H>
00029 #include <FL/Fl_Return_Button.H>
00030 #include <FL/Fl_Choice.H>
00031 #include <FL/Fl_Value_Input.H>
00032
00033 #ifndef FL_DOXYGEN
00034
00036 class FL_EXPORT Flcc_HueBox : public Fl_Widget {
00037     int px, py;
00038 protected:
00039     void draw() FL_OVERRIDE;
00040     int handle_key(int);
00041 public:
00042     int handle(int) FL_OVERRIDE;
00043     Flcc_HueBox(int X, int Y, int W, int H) : Fl_Widget(X,Y,W,H) {
00044         px = py = 0;}
00045 };
00046
00048 class FL_EXPORT Flcc_ValueBox : public Fl_Widget {
00049     int py;
00050 protected:
00051     void draw() FL_OVERRIDE;
00052     int handle_key(int);
00053 public:
00054     int handle(int) FL_OVERRIDE;
00055     Flcc_ValueBox(int X, int Y, int W, int H) : Fl_Widget(X,Y,W,H) {
00056         py = 0;}
00057 };
00058
00060 class FL_EXPORT Flcc_Value_Input : public Fl_Value_Input {
00061 public:
00062     int format(char*) FL_OVERRIDE;
00063     Flcc_Value_Input(int X, int Y, int W, int H) : Fl_Value_Input(X,Y,W,H) {}
00064 };
00065
00066 #endif // !FL_DOXYGEN
00067
00112 class FL_EXPORT Fl_Color_Chooser : public Fl_Group {
00113     Flcc_HueBox huebox;
00114     Flcc_ValueBox valuebox;
00115     Fl_Choice choice;
00116     Flcc_Value_Input rvalue;
00117     Flcc_Value_Input gvalue;
00118     Flcc_Value_Input bvalue;
00119     Fl_Box resize_box;

```

```

00120 double hue_, saturation_, value_;
00121 double r_, g_, b_;
00122 void set_valuators();
00123 static void rgb_cb(Fl_Widget*, void*);
00124 static void mode_cb(Fl_Widget*, void*);
00125 public:
00126
00127 int handle(int e) FL_OVERRIDE;
00128
00133 int mode() {return choice.value();}
00134
00139 void mode(int newMode);
00140
00147 double hue() const {return hue_;}
00148
00153 double saturation() const {return saturation_;}
00154
00159 double value() const {return value_;}
00160
00165 double r() const {return r_;}
00166
00171 double g() const {return g_;}
00172
00177 double b() const {return b_;}
00178
00179 int hsv(double H, double S, double V);
00180
00181 int rgb(double R, double G, double B);
00182
00183 static void hsv2rgb(double H, double S, double V, double& R, double& G, double& B);
00184
00185 static void rgb2hsv(double R, double G, double B, double& H, double& S, double& V);
00186
00187 Fl_Color_Chooser(int X, int Y, int W, int H, const char *L = 0);
00188 };
00189
00190 FL_EXPORT int fl_color_chooser(const char* name, double& r, double& g, double& b, int m=-1);
00191 FL_EXPORT int fl_color_chooser(const char* name, uchar& r, uchar& g, uchar& b, int m=-1);
00192
00193 #endif

```

13.35 fl_config.h

```

00001 /* FL/fl_config.h. Generated from fl_config.in by configure. */
00002 /*
00003  * Build configuration file for the Fast Light Tool Kit (FLTK).
00004  *
00005  * Copyright 1998-2023 by Bill Spitzak and others.
00006  *
00007  * This library is free software. Distribution and use rights are outlined in
00008  * the file "COPYING" which should have been included with this file. If this
00009  * file is missing or damaged, see the license at:
00010  *
00011  * https://www.fltk.org/COPYING.php
00012  *
00013  * Please see the following page on how to report bugs and issues:
00014  *
00015  * https://www.fltk.org/bugs.php
00016  */
00017
00018 #ifndef _FL_fl_config_h_
00019 #define _FL_fl_config_h_
00020
00021 /*
00022  * FL_ABI_VERSION (ABI version)
00023  *
00024  * define FL_ABI_VERSION: lxxxy for l.x.y (xx,yy with leading zero)
00025  */
00026
00027 /* #undef FL_ABI_VERSION */
00028
00029
00030 /*
00031  * FLTK_HAVE_CAIRO
00032  *
00033  * Do we have the Cairo library available?
00034  */
00035
00036 /* #undef FLTK_HAVE_CAIRO */
00037
00038
00039 /*
00040  * FLTK_HAVE_CAIROEXT
00041  *
00042  * Do we have the Cairo library available and want extended Cairo use in FLTK ?

```

```

00043 * This implies to link cairo.lib in all FLTK based apps.
00044 */
00045
00046 /* #undef FLTK_HAVE_CAIROEXT */
00047
00048
00049 /*
00050 * FLTK_HAVE_FORMS
00051 *
00052 * Do we have the Forms compatibility library available?
00053 */
00054
00055 #define FLTK_HAVE_FORMS 1
00056
00057
00058 /*
00059 * FLTK_USE_X11
00060 *
00061 * Do we use X11 for the current platform?
00062 *
00063 */
00064
00065 #define FLTK_USE_X11 1
00066
00067
00068 /*
00069 * FLTK_USE_CAIRO
00070 *
00071 * Do we use Cairo to draw to the display?
00072 *
00073 */
00074
00075 #define FLTK_USE_CAIRO 1
00076
00077
00078 /*
00079 * FLTK_USE_WAYLAND
00080 *
00081 * Do we use Wayland for the current platform?
00082 *
00083 */
00084
00085 #define FLTK_USE_WAYLAND 1
00086
00087
00088 /*
00089 * FLTK_USE_STD
00090 *
00091 * May we use std::string and std::vector for the current build?
00092 *
00093 * This is a build configuration option which allows FLTK to add some
00094 * features based on std::string and std::vector in FLTK 1.4.x
00095 *
00096 */
00097
00098 #define FLTK_USE_STD 0
00099
00100 #endif /* _FL_fl_config_h_ */

```

13.36 Fl_Copy_Surface.H

```

00001 //
00002 // Copy-to-clipboard code for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Copy_Surface_H
00018 #define Fl_Copy_Surface_H
00019
00020 #include <FL/Fl_Widget_Surface.H>
00021
00049 class FL_EXPORT Fl_Copy_Surface : public Fl_Widget_Surface {
00050 private:
00051     class Fl_Copy_Surface_Driver *platform_surface;

```

```

00052 protected:
00053     void translate(int x, int y) FL_OVERRIDE;
00054     void untranslate() FL_OVERRIDE;
00055 public:
00056     Fl_Copy_Surface(int w, int h);
00057     ~Fl_Copy_Surface();
00058     void set_current() FL_OVERRIDE;
00059     bool is_current() FL_OVERRIDE;
00061     int w();
00063     int h();
00064     void origin(int *x, int *y) FL_OVERRIDE;
00065     void origin(int x, int y) FL_OVERRIDE;
00066     int printable_rect(int *w, int *h) FL_OVERRIDE;
00067 };
00068
00069
00084 class Fl_Copy_Surface_Driver : public Fl_Widget_Surface {
00085     friend class Fl_Copy_Surface;
00086 protected:
00087     int width;
00088     int height;
00089     Fl_Copy_Surface_Driver(int w, int h) : Fl_Widget_Surface(NULL), width(w), height(h) {}
00090     virtual ~Fl_Copy_Surface_Driver() {}
00091     void set_current() FL_OVERRIDE = 0;
00092     void translate(int x, int y) FL_OVERRIDE = 0;
00093     void untranslate() FL_OVERRIDE = 0;
00094     int printable_rect(int *w, int *h) FL_OVERRIDE;
00099     static Fl_Copy_Surface_Driver *newCopySurfaceDriver(int w, int h);
00100 };
00101
00107 #endif // Fl_Copy_Surface_H

```

13.37 Fl_Counter.H

```

00001 //
00002 // Counter header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Counter widget . */
00019
00020 // A numerical value with up/down step buttons. From Forms.
00021
00022 #ifndef Fl_Counter_H
00023 #define Fl_Counter_H
00024
00025 #ifndef Fl_Valuator_H
00026 #include "Fl_Valuator.H"
00027 #endif
00028
00029 // values for type():
00030 #define FL_NORMAL_COUNTER      0
00031 #define FL_SIMPLE_COUNTER     1
00044 class FL_EXPORT Fl_Counter : public Fl_Valuator {
00045
00046     Fl_Font textfont_;
00047     Fl_Fontsize textsize_;
00048     Fl_Color textcolor_;
00049     double lstep_;
00050     uchar mouseobj_;
00051     static void repeat_callback(void *);
00052     int calc_mouseobj();
00053     void increment_cb();
00054
00055 protected:
00056
00057     void draw() FL_OVERRIDE;
00058     // compute widths of arrow boxes
00059     void arrow_widths(int &w1, int &w2);
00060
00061 public:
00062
00063     int handle(int) FL_OVERRIDE;

```

```

00064
00065 Fl_Counter(int X, int Y, int W, int H, const char* L = 0);
00066 ~Fl_Counter();
00067
00073 void lstep(double a) {lstep_ = a;}
00074
00079 void step(double a,double b) {Fl_Valuator::step(a); lstep_ = b;}
00080
00085 void step(double a) {Fl_Valuator::step(a);}
00086
00090 double step() const {return Fl_Valuator::step();}
00091
00093 Fl_Font textfont() const {return textfont_;}
00095 void textfont(Fl_Font s) {textfont_ = s;}
00096
00098 Fl_Fontsize textsize() const {return textsize_;}
00100 void textsize(Fl_Fontsize s) {textsize_ = s;}
00101
00103 Fl_Color textcolor() const {return textcolor_;}
00105 void textcolor(Fl_Color s) {textcolor_ = s;}
00106
00107 };
00108
00109 #endif

```

13.38 FI_Device.H File Reference

declaration of classes [Fl_Surface_Device](#), [Fl_Display_Device](#), [Fl_Device_Plugin](#).

```

#include <FL/Fl_Plugin.H>
#include <FL/platform_types.h>

```

Classes

- class [Fl_Device_Plugin](#)
This plugin socket allows the integration of new device drivers for special window or screen types.
- class [Fl_Display_Device](#)
The computer's display.
- class [Fl_Surface_Device](#)
A drawing surface that's susceptible to receive graphical output.

13.38.1 Detailed Description

declaration of classes [Fl_Surface_Device](#), [Fl_Display_Device](#), [Fl_Device_Plugin](#).

13.39 FI_Device.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Definition of classes Fl_Surface_Device, Fl_Display_Device
00003 // for the Fast Light Tool Kit (FLTK).
00004 //
00005 // Copyright 2010-2021 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00022 #ifndef Fl_Device_H
00023 #define Fl_Device_H
00024
00025 #include <FL/Fl_Plugin.H>
00026 #include <FL/platform_types.h>
00027
00028 class Fl_Graphics_Driver;

```



```

00029 class Fl_RGB_Image;
00030 class Fl_Widget;
00031 class Fl_Surface_Surface;
00032
00066 class FL_EXPORT Fl_Surface_Device {
00068     Fl_Graphics_Driver *pGraphicsDriver;
00069     static Fl_Surface_Device *surface_; // the surface that currently receives graphics requests
00070     static Fl_Surface_Device *default_surface(); // create surface if none exists yet
00071 protected:
00076     virtual void end_current() { surface_ = 0; }
00078     Fl_Surface_Device(Fl_Graphics_Driver *graphics_driver) {pGraphicsDriver = graphics_driver; }
00080     inline void driver(Fl_Graphics_Driver *graphics_driver) {pGraphicsDriver = graphics_driver;}
00081 public:
00082     virtual void set_current(void);
00083     virtual bool is_current();
00085     inline Fl_Graphics_Driver *driver() {return pGraphicsDriver; }
00090     static inline Fl_Surface_Device *surface() {
00091         return surface_ ? surface_ : default_surface();
00092     }
00094     virtual ~Fl_Surface_Device();
00095     static void push_current(Fl_Surface_Device *new_current);
00096     static Fl_Surface_Device *pop_current();
00097 };
00098
00104 class FL_EXPORT Fl_Display_Device : public Fl_Surface_Device {
00105     Fl_Display_Device(Fl_Graphics_Driver *graphics_driver);
00106 public:
00107     static Fl_Display_Device *display_device();
00108 };
00109
00117 class Fl_Device_Plugin : public Fl_Plugin {
00118 public:
00120     Fl_Device_Plugin(const char *pluginName)
00121     : Fl_Plugin(klass(), pluginName) { }
00123     virtual const char *klass() { return "fltk:device"; }
00125     virtual const char *name() = 0;
00127     virtual int print(Fl_Widget* w) = 0;
00131     virtual Fl_RGB_Image* rectangle_capture(Fl_Widget *widget, int x, int y, int w, int h) = 0;
00133     static Fl_Device_Plugin *opengl_plugin();
00134 };
00135
00136 #endif // Fl_Device_H

```

13.40 Fl_Dial.H

```

00001 //
00002 // Dial header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Dial widget . */
00019
00020 #ifndef Fl_Dial_H
00021 #define Fl_Dial_H
00022
00023 #ifndef Fl_Valuator_H
00024 #include "Fl_Valuator.H"
00025 #endif
00026
00027 // values for type():
00028 #define FL_NORMAL_DIAL 0
00029 #define FL_LINE_DIAL 1
00030 #define FL_FILL_DIAL 2
00045 class FL_EXPORT Fl_Dial : public Fl_Valuator {
00046
00047     short a1,a2;
00048
00049 protected:
00050
00051     // these allow subclasses to put the dial in a smaller area:
00052     void draw(int X, int Y, int W, int H);
00053     int handle(int event, int X, int Y, int W, int H);
00054     void draw() FL_OVERRIDE;

```

```

00055
00056 public:
00057
00058     int handle(int) FL_OVERRIDE;
00063     Fl_Dial(int x,int y,int w,int h, const char *l = 0);
00070     short angle1() const {return a1;}
00072     void angle1(short a) {a1 = a;}
00074     short angle2() const {return a2;}
00076     void angle2(short a) {a2 = a;}
00078     void angles(short a, short b) {a1 = a; a2 = b;}
00079
00080 };
00081
00082 #endif

```

13.41 Fl_Double_Window.H

```

00001 //
00002 // Double-buffered window header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Double_Window widget . */
00019
00020 #ifndef Fl_Double_Window_H
00021 #define Fl_Double_Window_H
00022
00023 #include "Fl_Window.H"
00024
00030 class FL_EXPORT Fl_Double_Window : public Fl_Window
00031 {
00032 public:
00036     Fl_Double_Window *as_double_window() FL_OVERRIDE {return this; }
00037     void show() FL_OVERRIDE;
00039     void show(int a, char **b) {Fl_Window::show(a,b);}
00040     void resize(int,int,int,int) FL_OVERRIDE;
00041     void hide() FL_OVERRIDE;
00042     void flush() FL_OVERRIDE;
00043     ~Fl_Double_Window();
00044
00049     Fl_Double_Window(int W, int H, const char *l = 0);
00050
00054     Fl_Double_Window(int X, int Y, int W, int H, const char *l = 0);
00055
00056 };
00057
00058 #endif

```

13.42 fl_draw.H File Reference

utility header to pull drawing functions together

```

#include <FL/Enumerations.H>
#include <FL/Fl_Graphics_Driver.H>
#include <FL/Fl_Rect.H>

```

Enumerations

- enum {
 - FL_SOLID = 0 , FL_DASH = 1 , FL_DOT = 2 , FL_DASHDOT = 3 ,
 - FL_DASHDOTDOT = 4 , FL_CAP_FLAT = 0x100 , FL_CAP_ROUND = 0x200 , FL_CAP_SQUARE = 0x300 ,
 - FL_JOIN_MITER = 0x1000 , FL_JOIN_ROUND = 0x2000 , FL_JOIN_BEVEL = 0x3000 }

Functions

- int [fl_add_symbol](#) (const char *name, void(*drawit)([FI_Color](#)), int scalable)
Adds a symbol to the system.
- int [fl_antialias](#) ()
Return whether line drawings are currently antialiased.
- void [fl_antialias](#) (int state)
Turn antialiased line drawings ON or OFF, if supported by platform.
- void [fl_arc](#) (double x, double y, double r, double start, double end)
Add a series of points to the current path on the arc of a circle.
- void [fl_arc](#) (int x, int y, int w, int h, double a1, double a2)
Draw ellipse sections using integer coordinates.
- void [fl_begin_complex_polygon](#) ()
Start drawing a complex filled polygon.
- void [fl_begin_line](#) ()
Start drawing a list of lines.
- void [fl_begin_loop](#) ()
Start drawing a closed sequence of lines.
- void [fl_begin_offscreen](#) ([FI_Offscreen](#) ctx)
Send all subsequent drawing commands to this offscreen buffer.
- void [fl_begin_points](#) ()
Start drawing a list of points.
- void [fl_begin_polygon](#) ()
Start drawing a convex filled polygon.
- char [fl_can_do_alpha_blending](#) ()
Check whether platform supports true alpha blending for RGBA images.
- [FI_RGB_Image](#) * [fl_capture_window](#) ([FI_Window](#) *win, int x, int y, int w, int h)
Captures the content of a rectangular zone of a mapped window.
- void [fl_chord](#) (int x, int y, int w, int h, double a1, double a2)
fl_chord declaration is a place holder - the function does not yet exist
- void [fl_circle](#) (double x, double y, double r)
fl_circle(x,y,r) is equivalent to fl_arc(x,y,r,0,360), but may be faster.
- void [fl_clip](#) (int x, int y, int w, int h)
Intersect the current clip region with a rectangle and push this new region onto the stack (deprecated).
- int [fl_clip_box](#) (int x, int y, int w, int h, int &X, int &Y, int &W, int &H)
Intersect a rectangle with the current clip region and return the bounding box of the result.
- [FI_Region](#) [fl_clip_region](#) ()
Return the current clipping region.
- void [fl_clip_region](#) ([FI_Region](#) r)
Replace the top of the clipping stack with a clipping region of any shape.
- [FI_Color](#) [fl_color](#) ()
Return the last fl_color() that was set.
- void [fl_color](#) ([FI_Color](#) c)
Set the color for all subsequent drawing operations.
- void [fl_color](#) (int c)
for back compatibility - use fl_color(FI_Color c) instead
- void [fl_color](#) (uchar r, uchar g, uchar b)
Set the color for all subsequent drawing operations.
- void [fl_copy_offscreen](#) (int x, int y, int w, int h, [FI_Offscreen](#) pixmap, int srcx, int srcy)
Copy a rectangular area of the given offscreen buffer into the current drawing destination.
- [FI_Offscreen](#) [fl_create_offscreen](#) (int w, int h)

- Creation of an offscreen graphics buffer.*

 - void **fl_cursor** ([FL_Cursor](#))

Sets the cursor for the current window to the specified shape and colors.
- void **fl_cursor** ([FL_Cursor](#), [FL_Color](#) fg, [FL_Color](#) bg=[FL_WHITE](#))
- void **fl_curve** (double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)
 - Add a series of points on a Bézier curve to the path.*
- void **fl_delete_offscreen** ([FL_Offscreen](#) ctx)
 - Deletion of an offscreen graphics buffer.*
- int **fl_descent** ()
 - Return the recommended distance above the bottom of a [fl_height\(\)](#) tall box to draw the text at so it looks centered vertically in that box.*
- void **fl_draw** (const char *str, int n, int x, int y)
 - Draws starting at the given x, y location a UTF-8 string of length n bytes.*
- void **fl_draw** (const char *str, int x, int y)
 - Draw a nul-terminated UTF-8 string starting at the given x, y location.*
- void **fl_draw** (const char *str, int x, int y, int w, int h, [FL_Align](#) align, [FL_Image](#) *img=0, int draw_symbols=1)
 - Fancy string drawing function which is used to draw all the labels.*
- void **fl_draw** (const char *str, int x, int y, int w, int h, [FL_Align](#) align, void(*callthis)(const char *, int, int, int), [FL_Image](#) *img=0, int draw_symbols=1)
 - The same as [fl_draw\(const char*,int,int,int,int,FL_Align,FL_Image*,int\)](#) with the addition of the *callthis* parameter, which is a pointer to a text drawing function such as [fl_draw\(const char*, int, int, int\)](#) to do the real work.*
- void **fl_draw** (int angle, const char *str, int n, int x, int y)
 - Draw at the given x, y location a UTF-8 string of length n bytes rotating angle degrees counter-clockwise.*
- void **fl_draw** (int angle, const char *str, int x, int y)
 - Draw a nul-terminated UTF-8 string starting at the given x, y location and rotating angle degrees counter-clockwise.*
- void **fl_draw_arrow** ([FL_Rect](#) bb, [FL_Arrow_Type](#) t, [FL_Orientation](#) o, [FL_Color](#) color)
 - Draw an "arrow like" GUI element for the selected scheme.*
- void **fl_draw_box** ([FL_Boxtype](#), int x, int y, int w, int h, [FL_Color](#))
 - Draws a box using given type, position, size and color.*
- void **fl_draw_check** ([FL_Rect](#) bb, [FL_Color](#) col)
 - Draw a check mark inside the given bounding box.*
- void **fl_draw_circle** (int x, int y, int d, [FL_Color](#) color)
 - Draw a potentially small, filled circle using a given color.*
- void **fl_draw_image** (const [uchar](#) *buf, int X, int Y, int W, int H, int D=3, int L=0)
 - Draw an 8-bit per color RGB or luminance image.*
- void **fl_draw_image** ([FL_Draw_Image_Cb](#) cb, void *data, int X, int Y, int W, int H, int D=3)
 - Draw an image using a callback function to generate image data.*
- void **fl_draw_image_mono** (const [uchar](#) *buf, int X, int Y, int W, int H, int D=1, int L=0)
 - Draw a gray-scale (1 channel) image.*
- void **fl_draw_image_mono** ([FL_Draw_Image_Cb](#) cb, void *data, int X, int Y, int W, int H, int D=1)
 - Draw a gray-scale image using a callback function to generate image data.*
- int **fl_draw_pixmap** (char *const *data, int x, int y, [FL_Color](#) bg=[FL_GRAY](#))
 - Draw XPM image data, with the top-left corner at the given position.*
- int **fl_draw_pixmap** (const char *const *data, int x, int y, [FL_Color](#) bg=[FL_GRAY](#))
 - Draw XPM image data, with the top-left corner at the given position.*
- void **fl_draw_radio** (int x, int y, int d, [FL_Color](#) color)
 - Draw a round check mark (circle) of a radio button.*
- int **fl_draw_symbol** (const char *label, int x, int y, int w, int h, [FL_Color](#))
 - Draw the named symbol in the given rectangle using the given color.*
- void **fl_end_complex_polygon** ()
 - End complex filled polygon, and draw.*

- void **fl_end_line** ()
End list of lines, and draw.
- void **fl_end_loop** ()
End closed sequence of lines, and draw.
- void **fl_end_offscreen** ()
Quit sending drawing commands to the current offscreen buffer.
- void **fl_end_points** ()
End list of points, and draw.
- void **fl_end_polygon** ()
End convex filled polygon, and draw.
- const char * **fl_expand_text** (const char *from, char *buf, int maxbuf, double maxw, int &n, double &width, int wrap, int draw_symbols=0)
Copy from to buf, replacing control characters with ^X.
- void **fl_focus_rect** (int x, int y, int w, int h)
Draw a dotted rectangle, used to indicate keyboard focus on a widget.
- **FL_Font** **fl_font** ()
Return the face set by the most recent call to fl_font().
- void **fl_font** (**FL_Font** face, **FL_Fontsize** fsize)
Sets the current font, which is then used in various drawing routines.
- void **fl_frame** (const char *s, int x, int y, int w, int h)
Draws a series of line segments around the given box.
- void **fl_frame2** (const char *s, int x, int y, int w, int h)
Draws a series of line segments around the given box.
- void **fl_gap** ()
Separate loops of the path.
- int **fl_height** ()
Return the recommended minimum line spacing for the current font.
- int **fl_height** (int font, int size)
This function returns the actual height of the specified font and size.
- const char * **fl_latin1_to_local** (const char *t, int n=-1)
Convert text from Windows/X11 latin1 character set to local encoding.
- void **fl_line** (int x, int y, int x1, int y1)
Draw a line from (x,y) to (x1,y1)
- void **fl_line** (int x, int y, int x1, int y1, int x2, int y2)
Draw a line from (x,y) to (x1,y1) and another from (x1,y1) to (x2,y2)
- void **fl_line_style** (int style, int width=0, char *dashes=0)
Set how to draw lines (the "pen").
- void **fl_load_identity** ()
Set the transformation matrix to identity.
- void **fl_load_matrix** (double a, double b, double c, double d, double x, double y)
Set the current transformation matrix.
- const char * **fl_local_to_latin1** (const char *t, int n=-1)
Convert text from local encoding to Windows/X11 latin1 character set.
- const char * **fl_local_to_mac_roman** (const char *t, int n=-1)
Convert text from local encoding to Mac Roman character set.
- void **fl_loop** (int x, int y, int x1, int y1, int x2, int y2)
Outline a 3-sided polygon with lines.
- void **fl_loop** (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
Outline a 4-sided polygon with lines.
- const char * **fl_mac_roman_to_local** (const char *t, int n=-1)
Convert text from Mac Roman character set to local encoding.

- void **fl_measure** (const char *str, int &x, int &y, int draw_symbols=1)
Measure how wide and tall the string will be when printed by the fl_draw() function with align parameter.
- int **fl_measure_pixmap** (char *const *data, int &w, int &h)
Get the dimensions of a pixmap.
- int **fl_measure_pixmap** (const char *const *cdata, int &w, int &h)
Get the dimensions of a pixmap.
- void **fl_mult_matrix** (double a, double b, double c, double d, double x, double y)
Concatenate another transformation onto the current one.
- int **fl_not_clipped** (int x, int y, int w, int h)
Does the rectangle intersect the current clip region?
- unsigned int **fl_old_shortcut** (const char *s)
Emulation of XForms named shortcuts.
- void **fl_overlay_clear** ()
Erase a selection rectangle without drawing a new one.
- void **fl_overlay_rect** (int x, int y, int w, int h)
Draw a transient dotted selection rectangle.
- float **fl_override_scale** ()
Removes any GUI scaling factor in subsequent drawing operations.
- void **fl_pie** (int x, int y, int w, int h, double a1, double a2)
Draw filled ellipse sections using integer coordinates.
- void **fl_point** (int x, int y)
Draw a single pixel at the given coordinates.
- void **fl_polygon** (int x, int y, int x1, int y1, int x2, int y2)
Fill a 3-sided polygon.
- void **fl_polygon** (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
Fill a 4-sided polygon.
- void **fl_pop_clip** ()
Restore the previous clip region.
- void **fl_pop_matrix** ()
Restore the current transformation matrix from the stack.
- void **fl_push_clip** (int x, int y, int w, int h)
Intersect the current clip region with a rectangle and push this new region onto the stack.
- void **fl_push_matrix** ()
Save the current transformation matrix on the stack.
- void **fl_push_no_clip** ()
Push an empty clip region onto the stack so nothing will be clipped.
- uchar * **fl_read_image** (uchar *p, int X, int Y, int W, int H, int alpha=0)
Reads an RGB(A) image from the current window or off-screen buffer.
- void **fl_rect** (FI_Rect r)
Draw a border inside the given bounding box.
- void **fl_rect** (int x, int y, int w, int h)
Draw a border inside the given bounding box.
- void **fl_rect** (int x, int y, int w, int h, FI_Color c)
Draw with passed color a border inside the given bounding box.
- void **fl_rectf** (FI_Rect bb, uchar r, uchar g, uchar b)
Color a rectangle with "exactly" the passed r, g, b color.
- void **fl_rectf** (FI_Rect r)
Color with current color a rectangle that exactly fills the given bounding box.
- void **fl_rectf** (FI_Rect r, FI_Color c)
Color with passed color a rectangle that exactly fills the given bounding box.
- void **fl_rectf** (int x, int y, int w, int h)

- Color with current color a rectangle that exactly fills the given bounding box.*

 - void `fl_rectf` (int x, int y, int w, int h, `FL_Color` c)
- Color with passed color a rectangle that exactly fills the given bounding box.*

 - void `fl_rectf` (int x, int y, int w, int h, `uchar` r, `uchar` g, `uchar` b)
- Color a rectangle with "exactly" the passed r, g, b color.*

 - void `fl_rescale_offscreen` (`FL_Offscreen` &ctx)
- Adapts an offscreen buffer to a changed value of the scale factor.*

 - void `fl_reset_spot` (void)
- Resets marked text.*

 - void `fl_restore_clip` ()
- Undo any clobbering of the clip region done by your program.*

 - void `fl_restore_scale` (float s)
- Restores the GUI scaling factor and the clipping region in subsequent drawing operations.*

 - void `fl_rotate` (double d)
- Concatenate rotation transformation onto the current one.*

 - void `fl_rounded_rect` (int x, int y, int w, int h, int r)
- Draw a rounded border inside the given bounding box.*

 - void `fl_rounded_rectf` (int x, int y, int w, int h, int r)
- Color with current color a rounded rectangle that exactly fills the given bounding box.*

 - void `fl_rtl_draw` (const char *str, int n, int x, int y)
- Draw a UTF-8 string of length n bytes right to left starting at the given x, y location.*

 - void `fl_scale` (double x)
- Concatenate scaling transformation onto the current one.*

 - void `fl_scale` (double x, double y)
- Concatenate scaling transformation onto the current one.*

 - void `fl_scroll` (int X, int Y, int W, int H, int dx, int dy, void(*draw_area)(void *, int, int, int, int), void *data)
- Scroll a rectangle and draw the newly exposed portions.*

 - void `fl_set_spot` (int font, int size, int X, int Y, int W, int H, `FL_Window` *win=0)
- Inform text input methods about the current text insertion cursor.*

 - void `fl_set_status` (int X, int Y, int W, int H)
- Related to text input methods under X11.*

 - const char * `fl_shortcut_label` (unsigned int shortcut)
- Get a human-readable string from a shortcut value.*

 - const char * `fl_shortcut_label` (unsigned int shortcut, const char **eom)
- Get a human-readable string from a shortcut value.*

 - `FL_Fontsize` `fl_size` ()
- Return the $size$ set by the most recent call to `fl_font()`.*

 - void `fl_text_extents` (const char *, int &dx, int &dy, int &w, int &h)
- Determine the minimum pixel dimensions of a nul-terminated string using the current `fl_font()`.*

 - void `fl_text_extents` (const char *t, int n, int &dx, int &dy, int &w, int &h)
- Determine the minimum pixel dimensions of a sequence of n characters (bytes) using the current `fl_font()`.*

 - double `fl_transform_dx` (double x, double y)
- Transform distance using current transformation matrix.*

 - double `fl_transform_dy` (double x, double y)
- Transform distance using current transformation matrix.*

 - double `fl_transform_x` (double x, double y)
- Transform coordinate using the current transformation matrix.*

 - double `fl_transform_y` (double x, double y)
- Transform coordinate using the current transformation matrix.*

 - void `fl_transformed_vertex` (double xf, double yf)
- Add coordinate pair to the vertex list without further transformations.*

- void `fl_translate` (double x, double y)
Concatenate translation transformation onto the current one.
- void `fl_vertex` (double x, double y)
Add a single vertex to the current path.
- double `fl_width` (const char *txt)
Return the typographical width of a nul-terminated string using the current font face and size.
- double `fl_width` (const char *txt, int n)
Return the typographical width of a sequence of n characters using the current font face and size.
- double `fl_width` (unsigned int c)
Return the typographical width of a single character using the current font face and size.
- void `fl_xylene` (int x, int y, int x1)
Draw a horizontal line from (x,y) to (x1,y).
- void `fl_xylene` (int x, int y, int x1, int y2)
Draw a horizontal line from (x,y) to (x1,y), then vertical from (x1,y) to (x1,y2).
- void `fl_xylene` (int x, int y, int x1, int y2, int x3)
Draw a horizontal line from (x,y) to (x1,y), then a vertical from (x1,y) to (x1,y2) and then another horizontal from (x1,y2) to (x3,y2).
- void `fl_yxline` (int x, int y, int y1)
Draw a vertical line from (x,y) to (x,y1)
- void `fl_yxline` (int x, int y, int y1, int x2)
Draw a vertical line from (x,y) to (x,y1), then a horizontal from (x,y1) to (x2,y1).
- void `fl_yxline` (int x, int y, int y1, int x2, int y3)
Draw a vertical line from (x,y) to (x,y1), then a horizontal from (x,y1) to (x2,y1), then another vertical from (x2,y1) to (x2,y3).

Variables

- char `fl_draw_shortcut`

13.42.1 Detailed Description

utility header to pull drawing functions together

13.43 fl_draw.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Portable drawing function header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00022 #ifndef fl_draw_H
00023 #define fl_draw_H
00024
00025 #include <FL/Enumerations.H>           // color names
00026 #include <FL/Fl_Graphics_Driver.H>    // fl_graphics_driver + Fl_Region
00027 #include <FL/Fl_Rect.H>
00028
00029 // Image class...
00030 class Fl_Image;
00031 class Fl_Window;
00032
00033 // Label flags...
```



```

00034 FL_EXPORT extern char fl_draw_shortcut;
00035
00040 // Colors:
00050 inline void fl_color(Fl_Color c) {
00051     fl_graphics_driver->color(c);
00052 } // select indexed color
00054 inline void fl_color(int c) {
00055     fl_color((Fl_Color)c);
00056 }
00067 inline void fl_color(uchar r, uchar g, uchar b) {
00068     fl_graphics_driver->color(r, g, b);
00069 }
00074 inline Fl_Color fl_color() {
00075     return fl_graphics_driver->color();
00076 }
00082 // clip:
00088 inline void fl_push_clip(int x, int y, int w, int h) {
00089     fl_graphics_driver->push_clip(x, y, w, h);
00090 }
00099 inline void fl_clip(int x, int y, int w, int h) {
00100     fl_graphics_driver->push_clip(x, y, w, h);
00101 }
00105 inline void fl_push_no_clip() {
00106     fl_graphics_driver->push_no_clip();
00107 }
00115 inline void fl_pop_clip() {
00116     fl_graphics_driver->pop_clip();
00117 }
00118
00132 inline int fl_not_clipped(int x, int y, int w, int h) {
00133     return fl_graphics_driver->not_clipped(x, y, w, h);
00134 }
00135
00178 inline int fl_clip_box(int x, int y, int w, int h, int &X, int &Y, int &W, int &H) {
00179     return fl_graphics_driver->clip_box(x, y, w, h, X, Y, W, H);
00180 }
00181
00183 inline void fl_restore_clip() {
00184     fl_graphics_driver->restore_clip();
00185 }
00186
00196 inline void fl_clip_region(Fl_Region r) {
00197     fl_graphics_driver->clip_region(r);
00198 }
00199
00206 inline Fl_Region fl_clip_region() {
00207     return fl_graphics_driver->clip_region();
00208 }
00209
00210
00211 // points:
00215 inline void fl_point(int x, int y) {
00216     fl_graphics_driver->point(x, y);
00217 }
00218
00219 // line type:
00249 inline void fl_line_style(int style, int width = 0, char *dashes = 0) {
00250     fl_graphics_driver->line_style(style, width, dashes);
00251 }
00252 enum {
00253     FL_SOLID      = 0,
00254     FL_DASH      = 1,
00255     FL_DOT       = 2,
00256     FL_DASHDOT   = 3,
00257     FL_DASHDOTDOT = 4,
00258
00259     FL_CAP_FLAT   = 0x100,
00260     FL_CAP_ROUND  = 0x200,
00261     FL_CAP_SQUARE = 0x300,
00262
00263     FL_JOIN_MITER = 0x1000,
00264     FL_JOIN_ROUND = 0x2000,
00265     FL_JOIN_BEVEL = 0x3000
00266 };
00267
00273 inline void fl_antialias(int state) {
00274     fl_graphics_driver->antialias(state);
00275 }
00276
00278 inline int fl_antialias() {
00279     return fl_graphics_driver->antialias();
00280 }
00281
00282 // rectangles tweaked to exactly fill the pixel rectangle:
00283
00289 inline void fl_rect(int x, int y, int w, int h) {
00290     fl_graphics_driver->rect(x, y, w, h);

```

```

00291 }
00292
00298 inline void fl_rounded_rect(int x, int y, int w, int h, int r) {
00299     fl_graphics_driver->rounded_rect(x, y, w, h, r);
00300 }
00301
00307 inline void fl_rect(Fl_Rect r) {
00308     fl_rect(r.x(), r.y(), r.w(), r.h());
00309 }
00310
00317 inline void fl_focus_rect(int x, int y, int w, int h) {
00318     fl_graphics_driver->focus_rect(x, y, w, h);
00319 }
00320
00324 inline void fl_rect(int x, int y, int w, int h, Fl_Color c) {
00325     fl_color(c);
00326     fl_rect(x, y, w, h);
00327 }
00328
00330 inline void fl_rectf(int x, int y, int w, int h) {
00331     fl_graphics_driver->rectf(x, y, w, h);
00332 }
00333
00338 inline void fl_rounded_rectf(int x, int y, int w, int h, int r) {
00339     fl_graphics_driver->rounded_rectf(x, y, w, h, r);
00340 }
00341
00345 inline void fl_rectf(int x, int y, int w, int h, Fl_Color c) {
00346     fl_color(c);
00347     fl_rectf(x, y, w, h);
00348 }
00349
00351 inline void fl_rectf(Fl_Rect r) {
00352     fl_graphics_driver->rectf(r.x(), r.y(), r.w(), r.h());
00353 }
00354
00358 inline void fl_rectf(Fl_Rect r, Fl_Color c) {
00359     fl_color(c);
00360     fl_rectf(r);
00361 }
00362
00370 inline void fl_rectf(int x, int y, int w, int h, uchar r, uchar g, uchar b) {
00371     fl_graphics_driver->colored_rectf(x, y, w, h, r, g, b);
00372 }
00373
00380 inline void fl_rectf(Fl_Rect bb, uchar r, uchar g, uchar b) {
00381     fl_graphics_driver->colored_rectf(bb.x(), bb.y(), bb.w(), bb.h(), r, g, b);
00382 }
00383
00384 // line segments:
00388 inline void fl_line(int x, int y, int x1, int y1) {
00389     fl_graphics_driver->line(x, y, x1, y1);
00390 }
00394 inline void fl_line(int x, int y, int x1, int y1, int x2, int y2) {
00395     fl_graphics_driver->line(x, y, x1, y1, x2, y2);
00396 }
00397
00398 // closed line segments:
00402 inline void fl_loop(int x, int y, int x1, int y1, int x2, int y2) {
00403     fl_graphics_driver->loop(x, y, x1, y1, x2, y2);
00404 }
00408 inline void fl_loop(int x, int y, int x1, int y1, int x2, int y2, int x3, int y3) {
00409     fl_graphics_driver->loop(x, y, x1, y1, x2, y2, x3, y3);
00410 }
00411
00412 // filled polygons
00416 inline void fl_polygon(int x, int y, int x1, int y1, int x2, int y2) {
00417     fl_graphics_driver->polygon(x, y, x1, y1, x2, y2);
00418 }
00422 inline void fl_polygon(int x, int y, int x1, int y1, int x2, int y2, int x3, int y3) {
00423     fl_graphics_driver->polygon(x, y, x1, y1, x2, y2, x3, y3);
00424 }
00425
00426 // draw rectilinear lines, horizontal segment first:
00430 inline void fl_xyline(int x, int y, int x1) {
00431     fl_graphics_driver->xyline(x, y, x1);
00432 }
00436 inline void fl_xyline(int x, int y, int x1, int y2) {
00437     fl_graphics_driver->xyline(x, y, x1, y2);
00438 }
00443 inline void fl_xyline(int x, int y, int x1, int y2, int x3) {
00444     fl_graphics_driver->xyline(x, y, x1, y2, x3);
00445 }
00446
00447 // draw rectilinear lines, vertical segment first:
00451 inline void fl_yxline(int x, int y, int y1) {
00452     fl_graphics_driver->yxline(x, y, y1);

```

```
00453 }
00457 inline void fl_yxline(int x, int y, int y1, int x2) {
00458     fl_graphics_driver->yxline(x, y, y1, x2);
00459 }
00464 inline void fl_yxline(int x, int y, int y1, int x2, int y3) {
00465     fl_graphics_driver->yxline(x, y, y1, x2, y3);
00466 }
00467
00468 // circular lines and pie slices (code in fl_arci.C):
00494 inline void fl_arc(int x, int y, int w, int h, double a1, double a2) {
00495     fl_graphics_driver->arc(x, y, w, h, a1, a2);
00496 }
00512 inline void fl_pie(int x, int y, int w, int h, double a1, double a2) {
00513     fl_graphics_driver->pie(x, y, w, h, a1, a2);
00514 }
00516 FL_EXPORT void fl_chord(int x, int y, int w, int h, double a1, double a2); // nyi
00517
00518 // scalable drawing code (code in fl_vertex.cxx and fl_arc.cxx):
00523 inline void fl_push_matrix() {
00524     fl_graphics_driver->push_matrix();
00525 }
00529 inline void fl_pop_matrix() {
00530     fl_graphics_driver->pop_matrix();
00531 }
00536 inline void fl_scale(double x, double y) {
00537     fl_graphics_driver->mult_matrix(x, 0, 0, y, 0, 0);
00538 }
00543 inline void fl_scale(double x) {
00544     fl_graphics_driver->mult_matrix(x, 0, 0, x, 0, 0);
00545 }
00550 inline void fl_translate(double x, double y) {
00551     fl_graphics_driver->translate(x, y);
00552 }
00557 inline void fl_rotate(double d) {
00558     fl_graphics_driver->rotate(d);
00559 }
00563 inline void fl_load_identity() {
00564     fl_graphics_driver->load_identity();
00565 }
00570 inline void fl_load_matrix(double a, double b, double c, double d, double x, double y) {
00571     fl_graphics_driver->load_matrix(a, b, c, d, x, y);
00572 }
00579 inline void fl_mult_matrix(double a, double b, double c, double d, double x, double y) {
00580     fl_graphics_driver->mult_matrix(a, b, c, d, x, y);
00581 }
00585 inline void fl_begin_points() {
00586     fl_graphics_driver->begin_points();
00587 }
00591 inline void fl_begin_line() {
00592     fl_graphics_driver->begin_line();
00593 }
00597 inline void fl_begin_loop() {
00598     fl_graphics_driver->begin_loop();
00599 }
00603 inline void fl_begin_polygon() {
00604     fl_graphics_driver->begin_polygon();
00605 }
00610 inline void fl_vertex(double x, double y) {
00611     fl_graphics_driver->vertex(x, y);
00612 }
00621 inline void fl_curve(double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3,
00622     double Y3) {
00623     fl_graphics_driver->curve(X0, Y0, X1, Y1, X2, Y2, X3, Y3);
00624 }
00653 inline void fl_arc(double x, double y, double r, double start, double end) {
00654     fl_graphics_driver->arc(x, y, r, start, end);
00655 }
00668 inline void fl_circle(double x, double y, double r) {
00669     fl_graphics_driver->circle(x, y, r);
00670 }
00674 inline void fl_end_points() {
00675     fl_graphics_driver->end_points();
00676 }
00680 inline void fl_end_line() {
00681     fl_graphics_driver->end_line();
00682 }
00686 inline void fl_end_loop() {
00687     fl_graphics_driver->end_loop();
00688 }
00692 inline void fl_end_polygon() {
00693     fl_graphics_driver->end_polygon();
00694 }
00708 inline void fl_begin_complex_polygon() {
00709     fl_graphics_driver->begin_complex_polygon();
00710 }
00717 inline void fl_gap() {
00718     fl_graphics_driver->gap();
```

```

00719 }
00723 inline void fl_end_complex_polygon() {
00724     fl_graphics_driver->end_complex_polygon();
00725 }
00726 // get and use transformed positions:
00731 inline double fl_transform_x(double x, double y) {
00732     return fl_graphics_driver->transform_x(x, y);
00733 }
00738 inline double fl_transform_y(double x, double y) {
00739     return fl_graphics_driver->transform_y(x, y);
00740 }
00745 inline double fl_transform_dx(double x, double y) {
00746     return fl_graphics_driver->transform_dx(x, y);
00747 }
00752 inline double fl_transform_dy(double x, double y) {
00753     return fl_graphics_driver->transform_dy(x, y);
00754 }
00759 inline void fl_transformed_vertex(double xf, double yf) {
00760     fl_graphics_driver->transformed_vertex(xf, yf);
00761 }
00762
00769 inline void fl_copy_offscreen(int x, int y, int w, int h, Fl_Offscreen pixmap, int srcx, int srcy) {
00770     fl_graphics_driver->copy_offscreen(x, y, w, h, pixmap, srcx, srcy);
00771 }
00772
00773 FL_EXPORT Fl_Offscreen fl_create_offscreen(int w, int h);
00774 FL_EXPORT void fl_begin_offscreen(Fl_Offscreen b);
00775 FL_EXPORT void fl_end_offscreen(void);
00776 FL_EXPORT void fl_delete_offscreen(Fl_Offscreen bitmap);
00777 FL_EXPORT void fl_rescale_offscreen(Fl_Offscreen &ctx);
00778
00783 /* NOTE: doxygen comments here to avoid triplication in os-specific sources */
00784
00785 // Fonts:
00786 /*
00787     Set the current font, which is then used in various drawing routines.
00788     Implemented and documented in src/fl_draw.cxx
00789 */
00790 FL_EXPORT void fl_font(Fl_Font face, Fl_Fontsize fsize);
00791
00796 inline Fl_Font fl_font() {
00797     return fl_graphics_driver->font();
00798 }
00803 inline Fl_Fontsize fl_size() {
00804     return fl_graphics_driver->size();
00805 }
00806
00807 // Information you can get about the current font:
00812 inline int fl_height() {
00813     return fl_graphics_driver->height();
00814 }
00815 FL_EXPORT int fl_height(int font, int size);
00820 inline int fl_descent() {
00821     return fl_graphics_driver->descent();
00822 }
00826 FL_EXPORT double fl_width(const char *txt);
00827
00831 inline double fl_width(const char *txt, int n) {
00832     return fl_graphics_driver->width(txt, n);
00833 }
00840 inline double fl_width(unsigned int c) {
00841     return fl_graphics_driver->width(c);
00842 }
00868 FL_EXPORT void fl_text_extents(const char *, int &dx, int &dy, int &w, int &h);
00869
00876 inline void fl_text_extents(const char *t, int n, int &dx, int &dy, int &w, int &h) {
00877     fl_graphics_driver->text_extents(t, n, dx, dy, w, h);
00878 }
00879
00880 // font encoding:
00881 // Note: doxygen comments here to avoid duplication for os-specific cases
00888 FL_EXPORT const char *fl_latin1_to_local(const char *t, int n = -1);
00895 FL_EXPORT const char *fl_local_to_latin1(const char *t, int n = -1);
00902 FL_EXPORT const char *fl_mac_roman_to_local(const char *t, int n = -1);
00909 FL_EXPORT const char *fl_local_to_mac_roman(const char *t, int n = -1);
00915 FL_EXPORT float fl_override_scale();
00916
00917 FL_EXPORT void fl_restore_scale(float s);
00918
00929 FL_EXPORT void fl_draw(const char *str, int x, int y);
00937 FL_EXPORT void fl_draw(int angle, const char *str, int x, int y);
00941 inline void fl_draw(const char *str, int n, int x, int y) {
00942     fl_graphics_driver->draw(str, n, x, y);
00943 }
00953 inline void fl_draw(int angle, const char *str, int n, int x, int y) {
00954     fl_graphics_driver->draw(angle, str, n, x, y);
00955 }

```

```

00959 inline void fl_rtl_draw(const char *str, int n, int x, int y) {
00960     fl_graphics_driver->rtl_draw(str, n, x, y);
00961 }
00962 FL_EXPORT void fl_measure(const char *str, int &x, int &y, int draw_symbols = 1);
00963 FL_EXPORT void fl_draw(const char *str, int x, int y, int w, int h, Fl_Align align, Fl_Image *img = 0,
00964                       int draw_symbols = 1);
00965 FL_EXPORT void fl_draw(const char *str, int x, int y, int w, int h, Fl_Align align,
00966                       void (*callthis)(const char *, int, int, int), Fl_Image *img = 0, int
00967                       draw_symbols = 1);
00968 // boxtypes:
00969
00970 FL_EXPORT void fl_frame(const char *s, int x, int y, int w, int h);
00971 FL_EXPORT void fl_frame2(const char *s, int x, int y, int w, int h);
00972 FL_EXPORT void fl_draw_box(Fl_Boxtype, int x, int y, int w, int h, Fl_Color);
00973
00974 // basic GUI objects (check marks, arrows, more to come ...):
00975
00976 // Draw a check mark in the given color inside the bounding box bb.
00977 void fl_draw_check(Fl_Rect bb, Fl_Color col);
00978
00979 // Draw one or more "arrows" (triangles)
00980 FL_EXPORT void fl_draw_arrow(Fl_Rect bb, Fl_Arrow_Type t, Fl_Orientation o, Fl_Color color);
00981
00982 // Draw a potentially small, filled circle
00983 FL_EXPORT void fl_draw_circle(int x, int y, int d, Fl_Color color);
00984
00985 // Draw the full "radio button" of a radio menu entry or radio button
00986 // This requires scheme specific handling (particularly gtk+ scheme)
00987 FL_EXPORT void fl_draw_radio(int x, int y, int d, Fl_Color color);
00988
00989 // images:
00990
01026 inline void fl_draw_image(const uchar *buf, int X, int Y, int W, int H, int D = 3, int L = 0) {
01027     fl_graphics_driver->draw_image(buf, X, Y, W, H, D, L);
01028 }
01029
01034 inline void fl_draw_image_mono(const uchar *buf, int X, int Y, int W, int H, int D = 1, int L = 0) {
01035     fl_graphics_driver->draw_image_mono(buf, X, Y, W, H, D, L);
01036 }
01037
01073 inline void fl_draw_image(Fl_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D = 3) {
01074     fl_graphics_driver->draw_image(cb, data, X, Y, W, H, D);
01075 }
01076
01081 inline void fl_draw_image_mono(Fl_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D = 1)
01082 {
01083     fl_graphics_driver->draw_image_mono(cb, data, X, Y, W, H, D);
01084 }
01084
01090 inline char fl_can_do_alpha_blending() {
01091     return Fl_Graphics_Driver::default_driver().can_do_alpha_blending();
01092 }
01093
01094 FL_EXPORT uchar *fl_read_image(uchar *p, int X, int Y, int W, int H, int alpha = 0);
01095 FL_EXPORT Fl_RGB_Image *fl_capture_window(Fl_Window *win, int x, int y, int w, int h);
01096
01097 // pixmaps:
01109 FL_EXPORT int fl_draw_pixmap(const char *const *data, int x, int y, Fl_Color bg = FL_GRAY);
01114 inline int fl_draw_pixmap(/*const*/ char *const *data, int x, int y, Fl_Color bg = FL_GRAY) {
01115     return fl_draw_pixmap((const char *const *)data, x, y, bg);
01116 }
01117 FL_EXPORT int fl_measure_pixmap(/*const*/ char *const *data, int &w, int &h);
01118 FL_EXPORT int fl_measure_pixmap(const char *const *cdata, int &w, int &h);
01119
01120 // other:
01121 FL_EXPORT void fl_scroll(int X, int Y, int W, int H, int dx, int dy,
01122                         void (*draw_area)(void *, int, int, int, int), void *data);
01123 FL_EXPORT const char *fl_shortcut_label(unsigned int shortcut);
01124 FL_EXPORT const char *fl_shortcut_label(unsigned int shortcut, const char **eom);
01125 FL_EXPORT unsigned int fl_old_shortcut(const char *s);
01126 FL_EXPORT void fl_overlay_rect(int x, int y, int w, int h);
01127 FL_EXPORT void fl_overlay_clear();
01128 FL_EXPORT void fl_cursor(Fl_Cursor);
01129 FL_EXPORT void fl_cursor(Fl_Cursor, Fl_Color fg, Fl_Color bg = FL_WHITE);
01130 FL_EXPORT const char *fl_expand_text(const char *from, char *buf, int maxbuf, double maxw,
01131                                     int &n, double &width, int wrap, int draw_symbols = 0);
01132
01133 // XIM:
01134 FL_EXPORT void fl_set_status(int X, int Y, int W, int H);
01142 FL_EXPORT void fl_set_spot(int font, int size, int X, int Y, int W, int H, Fl_Window *win = 0);
01154 FL_EXPORT void fl_reset_spot(void);
01155
01156
01157 // XForms symbols:
01158 FL_EXPORT int fl_draw_symbol(const char *label, int x, int y, int w, int h, Fl_Color);
01159 FL_EXPORT int fl_add_symbol(const char *name, void (*drawit)(Fl_Color), int scalable);

```

```
01162 #endif
```

13.44 Fl_Export.H

```
00001 /*
00002  * Windows DLL export .
00003  *
00004  * Copyright 1998-2018 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  *   https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *
00014  *   https://www.fltk.org/bugs.php
00015  */
00016
00017 #ifndef Fl_Export_H
00018 # define Fl_Export_H
00019
00020 /*
00021  * The following is used when building DLLs under Windows
00022  * and when building .so's under unix/linux.
00023  */
00024
00025 # if defined(FL_DLL)
00026 #   ifdef FL_LIBRARY
00027 #     define FL_EXPORT __declspec(dllexport)
00028 #   else
00029 #     define FL_EXPORT __declspec(dllimport)
00030 #   endif /* FL_LIBRARY */
00031 # elif __GNUC__ >= 4
00032 #   define FL_EXPORT __attribute__((visibility ("default")))
00033 # else
00034 #   define FL_EXPORT
00035 # endif /* FL_DLL */
00036
00037 #endif /* !Fl_Export_H */
```

13.45 Fl_File_Browser.H

```
00001 //
00002 // FileBrowser definitions.
00003 //
00004 // Copyright 1999-2010 by Michael Sweet.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //   https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //   https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018  Fl_File_Browser widget . */
00019
00020 //
00021 // Include necessary header files...
00022 //
00023
00024 #ifndef _Fl_File_Browser_H_
00025 # define _Fl_File_Browser_H_
00026
00027 # include "Fl_Browser.H"
00028 # include "Fl_File_Icon.H"
00029 # include "filename.H"
00030
00031
00032 //
00033 // Fl_File_Browser class...
00034 //
00035
00037 class FL_EXPORT Fl_File_Browser : public Fl_Browser {
00038
00039     int             filetype_;
```

```

00040  const char    *directory_;
00041  uchar         iconsize_;
00042  const char    *pattern_;
00043  const char    *errmsg_;
00044
00045  int  full_height() const FL_OVERRIDE;
00046  int  item_height(void *) const FL_OVERRIDE;
00047  int  item_width(void *) const FL_OVERRIDE;
00048  void item_draw(void *, int, int, int, int) const FL_OVERRIDE;
00049  int  incr_height() const FL_OVERRIDE { return (item_height(0) + linespacing()); }
00050
00051 public:
00052  enum { FILES, DIRECTORIES };
00053
00054  Fl_File_Browser(int, int, int, int, const char * = 0);
00055  ~Fl_File_Browser();
00056
00058  uchar         iconsize() const { return (iconsize_); }
00060  void         iconsize(uchar s) { iconsize_ = s; redraw(); }
00061
00067  void filter(const char *pattern);
00073  const char  *filter() const { return (pattern_); }
00074  int  load(const char *directory, Fl_File_Sort_F *sort = fl_numericsort);
00075  Fl_Fontsize  textsize() const { return Fl_Browser::textsize(); }
00076  void         textsize(Fl_Fontsize s) { Fl_Browser::textsize(s); iconsize_ = (uchar)(3 * s / 2); }
00077
00084  int  filetype() const { return (filetype_); }
00091  void filetype(int t) { filetype_ = t; }
00092  void errmsg(const char *errmsg);
00096  const char* errmsg() const { return errmsg_; }
00097 };
00098
00099 #endif // !_Fl_File_Browser_H_

```

13.46 Fl_File_Chooser.H

```

00001 //
00002 // Fl_File_Chooser dialog for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2024 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 // =====
00017 // DO NOT EDIT FL/Fl_File_Chooser.H and src/Fl_File_Chooser.cxx !!!
00018 // =====
00019 // Please use fluid to change src/Fl_File_Chooser.fl interactively
00020 // and then use fluid to "write code" or edit and use fluid -c .
00021 // =====
00022 //
00023
00024 // generated by Fast Light User Interface Designer (fluid) version 1.0400
00025
00026 #ifndef Fl_File_Chooser_H
00027 #define Fl_File_Chooser_H
00028 #include <FL/Fl.H>
00029 #include <FL/Fl_Double_Window.H>
00030 #include <FL/Fl_Group.H>
00031 #include <FL/Fl_Choice.H>
00032 #include <FL/Fl_Menu_Button.H>
00033 #include <FL/Fl_Button.H>
00034 #include <FL/Fl_Preferences.H>
00035 #include <FL/Fl_Tile.H>
00036 #include <FL/Fl_File_Browser.H>
00037 #include <FL/Fl_Box.H>
00038 #include <FL/Fl_Check_Button.H>
00039 #include <FL/Fl_File_Input.H>
00040 #include <FL/Fl_Return_Button.H>
00041 #include <FL/fl_ask.H>
00042
00043 class FL_EXPORT Fl_File_Chooser {
00044 public:
00049  enum Type {
00050      SINGLE = 0,
00051      MULTI  = 1,
00052      CREATE = 2,
00055      DIRECTORY = 4

```

```

00056     };
00057 private:
00058     static Fl_Preferences *prefs_;
00059     void (*callback_)(Fl_File_Chooser*, void *);
00060     void *data_;
00061     char directory_[FL_PATH_MAX];
00062     char pattern_[FL_PATH_MAX];
00063     char preview_text_[2048];
00064     int type_;
00065     void favoritesButtonCB();
00066     void favoritesCB(Fl_Widget *w);
00067     void fileListCB();
00068     void fileNameCB();
00069     void newdir();
00070     static void previewCB(Fl_File_Chooser *fc);
00071     void showChoiceCB();
00072     void update_favorites();
00073     void update_preview();
00074 public:
00075     Fl_File_Chooser(const char *pathname, const char *pattern, int type_val, const char *title);
00076 private:
00077     Fl_Double_Window *window;
00078     inline void cb_window_i(Fl_Double_Window*, void*);
00079     static void cb_window(Fl_Double_Window*, void*);
00080     Fl_Choice *showChoice;
00081     inline void cb_showChoice_i(Fl_Choice*, void*);
00082     static void cb_showChoice(Fl_Choice*, void*);
00083     Fl_Menu_Button *favoritesButton;
00084     inline void cb_favoritesButton_i(Fl_Menu_Button*, void*);
00085     static void cb_favoritesButton(Fl_Menu_Button*, void*);
00086 public:
00087     Fl_Button *newButton;
00088 private:
00089     inline void cb_newButton_i(Fl_Button*, void*);
00090     static void cb_newButton(Fl_Button*, void*);
00091     inline void cb__i(Fl_Tile*, void*);
00092     static void cb_(Fl_Tile*, void*);
00093     Fl_File_Browser *fileList;
00094     inline void cb_fileList_i(Fl_File_Browser*, void*);
00095     static void cb_fileList(Fl_File_Browser*, void*);
00096     Fl_Box *errorBox;
00097     Fl_Box *previewBox;
00098 public:
00099     Fl_Check_Button *previewButton;
00100 private:
00101     inline void cb_previewButton_i(Fl_Check_Button*, void*);
00102     static void cb_previewButton(Fl_Check_Button*, void*);
00103 public:
00104     Fl_Check_Button *showHiddenButton;
00105 private:
00106     inline void cb_showHiddenButton_i(Fl_Check_Button*, void*);
00107     static void cb_showHiddenButton(Fl_Check_Button*, void*);
00108     Fl_File_Input *fileName;
00109     inline void cb_fileName_i(Fl_File_Input*, void*);
00110     static void cb_fileName(Fl_File_Input*, void*);
00111     Fl_Return_Button *okButton;
00112     inline void cb_okButton_i(Fl_Return_Button*, void*);
00113     static void cb_okButton(Fl_Return_Button*, void*);
00114     Fl_Button *cancelButton;
00115     inline void cb_cancelButton_i(Fl_Button*, void*);
00116     static void cb_cancelButton(Fl_Button*, void*);
00117     Fl_Double_Window *favWindow;
00118     Fl_File_Browser *favList;
00119     inline void cb_favList_i(Fl_File_Browser*, void*);
00120     static void cb_favList(Fl_File_Browser*, void*);
00121     Fl_Button *favUpButton;
00122     inline void cb_favUpButton_i(Fl_Button*, void*);
00123     static void cb_favUpButton(Fl_Button*, void*);
00124     Fl_Button *favDeleteButton;
00125     inline void cb_favDeleteButton_i(Fl_Button*, void*);
00126     static void cb_favDeleteButton(Fl_Button*, void*);
00127     Fl_Button *favDownButton;
00128     inline void cb_favDownButton_i(Fl_Button*, void*);
00129     static void cb_favDownButton(Fl_Button*, void*);
00130     Fl_Button *favCancelButton;
00131     inline void cb_favCancelButton_i(Fl_Button*, void*);
00132     static void cb_favCancelButton(Fl_Button*, void*);
00133     Fl_Return_Button *favOkButton;
00134     inline void cb_favOkButton_i(Fl_Return_Button*, void*);
00135     static void cb_favOkButton(Fl_Return_Button*, void*);
00136 public:
00137     ~Fl_File_Chooser();
00138     void callback(void (*cb)(Fl_File_Chooser *, void *), void *d = 0);
00139     void color(Fl_Color c);
00140     Fl_Color color();
00141     int count();
00142     void directory(const char *d);

```



```

00143 char * directory();
00144 void filter(const char *p);
00145 const char * filter();
00146 int filter_value();
00147 void filter_value(int f);
00148 void iconsizе(uchar s);
00149 uchar iconsizе();
00150 void label(const char *l);
00151 const char * label();
00152 void ok_label(const char *l);
00153 const char * ok_label();
00154 void preview(int e);
00155 int preview() const { return previewButton->value(); }
00156 private:
00157 void showHidden(int e);
00158 void remove_hidden_files();
00159 public:
00160 void rescan();
00161 void rescan_keep_filename();
00162 void show();
00163 void hide();
00164 int shown();
00165 void textcolor(Fl_Color c);
00166 Fl_Color textcolor();
00167 void textfont(Fl_Font f);
00168 Fl_Font textfont();
00169 void textsize(Fl_Fontsize s);
00170 Fl_Fontsize textsize();
00171 void type(int t);
00172 int type();
00173 void * user_data() const;
00174 void user_data(void *d);
00175 const char *value(int f = 1);
00176 void value(const char *filename);
00177 int visible();
00178 void position(int x, int y);
00179 int x() const;
00180 int y() const;
00181 int w() const;
00182 int h() const;
00183 void size(int w, int h);
00184 void resize(int X, int Y, int w, int h);
00188 static const char *add_favorites_label;
00192 static const char *all_files_label;
00196 static const char *custom_filter_label;
00200 static const char *existing_file_label;
00204 static const char *favorites_label;
00208 static const char *filename_label;
00212 static const char *filesystems_label;
00216 static const char *manage_favorites_label;
00220 static const char *new_directory_label;
00224 static const char *new_directory_tooltip;
00228 static const char *preview_label;
00232 static const char *save_label;
00236 static const char *show_label;
00240 static const char *hidden_label;
00245 static Fl_File_Sort_F *sort;
00246 private:
00247 Fl_Widget* ext_group;
00248 public:
00249 Fl_Widget* add_extra(Fl_Widget* gr);
00250 protected:
00251 void show_error_box(int val);
00252 };
00253 FL_EXPORT char *fl_dir_chooser(const char *message, const char *fname, int relative=0);
00254 FL_EXPORT char *fl_file_chooser(const char *message, const char *pat, const char *fname, int relative=0);
00255 FL_EXPORT void fl_file_chooser_callback(void (*cb) (const char*));
00256 FL_EXPORT void fl_file_chooser_ok_label(const char*l);
00257 #endif

```

13.47 Fl_File_Icon.H

```

00001 //
00002 // Fl_File_Icon definitions.
00003 //
00004 // Copyright 1999-2010 by Michael Sweet.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //

```

```

00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_File_Icon widget . */
00019
00020 //
00021 // Include necessary header files...
00022 //
00023
00024 #ifndef _Fl_Fl_File_Icon_H_
00025 # define _Fl_Fl_File_Icon_H_
00026
00027 # include "Fl.H"
00028
00029
00030 //
00031 // Special color value for the icon color.
00032 //
00033
00034 # define FL_ICON_COLOR (Fl_Color)0xffffffff
00037 //
00038 // Fl_File_Icon class...
00039 //
00040
00045 class FL_EXPORT Fl_File_Icon {
00046
00047     static Fl_File_Icon *first_; // Pointer to first icon/filetype
00048     Fl_File_Icon *next_; // Pointer to next icon/filetype
00049     const char *pattern_; // Pattern string
00050     int type_; // Match only if directory or file?
00051     int num_data_; // Number of data elements
00052     int alloc_data_; // Number of allocated elements
00053     short *data_; // Icon data
00054
00055 public:
00056
00057     enum // File types
00058     {
00059         ANY, // Any kind of file
00060         PLAIN, // Only plain files
00061         FIFO, // Only named pipes
00062         DEVICE, // Only character and block devices
00063         LINK, // Only symbolic links
00064         DIRECTORY, // Only directories
00065     };
00066
00067     enum // Data opcodes
00068     {
00069         END, // End of primitive/icon
00070         COLOR, // Followed by color value (2 shorts)
00071         LINE, // Start of line
00072         CLOSEDLINE, // Start of closed line
00073         POLYGON, // Start of polygon
00074         OUTLINEPOLYGON, // Followed by outline color (2 shorts)
00075         VERTEX // Followed by scaled X,Y
00076     };
00077
00078     Fl_File_Icon(const char *p, int t, int nd = 0, short *d = 0);
00079     ~Fl_File_Icon();
00080
00081     short *add(short d);
00082
00083     short *add_color(Fl_Color c)
00084     { short *d = add((short)COLOR); add((short)(c >> 16)); add((short)c); return (d); }
00089
00090     short *add_vertex(int x, int y)
00091     { short *d = add((short)VERTEX); add((short)x); add((short)y); return (d); }
00098
00099     short *add_vertex(float x, float y)
00100     { short *d = add((short)VERTEX); add((short)(x * 10000.0));
00106     add((short)(y * 10000.0)); return (d); }
00107
00108
00110     void clear() { num_data_ = 0; }
00111
00112     void draw(int x, int y, int w, int h, Fl_Color ic, int active = 1);
00113
00114     void label(Fl_Widget *w);
00115
00116     static void labeltype(const Fl_Label *o, int x, int y, int w, int h, Fl_Align a);
00117     void load(const char *f);
00118     int load_fti(const char *fti);
00119     int load_image(const char *i);
00120
00122     Fl_File_Icon *next() { return (next_); }
00123
00125     const char *pattern() { return (pattern_); }

```

```

00126
00128     int             size() { return (num_data_); }
00129
00141     int             type() { return (type_); }
00142
00144     short          *value() { return (data_); }
00145
00146     static Fl_File_Icon *find(const char *filename, int filetype = ANY);
00147
00149     static Fl_File_Icon *first() { return (first_); }
00150     static void      load_system_icons(void);
00151 };
00152
00153 #endif // !_Fl_File_Icon_H_

```

13.48 Fl_File_Input.H

```

00001 //
00002 // File_Input header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 // Original version Copyright 1998 by Curtis Edwards.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00018 /* \file
00019     Fl_File_Input widget . */
00020
00021 #ifndef Fl_File_Input_H
00022 #   define Fl_File_Input_H
00023
00024 #   include <FL/Fl_Input.H>
00025
00045 class FL_EXPORT Fl_File_Input : public Fl_Input {
00046
00047     char            ok_entry_;
00048     uchar           down_box_;
00049     short           buttons_[200];
00050     short           pressed_;
00051
00052     void            draw_buttons();
00053     int             handle_button(int event);
00054     void            update_buttons();
00055
00056 public:
00057
00058     Fl_File_Input(int X, int Y, int W, int H, const char *L=0);
00059
00060     int handle(int event) FL_OVERRIDE;
00061
00062 protected:
00063     void draw() FL_OVERRIDE;
00064
00065 public:
00067     Fl_Boxtype     down_box() const { return (Fl_Boxtype)down_box_; }
00069     void           down_box(Fl_Boxtype b) { down_box_ = b; }
00070
00080     Fl_Color       errorcolor() const { return FL_RED; }
00081
00090     void           errorcolor(Fl_Color c) {(void)c;}
00091
00092     int           value(const char *str);
00093     int           value(const char *str, int len);
00094
00099     const char    *value() { return Fl_Input_::value(); }
00100 };
00101
00102 #endif // !Fl_File_Input_H

```

13.49 Fl_Fill_Dial.H

```

00001 //
00002 // Filled dial header file for the Fast Light Tool Kit (FLTK).

```

```

00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Fill_Dial widget . */
00019 //
00020 #ifndef Fl_Fill_Dial_H
00021 #define Fl_Fill_Dial_H
00022 //
00023 #include "Fl_Dial.H"
00024 //
00026 class FL_EXPORT Fl_Fill_Dial : public Fl_Dial {
00027 public:
00029     Fl_Fill_Dial(int X,int Y,int W,int H, const char *L);
00030 };
00031 //
00032 #endif

```

13.50 Fl_Fill_Slider.H

```

00001 //
00002 // Filled slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Fill_Slider widget . */
00019 //
00020 #ifndef Fl_Fill_Slider_H
00021 #define Fl_Fill_Slider_H
00022 //
00023 #include "Fl_Slider.H"
00025 class FL_EXPORT Fl_Fill_Slider : public Fl_Slider {
00026 public:
00028     Fl_Fill_Slider(int X,int Y,int W,int H,const char *L=0);
00029 };
00030 //
00031 #endif

```

13.51 Fl_Flex.H

```

00001 //
00002 // Fl_Flex widget header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2020 by Karsten Pedersen
00005 // Copyright 2022-2023 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017 //
00018 #ifndef Fl_Flex_H
00019 #define Fl_Flex_H

```

```

00020
00021 #include <FL/Fl_Group.H>
00022
00114 class FL_EXPORT Fl_Flex : public Fl_Group {
00115
00116     int margin_left_;           // left margin
00117     int margin_top_;           // top margin
00118     int margin_right_;        // right margin
00119     int margin_bottom_;       // bottom margin
00120     int gap_;                  // gap between widgets
00121     int fixed_size_size_;     // number of fixed size widgets in array
00122     int fixed_size_alloc_;    // allocated size of fixed size array
00123     Fl_Widget **fixed_size_;  // array of fixed size widgets
00124     bool need_layout_;        // true if layout needs to be calculated
00125
00126 public:
00127
00128     enum { // values for type(int)
00129         VERTICAL = 0,
00130         HORIZONTAL = 1,
00131         COLUMN = 0,
00132         ROW = 1
00133     };
00134
00135     // FLTK standard constructor
00136     Fl_Flex(int X, int Y, int W, int H, const char *L = 0);
00137
00138     // original Fl_Flex constructors:
00139     // backwards compatible if direction enums { ROW | COLUMN } are used
00140
00141     Fl_Flex(int direction);
00142     Fl_Flex(int w, int h, int direction);
00143     Fl_Flex(int x, int y, int w, int h, int direction);
00144
00145     virtual ~Fl_Flex();
00146
00147     virtual void end();
00148     void resize(int x, int y, int w, int h) FL_OVERRIDE;
00149
00150     void fixed(Fl_Widget &w, int size) {
00151         fixed(&w, size);
00152     }
00153
00154     void fixed(Fl_Widget *w, int size);
00155     int fixed(Fl_Widget *w) const;
00156
00157 protected:
00158
00159     void init(int t = VERTICAL);
00160
00161     virtual int alloc_size(int size) const;
00162
00163     void on_remove(int) FL_OVERRIDE;
00164     void draw() FL_OVERRIDE;
00165
00166 public:
00167
00168     void need_layout(int set) {
00169         if (set) need_layout_ = true;
00170         else need_layout_ = false;
00171     }
00172
00173     bool need_layout() const {
00174         return need_layout_;
00175     }
00176
00177     int margin() const { return margin_left_; }
00178
00179     int margin(int *left, int *top, int *right, int *bottom) const {
00180         if (left) *left = margin_left_;
00181         if (top) *top = margin_top_;
00182         if (right) *right = margin_right_;
00183         if (bottom) *bottom = margin_bottom_;
00184         if (margin_left_ == margin_top_ && margin_top_ == margin_right_ && margin_right_ ==
margin_bottom_)
00185             return 1;
00186         return 0;
00187     }
00188
00189     void margin(int m, int g = -1) {
00190         if (m < 0)
00191             m = 0;
00192         margin_left_ = margin_top_ = margin_right_ = margin_bottom_ = m;
00193         if (g >= 0)
00194             gap_ = g;
00195         need_layout(1);
00196     }

```

```

00267
00282 void margin(int left, int top, int right, int bottom) {
00283     margin_left_ = left < 0 ? 0 : left;
00284     margin_top_ = top < 0 ? 0 : top;
00285     margin_right_ = right < 0 ? 0 : right;
00286     margin_bottom_ = bottom < 0 ? 0 : bottom;
00287     need_layout(1);
00288 }
00289
00293 int gap() const {
00294     return gap_;
00295 }
00296
00305 void gap(int g) {
00306     gap_ = g < 0 ? 0 : g;
00307     need_layout(1);
00308 }
00309
00318 int horizontal() const {
00319     return type() == Fl_Flex::HORIZONTAL ? 1 : 0;
00320 }
00321
00322 // Calculate the layout of the widget and redraw it.
00323 void layout();
00324
00334 int spacing() const {
00335     return gap_;
00336 }
00337
00347 void spacing(int i) {
00348     gap(i);
00349     need_layout(1);
00350 }
00351
00352 };
00353
00354 #endif // Fl_Flex_H

```

13.52 Fl_Float_Input.H

```

00001 //
00002 // Floating point input header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2011 by Bill Spitzak and others.
00005 //
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00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Float_Input widget . */
00019
00020 #ifndef Fl_Float_Input_H
00021 #define Fl_Float_Input_H
00022
00023 #include "Fl_Input.H"
00024
00030 class FL_EXPORT Fl_Float_Input : public Fl_Input {
00031 public:
00038     Fl_Float_Input(int X,int Y,int W,int H,const char *l = 0);
00039 };
00040
00041 #endif

```

13.53 Fl_FormsBitmap.H

```

00001 //
00002 // Forms bitmap header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
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```

```

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00011 //
00012 // Please see the following page on how to report bugs and issues:
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00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_FormsBitmap widget . */
00019
00020 #ifndef Fl_FormsBitmap_H
00021 #define Fl_FormsBitmap_H
00022
00023 #include "Fl_Bitmap.H"
00024
00028 class FL_EXPORT Fl_FormsBitmap : public Fl_Widget {
00029     Fl_Bitmap *b;
00030 protected:
00031     void draw() FL_OVERRIDE;
00032 public:
00033     Fl_FormsBitmap(Fl_Boxtype, int, int, int, int, const char * = 0);
00034     void set(int W, int H, const uchar *bits);
00036     void bitmap(Fl_Bitmap *B) {b = B;}
00038     Fl_Bitmap *bitmap() const {return b;}
00039 };
00040
00041 #endif

```

13.54 Fl_FormsPixmap.H

```

00001 //
00002 // Forms pixmap header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
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00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_FormsPixmap widget . */
00019
00020 #ifndef Fl_FormsPixmap_H
00021 #define Fl_FormsPixmap_H
00022
00023 #include "Fl_Pixmap.H"
00024
00029 class FL_EXPORT Fl_FormsPixmap : public Fl_Widget {
00030     Fl_Pixmap *b;
00031 protected:
00032     void draw() FL_OVERRIDE;
00033 public:
00034     Fl_FormsPixmap(Fl_Boxtype t, int X, int Y, int W, int H, const char *L= 0);
00035
00036     void set(/*const*/char * const * bits);
00037
00042     void Pixmap(Fl_Pixmap *B) {b = B;}
00043
00045     Fl_Pixmap *Pixmap() const {return b;}
00046 };
00047
00048 #endif

```

13.55 Fl_Free.H

```

00001 //
00002 // Forms free header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
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```

```

00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Free widget . */
00019
00020 #ifndef Fl_Free_H
00021 #define Fl_Free_H
00022
00023 #ifndef Fl_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026
00027 #define FL_NORMAL_FREE          1
00028 #define FL_SLEEPING_FREE       2
00029 #define FL_INPUT_FREE          3
00030 #define FL_CONTINUOUS_FREE     4
00031 #define FL_ALL_FREE            5
00032 typedef int (*FL_HANDLEPTR)(Fl_Widget *, int , float, float, char);
00033
00034 class FL_EXPORT Fl_Free : public Fl_Widget {
00035     FL_HANDLEPTR hfunc;
00036     static void step(void *);
00037 protected:
00038     void draw() FL_OVERRIDE;
00039 public:
00040     int handle(int e) FL_OVERRIDE;
00041     Fl_Free(uchar t,int X,int Y,int W,int H,const char *L,FL_HANDLEPTR hdl);
00042     ~Fl_Free();
00043 };
00044
00045 // old event names for compatibility:
00046 #define FL_MOUSE          FL_DRAG
00047 #define FL_DRAW           100
00048 #define FL_STEP           101
00049 #define FL_FREEMEM        102
00050 #define FL_FREEZE         103
00051 #define FL_THAW           104
00052 #endif

```

13.56 Fl_GIF_Image.H

```

00001 //
00002 // GIF image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_GIF_Image widget . */
00019
00020 #ifndef Fl_GIF_Image_H
00021 #define Fl_GIF_Image_H
00022 # include "Fl_Pixmap.H"
00023
00024 class FL_EXPORT Fl_GIF_Image : public Fl_Pixmap {
00025 public:
00026     Fl_GIF_Image(const char* filename);
00027     // deprecated constructor w/o length (for backwards compatibility)
00028     Fl_GIF_Image(const char* imagename, const unsigned char *data);
00029     // constructor with length (since 1.4.0)
00030     Fl_GIF_Image(const char* imagename, const unsigned char *data, const size_t length);
00031
00032     static bool is_animated(const char *name_);
00033     static bool animate;
00034 protected:
00035     // Protected constructors needed for animated GIF support through Fl_Anim_GIF_Image.
00036     Fl_GIF_Image(const char* filename, bool anim);

```



```

00050 Fl_GIF_Image(const char* imagename, const unsigned char *data, const size_t length, bool anim);
00051 // Protected default constructor needed for Fl_Anim_GIF_Image.
00052 Fl_GIF_Image();
00053
00054 void load_gif_(class Fl_Image_Reader &rdr, bool anim=false);
00055
00056 void load(const char* filename, bool anim);
00057 void load(const char* imagename, const unsigned char *data, const size_t length, bool anim);
00058
00059 // Internal structure to "glue" animated GIF support into Fl_GIF_Image.
00060 // This data is passed during decoding to the Fl_Anim_GIF_Image class.
00061 struct GIF_FRAME {
00062     int ifrm, width, height, x, y, w, h,
00063         clr, bkgd, trans,
00064         dispose, delay;
00065     const uchar *bptr;
00066     const struct CPAL {
00067         uchar r, g, b;
00068     } *cpal;
00069     GIF_FRAME(int frame, uchar *data) : ifrm(frame), bptr(data) {}
00070     GIF_FRAME(int frame, int W, int H, int fx, int fy, int fw, int fh, uchar *data) :
00071         ifrm(frame), width(W), height(H), x(fx), y(fy), w(fw), h(fh), bptr(data) {}
00072     void disposal(int mode, int delay) { dispose = mode; this->delay = delay; }
00073     void colors(int nclr, int bg, int tp) { clr = nclr; bkgd = bg; trans = tp; }
00074 };
00075
00076 // Internal virtual methods, which are called during decoding to pass data
00077 // to the Fl_Anim_GIF_Image class.
00078 virtual void on_frame_data(GIF_FRAME &) {}
00079 virtual void on_extension_data(GIF_FRAME &) {}
00080
00081 private:
00082
00083 void lzw_decode(Fl_Image_Reader &rdr, uchar *Image, int Width, int Height, int CodeSize, int
    ColorMapSize, int Interlace);
00084 };
00085
00086 #endif

```

13.57 Fl_Gl_Window.H

```

00001 //
00002 // OpenGL header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Gl_Window widget . */
00019
00020 #ifndef Fl_Gl_Window_H
00021 #define Fl_Gl_Window_H
00022
00023 #include "Fl_Window.H"
00024
00025 class Fl_Gl_Choice; // structure to hold result of glXChooseVisual
00026 class Fl_Gl_Window_Driver;
00027 class FL_EXPORT Fl_Gl_Window : public Fl_Window {
00028     friend class Fl_Gl_Window_Driver;
00029     Fl_Gl_Window_Driver *pGlWindowDriver;
00030
00031     int mode_;
00032     const int *alist;
00033     Fl_Gl_Choice *g;
00034     GLContext context_;
00035     char valid_f_;
00036     char damage_l_; // damage() of back buffer
00037     virtual void draw_overlay();
00038     void init();
00039
00040     void *overlay;
00041
00042     static int can_do(int, const int *);
00043     int mode(int, const int *);
00044     static int gl_plugin_linkage();

```

```

00074 protected:
00075     void draw_begin();
00076     void draw() FL_OVERRIDE;
00077     void draw_end();
00078
00079 public:
00080     void show() FL_OVERRIDE;
00082     void show(int a, char **b) {Fl_Window::show(a,b);}
00083     void flush() FL_OVERRIDE;
00084     void hide() FL_OVERRIDE;
00085     void resize(int,int,int,int) FL_OVERRIDE;
00086     int handle(int) FL_OVERRIDE;
00087
00112     char valid() const {return valid_f_ & 1;}
00116     void valid(char v) {if (v) valid_f_ |= 1; else valid_f_ &= 0xfe;}
00117     void invalidate();
00118
00125     char context_valid() const {return valid_f_ & 2;}
00129     void context_valid(char v) {if (v) valid_f_ |= 2; else valid_f_ &= 0xfd;}
00130
00132     static int can_do(int m) {return can_do(m,0);}
00135     static int can_do(const int *m) {return can_do(0, m);}
00137     int can_do() {return can_do(mode_,alist);}
00141     Fl_Mode mode() const {return (Fl_Mode)mode_;}
00182     int mode(int a) {return mode(a,0);}
00194     int mode(const int *a) {return mode(0, a);}
00198     GLContext context() const {return context_;}
00199     void context(GLContext, int destroy_flag = 0);
00200     void make_current();
00201     void swap_buffers();
00202     void swap_interval(int);
00203     int swap_interval() const;
00204     void ortho();
00205
00206     int can_do_overlay();
00207     void redraw_overlay();
00208     void hide_overlay();
00209     void make_overlay_current();
00210
00211     // Note: Doxygen docs in Fl_Widget.H to avoid redundancy.
00212     Fl_Gl_Window* as_gl_window() FL_OVERRIDE { return this; }
00213     Fl_Gl_Window const* as_gl_window() const FL_OVERRIDE { return this; }
00214
00215     float pixels_per_unit();
00225     int pixel_w() { return int(pixels_per_unit() * w() + 0.5f); }
00235     int pixel_h() { return int(pixels_per_unit() * h() + 0.5f); }
00236
00237     ~Fl_Gl_Window();
00242     Fl_Gl_Window(int W, int H, const char *l=0) : Fl_Window(W,H,l) {init();}
00249     Fl_Gl_Window(int X, int Y, int W, int H, const char *l=0)
00250         : Fl_Window(X,Y,W,H,l) {init();}
00251 };
00252
00253 #endif // Fl_Gl_Window_H

```

13.58 Fl_Graphics_Driver.H

```

00001 //
00002 // Declaration of classes Fl_Graphics_Driver, Fl_Scalable_Graphics_Driver,
00003 // and Fl_Font_Descriptor for the Fast Light Tool Kit (FLTK).
00004 //
00005 // Copyright 2010-2023 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
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00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00028 #ifndef FL_GRAPHICS_DRIVER_H
00029 #define FL_GRAPHICS_DRIVER_H
00030
00031 #include <FL/Fl_Device.H>
00032 #include <FL/Fl_Image.H>
00033 #include <FL/Fl_Bitmap.H>
00034 #include <FL/Fl_Pixmap.H>
00035 #include <FL/Fl_RGB_Image.H>
00036
00037 class Fl_Graphics_Driver;
00038 class Fl_Font_Descriptor;

```

```

00039 class Fl_Image_Surface;
00040 FL_EXPORT extern Fl_Graphics_Driver *fl_graphics_driver;
00041
00050 typedef void (*Fl_Draw_Image_Cb)(void* data,int x,int y,int w,uchar* buf);
00051
00052 struct Fl_Fontdesc;
00053 typedef struct _PangoFontDescription PangoFontDescription;
00054
00055 #define FL_REGION_STACK_SIZE 10
00056 #define FL_MATRIX_STACK_SIZE 32
00057
00076 class FL_EXPORT Fl_Graphics_Driver {
00077     friend class Fl_Surface_Device;
00078     friend class Fl_Pixmap;
00079     friend class Fl_Bitmap;
00080     friend class Fl_RGB_Image;
00081     friend class Fl_SVG_Image;
00082     friend void fl_draw_image(const uchar* buf, int X,int Y,int W,int H, int D, int L);
00083     friend void fl_draw_image_mono(const uchar* buf, int X,int Y,int W,int H, int D, int L);
00084     friend void fl_draw_image_mono(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D);
00085     friend void fl_draw_image(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D);
00086     friend void fl_copy_offscreen(int x, int y, int w, int h, Fl_Offscreen pixmap, int srcx, int srcy);
00087     friend int fl_convert_pixmap(const char*const* cdata, uchar* out, Fl_Color bg);
00088     friend FL_EXPORT void gl_start();
00089     /* ===== Implementation note about image drawing =====
00090     A graphics driver can implement up to 6 virtual member functions to draw images:
00091     virtual void draw_pixmap(Fl_Pixmap *pixmap,int XP, int YP, int WP, int HP, int cx, int cy)
00092     virtual void draw_bitmap(Fl_Bitmap *bm,int XP, int YP, int WP, int HP, int cx, int cy)
00093     virtual void draw_rgb(Fl_RGB_Image *rgb,int XP, int YP, int WP, int HP, int cx, int cy)
00094 and
00095     virtual void draw_fixed(Fl_Pixmap *pixmap,int XP, int YP, int WP, int HP, int cx, int cy)
00096     virtual void draw_fixed(Fl_Bitmap *bm,int XP, int YP, int WP, int HP, int cx, int cy)
00097     virtual void draw_fixed(Fl_RGB_Image *rgb,int XP, int YP, int WP, int HP, int cx, int cy)
00098 - The 1st group of functions is used when the driver can directly map the image data,
00099 sized at data_w() x data_h(), to the image drawing area, sized at w()*scale x h()*scale
00100 where scale is the current GUI scale factor.
00101 - If the driver does not support such scale-and-draw operation for a given image type,
00102 it should implement the draw_fixed() function which is called by the library after the
00103 image has been internally resized to the drawing size and cached.
00104 - The platform-independent Fl_Graphics_Driver class implements the 1st group of functions.
00105 Each resizes the image, caches it, and calls the platform-specific implementation of
00106 draw_fixed(image-class *,...) with the cached image.
00107 - Consider an image object, say from class Fl_RGB_Image. Fl_RGB_Image::draw()
00108 calls the virtual member function draw_rgb(Fl_RGB_Image *,...). If Fl_XXX_Graphics_Driver
00109 re-implements this function, this code runs and is expected to draw the image
00110 adequately scaled to its drawing size. If Fl_XXX_Graphics_Driver does not re-implement
00111 this function, Fl_Graphics_Driver::draw_rgb(Fl_RGB_Image *,...) runs. It internally
00112 resizes the image, caches it, and calls Fl_XXX_Graphics_Driver::draw_fixed(Fl_RGB_Image *,...)
00113 that draws the image from its cached form which already has the adequate size.
00114 - Some drivers implement, for a given image class, only the function of the 1st group or
00115 only draw_fixed() as in these examples:
00116 - Fl_Quartz_Graphics_Driver implements only draw_rgb(Fl_RGB_Image *,...) because it
00117 can perform the scale-and-draw operation whatever the RGB image and the required scaling.
00118 - Fl_Xlib_Graphics_Driver implements only draw_fixed(Fl_Pixmap *,...). The library
00119 takes care of resizing and caching the Pixmap to the adequate drawing size.
00120 - Some drivers implement, for a given image class, the function of both groups, e.g. :
00121 Fl_GDI_Graphics_Driver implements both draw_rgb(Fl_RGB_Image *,...) and
00122 draw_fixed(Fl_RGB_Image *,...) because scale-and-draw may require function Alphablend()
00123 from MSIMG32.DLL. In the absence of that, the draw_rgb() implementation calls
00124 Fl_Graphics_Driver::draw_rgb() which runs Fl_GDI_Graphics_Driver::draw_fixed(Fl_RGB_Image*,...).
00125
00126 Graphics drivers also implement cache(Fl_Pixmap*), cache(Fl_Bitmap*) and cache(Fl_RGB_Image*)
00127 to compute the cached form of all image types, and uncache(Fl_RGB_Image *,...),
00128 uncache_pixmap(fl_uintptr_t) and delete_bitmask(fl_uintptr_t) to destroy cached image forms.
00129 Graphics drivers that use the mask_ variable of class Fl_Pixmap to cache an Fl_Pixmap
00130 object also reimplement the uchar **Fl_Graphics_Driver::mask_bitmap() member function.
00131 */
00132 private:
00133     virtual void draw_fixed(Fl_Pixmap *pixmap,int XP, int YP, int WP, int HP, int cx, int cy);
00134     virtual void draw_fixed(Fl_Bitmap *bm,int XP, int YP, int WP, int HP, int cx, int cy);
00135     virtual void draw_fixed(Fl_RGB_Image *rgb,int XP, int YP, int WP, int HP, int cx, int cy);
00136     // the default implementation of make_unused_color() is most probably enough
00137     virtual void make_unused_color(unsigned char &r, unsigned char &g, unsigned char &b, int
color_count, void **data);
00138     // some platforms may need to reimplement this
00139     virtual void set_current();
00140     float scale_; // scale between FLTK and drawing coordinates: drawing = FLTK * scale_
00141 public:
00142     static Fl_Graphics_Driver *newMainGraphicsDriver();
00143     struct matrix {double a, b, c, d, x, y;};
00144     typedef enum {
00145         NATIVE = 1,
00146         PRINTER = 2
00147     } driver_feature;
00148 protected:
00149     int fl_clip_state_number;

```

```

00154 static const matrix m0;
00155 Fl_Font font_;
00156 Fl_Fontsize size_;
00157 Fl_Color color_;
00158 int sptr;
00159 static const int matrix_stack_size = FL_MATRIX_STACK_SIZE;
00160 matrix stack[FL_MATRIX_STACK_SIZE];
00161 matrix m;
00162 int n;
00163 int gap_;
00164 enum SHAPE {NONE=0, LINE, LOOP, POLYGON, POINTS, COMPLEX_POLYGON} what;
00165 int rstackptr;
00166 static const int region_stack_max = FL_REGION_STACK_SIZE - 1;
00167 Fl_Region rstack[FL_REGION_STACK_SIZE];
00168 Fl_Font_Descriptor *font_descriptor_;
00169 int p_size;
00170 typedef struct { float x; float y; } XPOINT;
00171 XPOINT *xpoint;
00172 virtual void global_gc();
00173 virtual void cache(Fl_Pixmap *img);
00174 virtual void cache(Fl_Bitmap *img);
00175 virtual void cache(Fl_RGB_Image *img);
00176 virtual void uncache(Fl_RGB_Image *img, fl_uintptr_t &id_, fl_uintptr_t &mask_);
00177 // --- implementation is in src/drivers/xxx/Fl_xxx_Graphics_Driver_image.cxx
00178 virtual void draw_image(const uchar* buf, int X,int Y,int W,int H, int D=3, int L=0);
00179 virtual void draw_image_mono(const uchar* buf, int X,int Y,int W,int H, int D=1, int L=0);
00180 virtual void draw_image(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D=3);
00181 virtual void draw_image_mono(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D=1);
00182 virtual void draw_rgb(Fl_RGB_Image * rgb,int XP, int YP, int WP, int HP, int cx, int cy);
00183 virtual void draw_pixmap(Fl_Pixmap * pxm,int XP, int YP, int WP, int HP, int cx, int cy);
00184 virtual void draw_bitmap(Fl_Bitmap *bm, int XP, int YP, int WP, int HP, int cx, int cy);
00185 virtual void copy_offscreen(int x, int y, int w, int h, Fl_Offscreen pixmap, int srcx, int srcy);
00186
00188 static void change_image_size(Fl_Image *img, int W, int H) {
00189     img->w(W);
00190     img->h(H);
00191 }
00192 // Support function for image drawing
00193 virtual void uncache_pixmap(fl_uintptr_t p);
00194 // accessor functions to protected image members
00195 int start_image(Fl_Image *img, int XP, int YP, int WP, int HP, int &cx, int &cy,
00196               int &X, int &Y, int &W, int &H);
00198 static fl_uintptr_t* id(Fl_RGB_Image *rgb) {return &(rgb->id_);}
00200 static fl_uintptr_t* id(Fl_Pixmap *pm) {return &(pm->id_);}
00202 static fl_uintptr_t* id(Fl_Bitmap *bm) {return &(bm->id_);}
00204 static fl_uintptr_t* mask(Fl_RGB_Image *rgb) {return &(rgb->mask_);}
00206 static fl_uintptr_t* mask(Fl_Pixmap *pm) {return &(pm->mask_);}
00208 static void cache_w_h(Fl_Pixmap *pm, int*& pwidth, int*& pheight) {
00209     pwidth = &(pm->cache_w_);
00210     pheight = &(pm->cache_h_);
00211 }
00213 static void cache_w_h(Fl_Bitmap *bm, int*& pwidth, int*& pheight) {
00214     pwidth = &(bm->cache_w_);
00215     pheight = &(bm->cache_h_);
00216 }
00218 static void cache_w_h(Fl_RGB_Image *rgb, int*& pwidth, int*& pheight) {
00219     pwidth = &(rgb->cache_w_);
00220     pheight = &(rgb->cache_h_);
00221 }
00222 static Fl_Offscreen get_offscreen_and_delete_image_surface(Fl_Image_Surface*);
00224 static void draw_empty(Fl_Image* img, int X, int Y) {img->draw_empty(X, Y);}
00225
00226 Fl_Graphics_Driver();
00227 virtual void cache_size(Fl_Image *img, int &width, int &height);
00228 void cache_size_finalize(Fl_Image *img, int &width, int &height);
00229 static unsigned need_pixmap_bg_color;
00230 public:
00231 virtual ~Fl_Graphics_Driver();
00232 static Fl_Graphics_Driver &default_driver();
00233 // support of "complex shapes"
00234 void push_matrix();
00235 void pop_matrix();
00236 void load_identity();
00237 void load_matrix(double a, double b, double c, double d, double x, double y);
00238 void mult_matrix(double a, double b, double c, double d, double x, double y);
00239 void rotate(double d);
00240 void translate(double x,double y);
00241 double transform_x(double x, double y);
00242 double transform_y(double x, double y);
00243 double transform_dx(double x, double y);
00244 double transform_dy(double x, double y);
00246 inline Fl_Font_Descriptor *font_descriptor() { return font_descriptor_;}
00248 inline void font_descriptor(Fl_Font_Descriptor *d) { font_descriptor_ = d;}
00250 float scale() { return scale_; }
00252 virtual void scale(float f);
00254 virtual char can_do_alpha_blending();
00255 virtual void point(int x, int y);

```

```

00256 virtual void rect(int x, int y, int w, int h);
00257 virtual void focus_rect(int x, int y, int w, int h);
00258 virtual void rectf(int x, int y, int w, int h);
00259 virtual void _rbox(int fill, int x, int y, int w, int h, int r);
00260 virtual void rounded_rect(int x, int y, int w, int h, int r);
00261 virtual void rounded_rectf(int x, int y, int w, int h, int r);
00262 // the default implementation is most likely enough
00263 virtual void colored_rectf(int x, int y, int w, int h, uchar r, uchar g, uchar b);
00264 virtual void line(int x, int y, int x1, int y1);
00266 virtual void line(int x, int y, int x1, int y1, int x2, int y2);
00268 virtual void xyline(int x, int y, int x1);
00270 virtual void xyline(int x, int y, int x1, int y2);
00272 virtual void xyline(int x, int y, int x1, int y2, int x3);
00274 virtual void yxline(int x, int y, int y1);
00276 virtual void yxline(int x, int y, int y1, int x2);
00278 virtual void yxline(int x, int y, int y1, int x2, int y3);
00280 virtual void loop(int x0, int y0, int x1, int y1, int x2, int y2);
00282 virtual void loop(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3);
00283 virtual void polygon(int x0, int y0, int x1, int y1, int x2, int y2);
00285 virtual void polygon(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3);
00286 // --- clipping
00287 virtual void push_clip(int x, int y, int w, int h);
00288 virtual int clip_box(int x, int y, int w, int h, int &X, int &Y, int &W, int &H);
00289 virtual int not_clipped(int x, int y, int w, int h);
00291 virtual void push_no_clip(); // has default implementation
00293 virtual void pop_clip(); // has default implementation
00294 virtual Fl_Region clip_region(); // has default implementation
00295 virtual void clip_region(Fl_Region r); // has default implementation
00296 virtual void restore_clip();
00297 virtual void begin_points();
00298 virtual void begin_line();
00299 virtual void begin_loop();
00300 virtual void begin_polygon();
00301 virtual void begin_complex_polygon();
00302 virtual void transformed_vertex(double xf, double yf);
00303 virtual void transformed_vertex0(float x, float y);
00304 virtual void vertex(double x, double y);
00305 virtual void end_points();
00306 virtual void end_line();
00307 virtual void end_loop();
00308 virtual void fixloop();
00309 virtual void end_polygon();
00310 virtual void end_complex_polygon();
00311 // default implementation is most probably enough
00312 virtual bool can_fill_non_convex_polygon() { return true; }
00313 virtual void gap();
00314 virtual void circle(double x, double y, double r);
00315 virtual void arc(double x, double y, double r, double start, double end);
00316 virtual void arc(int x, int y, int w, int h, double a1, double a2);
00317 virtual void pie(int x, int y, int w, int h, double a1, double a2);
00318 // To support fl_draw_circle(int x, int y, int d, Fl_Color color),
00319 // the default implementation is most probably enough.
00320 virtual void draw_circle(int x, int y, int d, Fl_Color c);
00321 virtual void curve(double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3,
double Y3);
00322 virtual void line_style(int style, int width=0, char* dashes=0);
00323 virtual void color(Fl_Color c);
00324 virtual void set_color(Fl_Color i, unsigned int c);
00325 virtual void free_color(Fl_Color i, int overlay);
00326 virtual Fl_Color color();
00327 virtual void color(uchar r, uchar g, uchar b);
00328 virtual void draw(const char *str, int nChars, int x, int y);
00329 virtual void draw(const char *str, int nChars, float x, float y);
00330 virtual void draw(int angle, const char *str, int nChars, int x, int y);
00331 virtual void rtl_draw(const char *str, int nChars, int x, int y);
00332 virtual int has_feature(driver_feature feature);
00333 virtual void font(Fl_Font face, Fl_Fontsize fsize);
00334 virtual Fl_Font font();
00335 virtual Fl_Fontsize size();
00336 virtual double width(const char *str, int nChars);
00337 virtual double width(unsigned int c);
00338 virtual void text_extents(const char*, int n, int& dx, int& dy, int& w, int& h);
00339 virtual int height();
00340 virtual int descent();
00341 virtual void gc(void*);
00342 virtual void *gc(void);
00343 virtual uchar **mask_bitmap();
00344 // default implementation may be enough
00345 virtual float scale_font_for_PostScript(Fl_Font_Descriptor *desc, int s);
00346 // default implementation may be enough
00347 virtual float scale_bitmap_for_PostScript();
00348 // each platform implements these 3 functions its own way
00349 virtual void add_rectangle_to_region(Fl_Region r, int x, int y, int w, int h);
00350 virtual Fl_Region XRectangleRegion(int x, int y, int w, int h);
00351 virtual void XDestroyRegion(Fl_Region r);
00352 virtual const char* get_font_name(Fl_Font fnum, int* ap);
00353 virtual int get_font_sizes(Fl_Font fnum, int*& sizep);

```

```

00354 virtual Fl_Font set_fonts(const char *name);
00355 virtual Fl_Fontdesc* calc_fl_fonts(void);
00356 virtual unsigned font_desc_size();
00357 virtual const char *font_name(int num);
00358 virtual void font_name(int num, const char *name);
00359 // Default implementation may be enough
00360 virtual void overlay_rect(int x, int y, int w, int h);
00361 virtual float override_scale();
00362 virtual void restore_scale(float);
00363 virtual PangoFontDescription* pango_font_description() { return NULL; }
00364 virtual void antialias(int state);
00365 virtual int antialias();
00366 virtual void delete_bitmask(fl_uintptr_t bm);
00367 };
00368
00369 #ifndef FL_DOXYGEN
00370
00371 /* This class is not part of FLTK's public API.
00372 Platforms usually define a derived class called Fl_XXX_Font_Descriptor
00373 containing extra platform-specific data/functions.
00374 This is a class for an actual system font, with junk to
00375 help choose it and info on character sizes. Each Fl_Fontdesc has a
00376 linked list of these. These are created the first time each system
00377 font/size combination is used.
00378 */
00379 class Fl_Font_Descriptor {
00380 public:
00381     Fl_Font_Descriptor *next;
00382     Fl_Fontsize size;
00383     Fl_Font_Descriptor(const char* fontname, Fl_Fontsize size);
00384     virtual FL_EXPORT ~Fl_Font_Descriptor() {}
00385     int ascent, descent;
00386     unsigned int listbase; // base of display list, 0 = none
00387 };
00388
00389 // This struct is not part of FLTK's public API.
00390 struct Fl_Fontdesc {
00391     const char *name;
00392     char fontname[128]; // "Pretty" font name
00393     Fl_Font_Descriptor *first; // linked list of sizes of this style
00394 };
00395
00396 /* Abstract class Fl_Scalable_Graphics_Driver is platform-independent.
00397 It supports the scaling of all graphics coordinates by a
00398 float factor helpful to support HiDPI displays.
00399 This class does :
00400 - compute scaled coordinates
00401 - scale the cached offscreen of image objects
00402 - scale the pixel arrays used when performing direct image draws
00403 - call the member functions of a platform-specific,
00404 Fl_Scalable_Graphics_Driver-derived class that do the drawings with adequately
00405 scaled coordinates. The member functions are named with the _unscaled suffix.
00406 - scale and unscale the clipping region.
00407
00408 This class is presently used by the X11 and Windows platforms to support HiDPI displays.
00409 In the future, it may also be used by other platforms.
00410 */
00411
00412 class FL_EXPORT Fl_Scalable_Graphics_Driver : public Fl_Graphics_Driver {
00413 public:
00414     Fl_Scalable_Graphics_Driver();
00415     // This function aims to compute accurately int(x * s) in
00416     // presence of rounding errors existing with floating point numbers
00417     // and that sometimes differ between 32 and 64 bits.
00418     static inline int floor(int x, float s) { return int(x * s + 0.001f); }
00419     inline int floor(int x) { return Fl_Scalable_Graphics_Driver::floor(x, scale()); }
00420 protected:
00421     int line_width_;
00422     virtual Fl_Region scale_clip(float f);
00423     void unscale_clip(Fl_Region r);
00424     void point(int x, int y) FL_OVERRIDE;
00425     virtual void point_unscaled(float x, float y);
00426     void rect(int x, int y, int w, int h) FL_OVERRIDE;
00427     void rectf(int x, int y, int w, int h) FL_OVERRIDE;
00428     virtual void rectf_unscaled(int x, int y, int w, int h);
00429     void line(int x, int y, int x1, int y1) FL_OVERRIDE;
00430     virtual void line_unscaled(int x, int y, int x1, int y1);
00431     void line(int x, int y, int x1, int y1, int x2, int y2) FL_OVERRIDE;
00432     virtual void line_unscaled(int x, int y, int x1, int y1, int x2, int y2);
00433     void xyline(int x, int y, int x1) FL_OVERRIDE;
00434     virtual void xyline_unscaled(int x, int y, int x1);
00435     void xyline(int x, int y, int x1, int y2) FL_OVERRIDE {Fl_Graphics_Driver::xyline(x, y, x1, y2);}
00436     void xyline(int x, int y, int x1, int y2, int x3) FL_OVERRIDE {Fl_Graphics_Driver::xyline(x, y, x1,
00437 y2, x3);}
00438     void yxline(int x, int y, int y1) FL_OVERRIDE;
00439     virtual void yxline_unscaled(int x, int y, int y1);
00440     void yxline(int x, int y, int y1, int x2) FL_OVERRIDE {Fl_Graphics_Driver::yxline(x, y, y1, x2);}
00441     void yxline(int x, int y, int y1, int x2, int y3) FL_OVERRIDE {Fl_Graphics_Driver::yxline(x, y, y1,

```

```

x2, y3);}
00441 void loop(int x0, int y0, int x1, int y1, int x2, int y2) FL_OVERRIDE;
00442 virtual void loop_unscaled(int x0, int y0, int x1, int y1, int x2, int y2);
00443 void loop(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3) FL_OVERRIDE;
00444 virtual void loop_unscaled(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3);
00445 void polygon(int x0, int y0, int x1, int y1, int x2, int y2) FL_OVERRIDE;
00446 virtual void polygon_unscaled(int x0, int y0, int x1, int y1, int x2, int y2);
00447 void polygon(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3) FL_OVERRIDE;
00448 virtual void polygon_unscaled(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3);
00449 void circle(double x, double y, double r) FL_OVERRIDE;
00450 virtual void ellipse_unscaled(double xt, double yt, double rx, double ry);
00451 void font(Fl_Font face, Fl_Fontsize size) FL_OVERRIDE;
00452 Fl_Font font() FL_OVERRIDE;
00453 virtual void font_unscaled(Fl_Font face, Fl_Fontsize size);
00454 double width(const char *str, int n) FL_OVERRIDE;
00455 double width(unsigned int c) FL_OVERRIDE;
00456 virtual double width_unscaled(const char *str, int n);
00457 virtual double width_unscaled(unsigned int c);
00458 Fl_Fontsize size() FL_OVERRIDE;
00459 virtual Fl_Fontsize size_unscaled();
00460 void text_extents(const char *str, int n, int &dx, int &dy, int &w, int &h) FL_OVERRIDE;
00461 virtual void text_extents_unscaled(const char *str, int n, int &dx, int &dy, int &w, int &h);
00462 int height() FL_OVERRIDE;
00463 int descent() FL_OVERRIDE;
00464 virtual int height_unscaled();
00465 virtual int descent_unscaled();
00466 void draw(const char *str, int n, int x, int y) FL_OVERRIDE;
00467 virtual void draw_unscaled(const char *str, int n, int x, int y);
00468 void draw(int angle, const char *str, int n, int x, int y) FL_OVERRIDE;
00469 virtual void draw_unscaled(int angle, const char *str, int n, int x, int y);
00470 void draw(const char *str, int nChars, float x, float y) FL_OVERRIDE;
00471 void rtl_draw(const char* str, int n, int x, int y) FL_OVERRIDE;
00472 virtual void rtl_draw_unscaled(const char* str, int n, int x, int y);
00473 void arc(double x, double y, double r, double start, double end) FL_OVERRIDE;
00474 void arc(int x, int y, int w, int h, double a1, double a2) FL_OVERRIDE;
00475 virtual void arc_unscaled(int x, int y, int w, int h, double a1, double a2);
00476 void pie(int x, int y, int w, int h, double a1, double a2) FL_OVERRIDE;
00477 virtual void pie_unscaled(int x, int y, int w, int h, double a1, double a2);
00478 void draw_circle(int x, int y, int d, Fl_Color c) FL_OVERRIDE;
00479 void line_style(int style, int width=0, char* dashes=0) FL_OVERRIDE;
00480 virtual void line_style_unscaled(int style, int width, char* dashes);
00481 void draw_image_rescale(void *buf, Fl_Draw_Image_Cb cb, int X, int Y, int W, int H, int D, int L,
bool mono);
00482 virtual void draw_image_unscaled(const uchar* buf, int X,int Y,int W,int H, int D=3, int L=0);
00483 virtual void draw_image_unscaled(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D=3);
00484 void draw_image(const uchar* buf, int X,int Y,int W,int H, int D=3, int L=0) FL_OVERRIDE;
00485 void draw_image(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D=3) FL_OVERRIDE;
00486 virtual void draw_image_mono_unscaled(const uchar* buf, int x, int y, int w, int h, int d, int l);
00487 void draw_image_mono(const uchar* buf, int X,int Y,int W,int H, int D=1, int L=0) FL_OVERRIDE;
00488 virtual void draw_image_mono_unscaled(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int
D=1);
00489 void draw_image_mono(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D=1) FL_OVERRIDE;
00490
00491 void transformed_vertex(double xf, double yf) FL_OVERRIDE;
00492 void vertex(double x, double y) FL_OVERRIDE;
00493 float override_scale() FL_OVERRIDE;
00494 void restore_scale(float) FL_OVERRIDE;
00495 virtual void *change_pen_width(int lwidth);
00496 virtual void reset_pen_width(void *data);
00497 };
00498 #endif // FL_DOXYGEN
00499
00500 #endif // FL_GRAPHICS_DRIVER_H
00501

```

13.59 Fl_Grid.H File Reference

Fl_Grid container widget.

```
#include <FL/Fl_Group.H>
```

```
#include <FL/Fl_Rect.H>
```

Classes

- class [Fl_Grid::Cell](#)
- class [Fl_Grid](#)

Fl_Grid is a container (layout) widget with multiple columns and rows.

Typedefs

- typedef unsigned short **Fl_Grid_Align**
Fl_Grid type for child widget alignment control.

Variables

- const **Fl_Grid_Align FL_GRID_BOTTOM** = 0x0002
Align the widget at the bottom of the cell.
- const **Fl_Grid_Align FL_GRID_BOTTOM_LEFT** = **FL_GRID_BOTTOM** | **FL_GRID_LEFT**
- const **Fl_Grid_Align FL_GRID_BOTTOM_RIGHT** = **FL_GRID_BOTTOM** | **FL_GRID_RIGHT**
- const **Fl_Grid_Align FL_GRID_CENTER** = 0x0000
Align the widget in the middle of the cell (default).
- const **Fl_Grid_Align FL_GRID_FILL** = 0x0030
Stretch the widget in both directions to fill the cell.
- const **Fl_Grid_Align FL_GRID_HORIZONTAL** = 0x0010
Stretch the widget horizontally to fill the cell.
- const **Fl_Grid_Align FL_GRID_LEFT** = 0x0004
Align the widget at the left side of the cell.
- const **Fl_Grid_Align FL_GRID_PROPORTIONAL** = 0x0040
Stretch the widget proportionally.
- const **Fl_Grid_Align FL_GRID_RIGHT** = 0x0008
Align the widget at the right side of the cell.
- const **Fl_Grid_Align FL_GRID_TOP** = 0x0001
Align the widget at the top of the cell.
- const **Fl_Grid_Align FL_GRID_TOP_LEFT** = **FL_GRID_TOP** | **FL_GRID_LEFT**
- const **Fl_Grid_Align FL_GRID_TOP_RIGHT** = **FL_GRID_TOP** | **FL_GRID_RIGHT**
- const **Fl_Grid_Align FL_GRID_VERTICAL** = 0x0020
Stretch the widget vertically to fill the cell.

13.59.1 Detailed Description

[Fl_Grid](#) container widget.

13.60 Fl_Grid.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // Fl_Grid widget header for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2021-2022 by Albrecht Schlosser.
00005 // Copyright 2022-2023 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00018 #ifndef _FL_FL_GRID_H_
00019 #define _FL_FL_GRID_H_
00020
00025 #include <FL/Fl_Group.H>
00026 #include <FL/Fl_Rect.H>
00027
00029 typedef unsigned short Fl_Grid_Align;
00030
00032 const Fl_Grid_Align FL_GRID_CENTER = 0x0000;
00033
```



```

00035 const Fl_Grid_Align FL_GRID_TOP           = 0x0001;
00036
00038 const Fl_Grid_Align FL_GRID_BOTTOM         = 0x0002;
00039
00041 const Fl_Grid_Align FL_GRID_LEFT          = 0x0004;
00042
00044 const Fl_Grid_Align FL_GRID_RIGHT         = 0x0008;
00045
00047 const Fl_Grid_Align FL_GRID_HORIZONTAL    = 0x0010;
00048
00050 const Fl_Grid_Align FL_GRID_VERTICAL      = 0x0020;
00051
00053 const Fl_Grid_Align FL_GRID_FILL          = 0x0030;
00054
00056 const Fl_Grid_Align FL_GRID_PROPORTIONAL  = 0x0040;
00057
00058 const Fl_Grid_Align FL_GRID_TOP_LEFT      = FL_GRID_TOP | FL_GRID_LEFT;
00059 const Fl_Grid_Align FL_GRID_TOP_RIGHT     = FL_GRID_TOP | FL_GRID_RIGHT;
00060 const Fl_Grid_Align FL_GRID_BOTTOM_LEFT   = FL_GRID_BOTTOM | FL_GRID_LEFT;
00061 const Fl_Grid_Align FL_GRID_BOTTOM_RIGHT  = FL_GRID_BOTTOM | FL_GRID_RIGHT;
00062
00147 class FL_EXPORT Fl_Grid : public Fl_Group {
00148     friend class Fl_Grid_Type;
00149
00150 public:
00151     class Cell {
00152         friend class Fl_Grid;
00153     private:
00154         Cell *next_;           // next cell in row
00155         short row_;           // row number
00156         short col_;           // column number
00157         short rowspan_;       // row span (1 - n)
00158         short colspan_;       // column span (1 - n)
00159         Fl_Grid_Align align_; // widget alignment in its cell
00160         Fl_Widget *widget_;   // assigned widget
00161         int w_;               // minimal widget width
00162         int h_;               // minimal widget height
00163
00164     public:
00165
00166         void Cell_() {
00167             next_ = NULL;
00168             row_ = 0;
00169             col_ = 0;
00170             rowspan_ = 1;
00171             colspan_ = 1;
00172             widget_ = NULL;
00173             w_ = 0;
00174             h_ = 0;
00175             align_ = 0;
00176         }
00177
00178         Cell(int row, int col) {
00179             Cell_();
00180             row_ = row;
00181             col_ = col;
00182         }
00183
00184         Cell(Fl_Widget *w, int row, int col) {
00185             Cell_();
00186             widget_ = w;
00187             row_ = row;
00188             col_ = col;
00189         }
00190
00191         ~Cell() {}
00192
00193         Fl_Widget *widget() const { return widget_; }
00194
00195         short row() const { return row_; }
00196         short col() const { return col_; }
00197
00198         void rowspan(short v) { rowspan_ = v; }
00199         void colspan(short v) { colspan_ = v; }
00200         short rowspan() const { return rowspan_; }
00201         short colspan() const { return colspan_; }
00202
00203         void align(Fl_Grid_Align align) { align_ = align; }
00204         Fl_Grid_Align align() const { return align_; }
00205
00206         void minimum_size(int w, int h) { if (w>=0) w_ = w; if (h>=0) h_ = h; }
00207         void minimum_size(int *w, int *h) const { if (w) *w = w_; if (h) *h = h_; }
00208     }; // class Cell
00209
00210 private:
00211     class Row;
00212     class Col;

```

```

00213 short rows_;
00214 short cols_;
00215
00216 short margin_left_; // left margin
00217 short margin_top_; // top margin
00218 short margin_right_; // right margin
00219 short margin_bottom_; // bottom margin
00220 short gap_row_; // gap between rows
00221 short gap_col_; // gap between columns
00222 Fl_Rect old_size; // only for resize callback (TBD)
00223 Col *Cols_; // array of columns
00224 Row *Rows_; // array of rows
00225 bool need_layout_; // true if layout needs to be calculated
00226
00227 protected:
00228     Fl_Color grid_color; // color for drawing the grid lines (design helper)
00229     bool draw_grid_; // draw the grid for testing / design
00230
00231 protected:
00232     void init();
00233     Cell *add_cell(int row, int col);
00234     void remove_cell(int row, int col);
00235
00236 public:
00237     Fl_Grid(int X, int Y, int W, int H, const char *L = 0);
00238     virtual ~Fl_Grid();
00239
00240     // define and manage the layout and resizing
00241
00242     virtual void layout(int rows, int cols, int margin = -1, int gap = -1);
00243     virtual void layout();
00244     virtual void clear_layout();
00245     virtual void resize(int X, int Y, int W, int H) FL_OVERRIDE;
00246
00247     short rows() const { return rows_; }
00248     short cols() const { return cols_; }
00249
00260     void need_layout(int set) {
00261         if (set) {
00262             need_layout_ = true;
00263             redraw();
00264         }
00265         else {
00266             need_layout_ = false;
00267         }
00268     }
00269
00273     bool need_layout() const {
00274         return need_layout_;
00275     }
00276
00277 protected:
00278     virtual void draw() FL_OVERRIDE;
00279     void on_remove(int) FL_OVERRIDE;
00280     virtual void draw_grid(); // draw grid lines for debugging
00281
00282 public:
00283
00284     // get and set individual margins
00285
00286     virtual void margin(int left, int top = -1, int right = -1, int bottom = -1);
00287     int margin(int *left, int *top, int *right, int *bottom) const;
00288
00289     // get and set default row and column gaps for all rows and columns, respectively
00290
00291     virtual void gap(int row_gap, int col_gap = -1); // set default row and column gap(s)
00292     void gap(int *row_gap, int *col_gap) const;
00293
00294     // find cells, get cell pointers
00295
00296     Fl_Grid::Cell* cell(int row, int col) const;
00297     Fl_Grid::Cell* cell(Fl_Widget *widget) const;
00298
00299     // assign a widget to a cell
00300
00301     Fl_Grid::Cell* widget(Fl_Widget *wi, int row, int col, Fl_Grid_Align align = FL_GRID_FILL);
00302     Fl_Grid::Cell* widget(Fl_Widget *wi, int row, int col, int rowspan, int colspan, Fl_Grid_Align align
= FL_GRID_FILL);
00303
00304     // set minimal column and row sizes (widths and heights, respectively),
00305     // set row and column specific gaps and weights
00306
00307     void col_width(int col, int value);
00308     void col_width(const int *value, size_t size);
00309     int col_width(int col) const;
00310
00311     void col_weight(int col, int value);

```

```

00312 void col_weight(const int *value, size_t size);
00313 int col_weight(int col) const;
00314
00315 void col_gap(int col, int value);
00316 void col_gap(const int *value, size_t size);
00317 int col_gap(int col) const;
00318
00319 void row_height(int row, int value);
00320 void row_height(const int *value, size_t size);
00321 int row_height(int row) const;
00322
00323 void row_weight(int row, int value);
00324 void row_weight(const int *value, size_t size);
00325 int row_weight(int row) const;
00326
00327 void row_gap(int row, int value);
00328 void row_gap(const int *value, size_t size);
00329 int row_gap(int row) const;
00330
00331 int computed_col_width(int col) const;
00332 int computed_row_height(int row) const;
00333
00351 void show_grid(int set) {
00352     draw_grid_ = set ? true : false;
00353 }
00354
00368 void show_grid(int set, Fl_Color col) {
00369     draw_grid_ = set ? true : false;
00370     grid_color = col;
00371 }
00372
00373 void debug(int level = 127);
00374
00375 }; // class Fl_Grid
00376
00377 #endif // _FL_FL_GRID_H_

```

13.61 Fl_Group.H File Reference

[Fl_Group](#) and [Fl_End](#) classes.

```
#include "Fl_Widget.H"
```

Classes

- class [Fl_End](#)

This is a dummy class that allows you to end a [Fl_Group](#) in a constructor list of a class:

- class [Fl_Group](#)

The [Fl_Group](#) class is the FLTK container widget.

13.61.1 Detailed Description

[Fl_Group](#) and [Fl_End](#) classes.

13.62 Fl_Group.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Group header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00021 #ifndef Fl_Group_H

```

```

00022 #define Fl_Group_H
00023
00024 #include "Fl_Widget.H"
00025
00026 // Don't #include Fl_Rect.H because this would introduce lots
00027 // of unnecessary dependencies on Fl_Rect.H
00028 class Fl_Rect;
00029
00030
00056 class FL_EXPORT Fl_Group : public Fl_Widget {
00057
00058     union {
00059         Fl_Widget** array_; // used if group has two or more children or NULL
00060         Fl_Widget* child1_; // used if group has one child or NULL
00061     };
00062     Fl_Widget* savedfocus_;
00063     Fl_Widget* resizable_;
00064     int children_;
00065     Fl_Rect *bounds_; // remembered initial sizes of children
00066     int *sizes_; // remembered initial sizes of children (FLTK 1.3 compat.)
00067
00068     int navigation(int);
00069     static Fl_Group *current_;
00070
00071     // unimplemented copy ctor and assignment operator
00072     Fl_Group(const Fl_Group&);
00073     Fl_Group& operator=(const Fl_Group&);
00074
00075 protected:
00076     void draw() FL_OVERRIDE;
00077     void draw_child(Fl_Widget& widget) const;
00078     void draw_children();
00079     void draw_outside_label(const Fl_Widget& widget) const;
00080     void update_child(Fl_Widget& widget) const;
00081     Fl_Rect *bounds();
00082     int *sizes(); // FLTK 1.3 compatibility
00083     virtual int on_insert(Fl_Widget*, int);
00084     virtual int on_move(int, int);
00085     virtual void on_remove(int);
00086
00087 public:
00088
00089     int handle(int) FL_OVERRIDE;
00090     void begin();
00091     void end();
00092     static Fl_Group *current();
00093     static void current(Fl_Group *g);
00094
00098     int children() const {return children_;}
00102     Fl_Widget* child(int n) const {return array()[n];}
00103     int find(const Fl_Widget*) const;
00107     int find(const Fl_Widget& o) const {return find(&o);}
00108     Fl_Widget* const* array() const;
00109
00110     void resize(int,int,int,int) FL_OVERRIDE;
00115     Fl_Group(int,int,int,int, const char * = 0);
00116     virtual ~Fl_Group();
00117     void add(Fl_Widget&);
00121     void add(Fl_Widget* o) {add(*o);}
00122     void insert(Fl_Widget&, int i);
00127     void insert(Fl_Widget& o, Fl_Widget* before) {insert(o,find(before));}
00128     void remove(int index);
00129     void remove(Fl_Widget&);
00134     void remove(Fl_Widget* o) {remove(*o);}
00135     void clear();
00136
00137     /* delete child n (by index) */
00138     virtual int delete_child(int n);
00139
00144     void resizable(Fl_Widget& o) {resizable_ = &o;}
00198     void resizable(Fl_Widget* o) {resizable_ = o;}
00203     Fl_Widget* resizable() const {return resizable_;}
00207     void add_resizable(Fl_Widget& o) {resizable_ = &o; add(o);}
00208     void init_sizes();
00209
00219     void clip_children(int c) { if (c) set_flag(CLIP_CHILDREN); else clear_flag(CLIP_CHILDREN); }
00227     unsigned int clip_children() { return (flags() & CLIP_CHILDREN) != 0; }
00228
00229     // Note: Doxygen docs in Fl_Widget.H to avoid redundancy.
00230     Fl_Group* as_group() FL_OVERRIDE { return this; }
00231     Fl_Group const* as_group() const FL_OVERRIDE { return this; }
00232
00233     // back compatibility functions:
00234
00240     void focus(Fl_Widget* W) {W->take_focus();}
00241
00243     Fl_Widget* & _ddfdesign_kludge() {return resizable_;}

```

```

00244
00246 void forms_end();
00247 };
00248
00249 // dummy class used to end child groups in constructors for complex
00250 // subclasses of Fl_Group:
00271 class FL_EXPORT Fl_End {
00272 public:
00274 Fl_End() {Fl_Group::current()->end();}
00275 };
00276
00277 #endif

```

13.63 Fl_Help_Dialog.H

```

00001 //
00002 // Fl_Help_Dialog dialog for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2021 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 // https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 // https://www.fltk.org/bugs.php
00015 //
00016 // =====
00017 // DO NOT EDIT FL/Fl_Help_Dialog.H and src/Fl_Help_Dialog.cxx !!!
00018 // =====
00019 // Please use fluid to change src/Fl_Help_Dialog.fl interactively
00020 // and then use fluid to "write code" or edit and use fluid -c .
00021 // =====
00022 //
00023
00024 // generated by Fast Light User Interface Designer (fluid) version 1.0400
00025
00026 #ifndef Fl_Help_Dialog_H
00027 #define Fl_Help_Dialog_H
00028 #include <FL/Fl.H>
00029 #include <FL/Fl_Double_Window.H>
00030 #include <FL/Fl_Group.H>
00031 #include <FL/Fl_Button.H>
00032 #include <FL/Fl_Input.H>
00033 #include <FL/Fl_Box.H>
00034 #include <FL/Fl_Help_View.H>
00035
00036 class FL_EXPORT Fl_Help_Dialog {
00037 int index_;
00038 int max_;
00039 int line_[100]; // FIXME: we must remove those static numbers
00040 char file_[100][FL_PATH_MAX]; // FIXME: we must remove those static numbers
00041 int find_pos_;
00042 public:
00043 Fl_Help_Dialog();
00044 private:
00045 Fl_Double_Window *window_;
00046 Fl_Button *back_;
00047 inline void cb_back__i(Fl_Button*, void*);
00048 static void cb_back_(Fl_Button*, void*);
00049 Fl_Button *forward_;
00050 inline void cb_forward__i(Fl_Button*, void*);
00051 static void cb_forward_(Fl_Button*, void*);
00052 Fl_Button *smaller_;
00053 inline void cb_smaller__i(Fl_Button*, void*);
00054 static void cb_smaller_(Fl_Button*, void*);
00055 Fl_Button *larger_;
00056 inline void cb_larger__i(Fl_Button*, void*);
00057 static void cb_larger_(Fl_Button*, void*);
00058 Fl_Input *find_;
00059 inline void cb_find__i(Fl_Input*, void*);
00060 static void cb_find_(Fl_Input*, void*);
00061 Fl_Help_View *view_;
00062 inline void cb_view__i(Fl_Help_View*, void*);
00063 static void cb_view_(Fl_Help_View*, void*);
00064 public:
00065 ~Fl_Help_Dialog();
00066 int h();
00067 void hide();
00068 int load(const char *f);
00069 void position(int xx, int yy);
00070 void resize(int xx, int yy, int ww, int hh);

```

```

00071 void show();
00072 void show(int argc, char **argv);
00073 void textsize(Fl_Fontsize s);
00074 Fl_Fontsize textsize();
00075 void topline(const char *n);
00076 void topline(int n);
00077 void value(const char *f);
00078 const char * value() const;
00079 int visible();
00080 int w();
00081 int x();
00082 int y();
00083 };
00084 #endif

```

13.64 Fl_Help_View.H

```

00001 //
00002 // Help Viewer widget definitions.
00003 //
00004 // Copyright 1997-2010 by Easy Software Products.
00005 // Image support by Matthias Melcher, Copyright 2000-2009.
00006 // Copyright 2011-2022 by Bill Spitzak and others.
00007 //
00008 // This library is free software. Distribution and use rights are outlined in
00009 // the file "COPYING" which should have been included with this file. If this
00010 // file is missing or damaged, see the license at:
00011 //
00012 //     https://www.fltk.org/COPYING.php
00013 //
00014 // Please see the following page on how to report bugs and issues:
00015 //
00016 //     https://www.fltk.org/bugs.php
00017 //
00018 //
00019 /* \file
00020    Fl_Help_View widget . */
00021 //
00022 #ifndef Fl_Help_View_H
00023 #define Fl_Help_View_H
00024 //
00025 //
00026 // Include necessary header files...
00027 //
00028 //
00029 #include "Fl.H"
00030 #include "Fl_Group.H"
00031 #include "Fl_Scrollbar.H"
00032 #include "fl_draw.H"
00033 #include "filename.H"
00034 //
00035 class Fl_Shared_Image;
00036 //
00037 // Fl_Help_Func type - link callback function for files...
00038 //
00039 //
00040 typedef const char *(Fl_Help_Func)(Fl_Widget *, const char *);
00041 //
00042 //
00043 // Fl_Help_Block structure...
00044 //
00045 //
00046 struct Fl_Help_Block {
00047     const char    *start,           // Start of text
00048                 *end;             // End of text
00049     uchar        border;          // Draw border?
00050     Fl_Color     bgcolor;         // Background color
00051     int          x,               // Indentation/starting X coordinate
00052                 y,               // Starting Y coordinate
00053                 w,               // Width
00054                 h;               // Height
00055     int          line[32];        // Left starting position for each line
00056     int          ol;             // is ordered list <OL> element
00057     int          ol_num;         // item number in ordered list
00058 };
00059 //
00060 //
00061 // Fl_Help_Link structure...
00062 //
00063 //
00064 struct Fl_Help_Link {
00065     char          filename[192],
00066                 name[32];
00067     int           x,
00068                 y,
00069                 w,

```

```

00070             h;
00071 };
00072
00073 /*
00074  * Fl_Help_View font stack opaque implementation
00075  */
00076
00077 struct FL_EXPORT Fl_Help_Font_Style {
00078     Fl_Font      f;
00079     Fl_Fontsize  s;
00080     Fl_Color     c;
00081
00082     void get(Fl_Font &afont, Fl_Fontsize &asize, Fl_Color &acolor) {afont=f; asize=s; acolor=c;}
00083     void set(Fl_Font afont, Fl_Fontsize asize, Fl_Color acolor) {f=afont; s=asize; c=acolor;}
00084     Fl_Help_Font_Style(Fl_Font afont, Fl_Fontsize asize, Fl_Color acolor) {set(afont, asize, acolor);}
00085     Fl_Help_Font_Style(){} // For in table use
00086 };
00087
00088 const size_t MAX_FL_HELP_FS_ELTS = 100;
00089
00090 struct FL_EXPORT Fl_Help_Font_Stack {
00091     Fl_Help_Font_Stack() {
00092         nfonts_ = 0;
00093     }
00094
00095     void init(Fl_Font f, Fl_Fontsize s, Fl_Color c) {
00096         nfonts_ = 0;
00097         elts_[nfonts_].set(f, s, c);
00098         fl_font(f, s);
00099         fl_color(c);
00100     }
00101
00102     void top(Fl_Font &f, Fl_Fontsize &s, Fl_Color &c) { elts_[nfonts_].get(f, s, c); }
00103     void push(Fl_Font f, Fl_Fontsize s, Fl_Color c) {
00104         if (nfonts_ < MAX_FL_HELP_FS_ELTS-1) nfonts_ ++;
00105         elts_[nfonts_].set(f, s, c);
00106         fl_font(f, s); fl_color(c);
00107     }
00108     void pop(Fl_Font &f, Fl_Fontsize &s, Fl_Color &c) {
00109         if (nfonts_ > 0) nfonts_ --;
00110         top(f, s, c);
00111         fl_font(f, s); fl_color(c);
00112     }
00113     size_t count() const {return nfonts_;} // Gets the current number of fonts in the stack
00114
00115 protected:
00116     size_t nfonts_;
00117     Fl_Help_Font_Style elts_[MAX_FL_HELP_FS_ELTS];
00118 };
00119
00120 struct Fl_Help_Target {
00121     char      name[32];
00122     int       y;
00123 };
00124
00125 class FL_EXPORT Fl_Help_View : public Fl_Group { // Help viewer widget
00126
00127     enum { RIGHT = -1, CENTER, LEFT };
00128
00129     char      title_[1024];
00130     Fl_Color  defcolor_,
00131             bgcolor_,
00132             textcolor_,
00133             linkcolor_;
00134     Fl_Font   textfont_;
00135     Fl_Fontsize textsize_;
00136     const char *value_;
00137     Fl_Help_Font_Stack fstack_;
00138     int       nblocks_,
00139             ablocks_;
00140     Fl_Help_Block *blocks_;
00141
00142     Fl_Help_Func *link_;
00143
00144     int       nlinks_,
00145             alinks_;
00146     Fl_Help_Link *links_;
00147
00148     int       ntargets_,
00149             atargets_;
00150     Fl_Help_Target *targets_;
00151
00152     char      directory_[FL_PATH_MAX];
00153     char      filename_[FL_PATH_MAX];
00154     int       topline_,
00155             leftline_,
00156             size_,
00157             hsize_,
00158             scrollbar_size_;

```

```

00235 Fl_Scrollbar scrollbar_,
00236 hscrollbar_;
00237
00238 static int selection_first;
00239 static int selection_last;
00240 static int selection_push_first;
00241 static int selection_push_last;
00242 static int selection_drag_first;
00243 static int selection_drag_last;
00244 static int selected;
00245 static int draw_mode;
00246 static int mouse_x;
00247 static int mouse_y;
00248 static int current_pos;
00249 static Fl_Help_View *current_view;
00250 static Fl_Color hv_selection_color;
00251 static Fl_Color hv_selection_text_color;
00252
00253
00254 void initfont(Fl_Font &f, Fl_Fontsize &s, Fl_Color &c) { f = textfont_; s = textsize_; c =
textcolor_; fstack_.init(f, s, c); }
00255 void pushfont(Fl_Font f, Fl_Fontsize s) {fstack_.push(f, s, textcolor_);}
00256 void pushfont(Fl_Font f, Fl_Fontsize s, Fl_Color c) {fstack_.push(f, s, c);}
00257 void popfont(Fl_Font &f, Fl_Fontsize &s, Fl_Color &c) {fstack_.pop(f, s, c);}
00258
00259 Fl_Help_Block *add_block(const char *s, int xx, int yy, int ww, int hh, uchar border = 0);
00260 void add_link(const char *n, int xx, int yy, int ww, int hh);
00261 void add_target(const char *n, int yy);
00262 static int compare_targets(const Fl_Help_Target *t0, const Fl_Help_Target *t1);
00263 int do_align(Fl_Help_Block *block, int line, int xx, int a, int &l);
00264 protected:
00265 void draw() FL_OVERRIDE;
00266 private:
00267 void format();
00268 void format_table(int *table_width, int *columns, const char *table);
00269 void free_data();
00270 int get_align(const char *p, int a);
00271 const char *get_attr(const char *p, const char *n, char *buf, int bufsize);
00272 Fl_Color get_color(const char *n, Fl_Color c);
00273 Fl_Shared_Image *get_image(const char *name, int W, int H);
00274 int get_length(const char *l);
00275 public:
00276 int handle(int) FL_OVERRIDE;
00277 private:
00278
00279 void hv_draw(const char *t, int x, int y, int entity_extra_length = 0);
00280 char begin_selection();
00281 char extend_selection();
00282 void end_selection(int c=0);
00283 void clear_global_selection();
00284 Fl_Help_Link *find_link(int, int);
00285 void follow_link(Fl_Help_Link*);
00286
00287 public:
00288
00289 Fl_Help_View(int xx, int yy, int ww, int hh, const char *l = 0);
00290 ~Fl_Help_View();
00291 const char *directory() const { if (directory_[0]) return (directory_);
00292 else return ((const char *)0); }
00293 const char *filename() const { if (filename_[0]) return (filename_);
00294 else return ((const char *)0); }
00297 int find(const char *s, int p = 0);
00320 void link(Fl_Help_Func *fn) { link_ = fn; }
00321 int load(const char *f);
00322 void resize(int,int,int,int) FL_OVERRIDE;
00324 int size() const { return (size_); }
00325 void size(int W, int H) { Fl_Widget::size(W, H); }
00327 void textcolor(Fl_Color c) { if (textcolor_ == defcolor_) textcolor_ = c; defcolor_ = c; }
00329 Fl_Color textcolor() const { return (defcolor_); }
00331 void textfont(Fl_Font f) { textfont_ = f; format(); }
00333 Fl_Font textfont() const { return (textfont_); }
00335 void textsize(Fl_Fontsize s) { textsize_ = s; format(); }
00337 Fl_Fontsize textsize() const { return (textsize_); }
00339 const char *title() const { return (title_); }
00340 void topline(const char *n);
00341 void topline(int);
00343 int topline() const { return (topline_); }
00344 void leftline(int);
00346 int leftline() const { return (leftline_); }
00347 void value(const char *val);
00349 const char *value() const { return (value_); }
00350 void clear_selection();
00351 void select_all();
00361 int scrollbar_size() const {
00362 return(scrollbar_size_);
00363 }
00383 void scrollbar_size(int newSize) {

```



```

00384     scrollbar_size_ = newSize;
00385     }
00386 };
00387
00388 #endif // !Fl_Help_View_H

```

13.65 Fl_Hold_Browser.H

```

00001 //
00002 // Hold browser header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Hold_Browser widget . */
00019
00020 #ifndef Fl_Hold_Browser_H
00021 #define Fl_Hold_Browser_H
00022
00023 #include "Fl_Browser.H"
00024
00038 class FL_EXPORT Fl_Hold_Browser : public Fl_Browser {
00039 public:
00046     Fl_Hold_Browser(int X,int Y,int W,int H,const char *L=0);
00047 };
00048
00049 #endif

```

13.66 Fl_Hor_Fill_Slider.H

```

00001 //
00002 // Horizontal fill slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Hor_Fill_Slider widget . */
00019
00020 #ifndef Fl_Hor_Fill_Slider_H
00021 #define Fl_Hor_Fill_Slider_H
00022
00023 #include "Fl_Slider.H"
00024
00025 class FL_EXPORT Fl_Hor_Fill_Slider : public Fl_Slider {
00026 public:
00027     Fl_Hor_Fill_Slider(int X,int Y,int W,int H,const char *L=0);
00028 };
00029
00030 #endif

```

13.67 Fl_Hor_Nice_Slider.H

```

00001 //
00002 // Horizontal "nice" slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //

```

```

00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Hor_Nice_Slider widget . */
00019 //
00020 #ifndef Fl_Hor_Nice_Slider_H
00021 #define Fl_Hor_Nice_Slider_H
00022 //
00023 #include "Fl_Slider.H"
00024 //
00025 class FL_EXPORT Fl_Hor_Nice_Slider : public Fl_Slider {
00026 public:
00027     Fl_Hor_Nice_Slider(int X,int Y,int W,int H,const char *L=0);
00028 };
00029 #endif

```

13.68 Fl_Hor_Slider.H

```

00001 //
00002 // Horizontal slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2011 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Hor_Slider widget . */
00019 //
00020 #ifndef Fl_Hor_Slider_H
00021 #define Fl_Hor_Slider_H
00022 //
00023 #include "Fl_Slider.H"
00024 //
00025 class FL_EXPORT Fl_Hor_Slider : public Fl_Slider {
00026 public:
00027     Fl_Hor_Slider(int X,int Y,int W,int H,const char *l=0);
00028 };
00029 #endif

```

13.69 Fl_Hor_Value_Slider.H

```

00001 //
00002 // Horizontal value slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
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00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Hor_Value_Slider widget . */
00019 //
00020 #ifndef Fl_Hor_Value_Slider_H

```

```

00021 #define Fl_Hor_Value_Slider_H
00022
00023 #include "Fl_Value_Slider.H"
00024
00025 class FL_EXPORT Fl_Hor_Value_Slider : public Fl_Value_Slider {
00026 public:
00027     Fl_Hor_Value_Slider(int X,int Y,int W,int H,const char *l=0);
00028 };
00029
00030 #endif

```

13.70 Fl_ICO_Image.H

```

00001 //
00002 // ICO image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2022-2023 by Bill Spitzak and others.
00005 //
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00007 // the file "COPYING" which should have been included with this file. If this
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00011 //
00012 // Please report all bugs and problems on the following page:
00013 //
00014 //     http://www.fltk.org/str.php
00015 //
00016
00017 // https://en.wikipedia.org/wiki/ICO_(file_format)
00018 // http://www.daubnet.com/en/file-format-ico
00019
00020 #ifndef Fl_ICO_Image_H
00021 # define Fl_ICO_Image_H
00022 # include "Fl_BMP_Image.H"
00023
00024 class FL_EXPORT Fl_ICO_Image : public Fl_BMP_Image {
00025 public:
00026     struct IconDirEntry {
00027         int bWidth;
00028         int bHeight;
00029         int bColorCount;
00030         int bReserved;
00031         int wPlanes;
00032         int wBitCount;
00033         int dwBytesInRes;
00034         int dwImageOffset;
00035     };
00036
00037     Fl_ICO_Image(const char *filename, int id = -1, const unsigned char *data = NULL, const size_t
00038     datasize = 0);
00039     ~Fl_ICO_Image();
00040
00041     int idcount() const { return idcount_; }
00042
00043     const IconDirEntry * icondirentry() const { return icondirentry_; }
00044
00045 private:
00046     int idcount_;
00047     struct IconDirEntry *icondirentry_;
00048     void load_ico_(class Fl_Image_Reader &rdr, int id);
00049 };
00050
00051 #endif // Fl_ICO_Image_H

```

13.71 Fl_Image.H File Reference

[Fl_Image](#), [Fl_RGB_Image](#) classes.

```

#include "Enumerations.H"
#include "Fl_Widget.H"

```

Classes

- class [Fl_Image](#)

Base class for image caching, scaling and drawing.

- class [Fl_RGB_Image](#)

The [Fl_RGB_Image](#) class supports caching and drawing of full-color images with 1 to 4 channels of color information.

Enumerations

- enum [Fl_RGB_Scaling](#) { [FL_RGB_SCALING_NEAREST](#) = 0 , [FL_RGB_SCALING_BILINEAR](#) }

The scaling algorithm to use for RGB images.

13.71.1 Detailed Description

[Fl_Image](#), [Fl_RGB_Image](#) classes.

13.71.2 Enumeration Type Documentation

13.71.2.1 Fl_RGB_Scaling

enum [Fl_RGB_Scaling](#)

The scaling algorithm to use for RGB images.

Enumerator

FL_RGB_SCALING_NEAREST	default RGB image scaling algorithm
FL_RGB_SCALING_BILINEAR	more accurate, but slower RGB image scaling algorithm

13.72 Fl_Image.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
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00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00020 #ifndef Fl_Image_H
00021 #define Fl_Image_H
00022
00023 #include "Enumerations.H"
00024 #include "Fl_Widget.H" // for fl_uintptr_t
00025
00026 class Fl_Widget;
00027 class Fl_Pixmap;
00028 struct Fl_Menu_Item;
00029 struct Fl_Label;
00030 class Fl_RGB_Image;
00031
00032
00036 enum Fl_RGB_Scaling {
00037     FL_RGB_SCALING_NEAREST = 0,
00038     FL_RGB_SCALING_BILINEAR
00039 };
00040
00041
00060 class FL_EXPORT Fl_Image {
00061     friend class Fl_Graphics_Driver;
00062 public:
00063     static const int ERR_NO_IMAGE           = -1;
00064     static const int ERR_FILE_ACCESS       = -2;
00065     static const int ERR_FORMAT            = -3;
00066     static const int ERR_MEMORY_ACCESS     = -4;
00067
00068 private:

```

```

00069 int w_, h_, d_, ld_, count_;
00070 int data_w_, data_h_;
00071 const char * const *data_;
00072 static Fl_RGB_Scaling RGB_scaling_; // method used when copying RGB images
00073 static Fl_RGB_Scaling scaling_algorithm_; // method used to rescale RGB source images before drawing
00074 // Forbid use of copy constructor and assign operator
00075 Fl_Image & operator=(const Fl_Image &);
00076 Fl_Image(const Fl_Image &);
00077 // Presently redefined in Fl_SVG_Image
00078 virtual void cache_size_(int & /*width*/, int & /*height*/) {}
00079
00080 protected:
00081
00082 void w(int W) {w_ = W; data_w_ = W;}
00093 void h(int H) {h_ = H; data_h_ = H;}
00097 void d(int D) {d_ = D;}
00109 void ld(int LD) {ld_ = LD;}
00117 void data(const char * const *p, int c) {data_ = p; count_ = c;}
00118 void draw_empty(int X, int Y);
00119
00120 static void labeltype(const Fl_Label *lo, int lx, int ly, int lw, int lh, Fl_Align la);
00121 static void measure(const Fl_Label *lo, int &lw, int &lh);
00122 int draw_scaled(int X, int Y, int W, int H);
00123
00124 public:
00125
00131 int w() const {return w_;}
00137 int h() const {return h_;}
00141 int data_w() const {return data_w_;}
00145 int data_h() const {return data_h_;}
00151 int d() const {return d_;}
00156 int ld() const {return ld_;}
00165 int count() const {return count_;}
00191 const char * const *data() const {return data_;}
00192 int fail() const;
00220 virtual void release() {
00221     delete this;
00222 }
00223
00233 virtual class Fl_Shared_Image *as_shared_image() {
00234     return 0;
00235 }
00236
00237 Fl_Image(int W, int H, int D);
00238 virtual ~Fl_Image();
00239 virtual Fl_Image *copy(int W, int H) const;
00266 Fl_Image *copy() const { return copy(w(), h()); }
00267 virtual void color_average(Fl_Color c, float i);
00279 void inactive() { color_average(FL_GRAY, .33f); }
00280 virtual void desaturate();
00281 virtual void label(Fl_Widget*w);
00282 virtual void label(Fl_Menu_Item*m);
00294 virtual void draw(int X, int Y, int W, int H, int cx=0, int cy=0); // platform dependent
00299 void draw(int X, int Y) {draw(X, Y, w(), h(), 0, 0);} // platform dependent
00300 virtual void uncache();
00301
00302 // used by fl_define_FL_IMAGE_LABEL() to avoid 'friend' declaration
00303 static Fl_Labeltype define_FL_IMAGE_LABEL();
00304
00305 // set RGB image scaling method
00306 static void RGB_scaling(Fl_RGB_Scaling);
00307 // get RGB image scaling method
00308 static Fl_RGB_Scaling RGB_scaling();
00309
00310 // set the image drawing size
00311 virtual void scale(int width, int height, int proportional = 1, int can_expand = 0);
00320 static void scaling_algorithm(Fl_RGB_Scaling algorithm) {scaling_algorithm_ = algorithm; }
00322 static Fl_RGB_Scaling scaling_algorithm() {return scaling_algorithm_;}
00323 static bool register_images_done;
00324 };
00325
00326 class Fl_SVG_Image;
00327
00339 class FL_EXPORT Fl_RGB_Image : public Fl_Image {
00340     friend class Fl_Graphics_Driver;
00341     static size_t max_size_;
00342 public:
00343     const uchar *array;
00350     int alloc_array;
00351
00352 private:
00353     // These two variables are used to cache the image and mask for the main display graphics driver
00354     fl_uintptr_t id_;
00355     fl_uintptr_t mask_;
00356     int cache_w_, cache_h_; // size of image when cached
00357 public:

```

```

00358
00359 Fl_RGB_Image(const uchar *bits, int W, int H, int D=3, int LD=0);
00360 Fl_RGB_Image(const uchar *bits, int bits_length, int W, int H, int D, int LD);
00361 Fl_RGB_Image(const Fl_Pixmap *pixmap, Fl_Color bg=FL_GRAY);
00362 ~Fl_RGB_Image() FL_OVERRIDE;
00363 Fl_Image *copy(int W, int H) const FL_OVERRIDE;
00364 Fl_Image *copy() const { return Fl_Image::copy(); }
00365 void color_average(Fl_Color c, float i) FL_OVERRIDE;
00366 void desaturate() FL_OVERRIDE;
00367 void draw(int X, int Y, int W, int H, int cx=0, int cy=0) FL_OVERRIDE;
00368 void draw(int X, int Y) {draw(X, Y, w(), h(), 0, 0);}
00369 void label(Fl_Widget*w) FL_OVERRIDE;
00370 void label(Fl_Menu_Item*m) FL_OVERRIDE;
00371 void uncache() FL_OVERRIDE;
00372 int cache_w() {return cache_w_;}
00373 int cache_h() {return cache_h_;}
00383 static void max_size(size_t size) { max_size_ = size;}
00388 static size_t max_size() {return max_size_;}
00391 virtual Fl_SVG_Image *as_svg_image() { return NULL; }
00394 virtual void normalize() {}
00395 };
00396
00397 #endif // !Fl_Image_H

```

13.73 Fl_Image_Surface.H

```

00001 //
00002 // Draw-to-image code for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2016 by Bill Spitzak and others.
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00012 // Please see the following page on how to report bugs and issues:
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Image_Surface_H
00018 #define Fl_Image_Surface_H
00019
00020 #include <FL/Fl_Widget_Surface.H>
00021 #include <FL/Fl_Image.H>
00022 #include <FL/Fl_Shared_Image.H>
00023 #include <FL/platform_types.h> // for Fl_Offscreen
00024
00025
00065 class FL_EXPORT Fl_Image_Surface : public Fl_Widget_Surface {
00066     friend class Fl_Graphics_Driver;
00067 private:
00068     class Fl_Image_Surface_Driver *platform_surface;
00069     Fl_Offscreen get_offscreen_before_delete();
00070 protected:
00071     void translate(int x, int y) FL_OVERRIDE;
00072     void untranslate() FL_OVERRIDE;
00073 public:
00074     Fl_Image_Surface(int w, int h, int high_res = 0, Fl_Offscreen off = 0);
00075     ~Fl_Image_Surface();
00076     void set_current() FL_OVERRIDE;
00077     bool is_current() FL_OVERRIDE;
00078     Fl_RGB_Image *image();
00079     Fl_Shared_Image *highres_image();
00080     void origin(int *x, int *y) FL_OVERRIDE;
00081     void origin(int x, int y) FL_OVERRIDE;
00082     int printable_rect(int *w, int *h) FL_OVERRIDE;
00083     Fl_Offscreen offscreen();
00084     void rescale();
00085     void mask(const Fl_RGB_Image *);
00086 };
00087
00088
00100 class Fl_Image_Surface_Driver : public Fl_Widget_Surface {
00101     friend class Fl_Image_Surface;
00102 private:
00103     Fl_Image_Surface *image_surface_;
00104 protected:
00105     int width;
00106     int height;
00107     Fl_Offscreen offscreen;
00108     int external_offscreen;

```

```

00109 Fl_Image_Surface_Driver(int w, int h, int /*high_res*/, Fl_Offscreen off) : Fl_Widget_Surface(NULL),
width(w), height(h), offscreen(off) {external_offscreen = (off != 0);}
00110 virtual ~Fl_Image_Surface_Driver() {}
00111 static void copy_with_mask(Fl_RGB_Image* mask, uchar *dib_dst, uchar *dib_src,
00112                          int line_size, bool bottom_to_top);
00113 static Fl_RGB_Image *RGB3_to_RGB1(const Fl_RGB_Image *rgb3, int W, int H);
00114 void set_current() FL_OVERRIDE = 0;
00115 void translate(int x, int y) FL_OVERRIDE = 0;
00116 void untranslate() FL_OVERRIDE = 0;
00117 int printable_rect(int *w, int *h) FL_OVERRIDE;
00118 virtual Fl_RGB_Image *image() = 0;
00119 virtual void mask(const Fl_RGB_Image *) {}
00124 static Fl_Image_Surface_Driver *newImageSurfaceDriver(int w, int h, int high_res, Fl_Offscreen off);
00125 public:
00127 Fl_Image_Surface *image_surface() { return image_surface_; }
00128 };
00129
00135 #endif // Fl_Image_Surface_H

```

13.74 Fl_Input.H

```

00001 //
00002 // Input header file for the Fast Light Tool Kit (FLTK).
00003 //
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00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //   https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018    Fl_Input widget . */
00019
00020 #ifndef Fl_Input_H
00021 #define Fl_Input_H
00022
00023 #include "Fl_Input_.H"
00024
00025 class FL_EXPORT Fl_Input : public Fl_Input_ {
00026     friend class Fl_Screen_Driver;
00027     friend class Fl_Cocoa_Screen_Driver; // Not ideal, but probably no other platform will use it
00028     int shift_position(int p);
00029     int shift_up_down_position(int p);
00030     void handle_mouse(int keepmark=0);
00031
00032     // Private keyboard functions
00033     int kf_lines_up(int repeat_num);
00034     int kf_lines_down(int repeat_num);
00035     int kf_page_up();
00036     int kf_page_down();
00037     int kf_insert_toggle();
00038     int kf_delete_word_right();
00039     int kf_delete_word_left();
00040     int kf_delete_sol();
00041     int kf_delete_eol();
00042     int kf_delete_char_right();
00043     int kf_delete_char_left();
00044     int kf_move_sol();
00045     int kf_move_eol();
00046     int kf_clear_eol();
00047     int kf_move_char_left();
00048     int kf_move_char_right();
00049     int kf_move_word_left();
00050     int kf_move_word_right();
00051     int kf_move_up_and_sol();
00052     int kf_move_down_and_eol();
00053     int kf_top();
00054     int kf_bottom();
00055     int kf_select_all();
00056     int kf_undo();
00057     int kf_redo();
00058     int kf_copy();
00059     int kf_paste();
00060     int kf_copy_cut();
00061
00062 protected:
00063     void draw() FL_OVERRIDE;
00064     int handle_key();

```

```

00260 int handle_rmb();
00261
00262 public:
00263 int handle(int) FL_OVERRIDE;
00264 Fl_Input(int,int,int,int,const char * = 0);
00265 static const char *cut_menu_text;
00266 static const char *copy_menu_text;
00267 static const char *paste_menu_text;
00268 };
00269
00270 #endif

```

13.75 Fl_Input_.H

```

00001 //
00002 // Input base class header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2015 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018 Fl_Input_ widget . */
00019
00020 #ifndef Fl_Input__H
00021 #define Fl_Input__H
00022
00023 #ifndef Fl_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026
00027 #define FL_NORMAL_INPUT          0
00028 #define FL_FLOAT_INPUT          1
00029 #define FL_INT_INPUT            2
00030 #define FL_HIDDEN_INPUT        3
00031 #define FL_MULTILINE_INPUT     4
00032 #define FL_SECRET_INPUT        5
00033 #define FL_INPUT_TYPE          7
00034 #define FL_INPUT_READONLY     8
00035 #define FL_NORMAL_OUTPUT      (FL_NORMAL_INPUT | FL_INPUT_READONLY)
00036 #define FL_MULTILINE_OUTPUT   (FL_MULTILINE_INPUT | FL_INPUT_READONLY)
00037 #define FL_INPUT_WRAP        16
00038 #define FL_MULTILINE_INPUT_WRAP (FL_MULTILINE_INPUT | FL_INPUT_WRAP)
00039 #define FL_MULTILINE_OUTPUT_WRAP (FL_MULTILINE_INPUT | FL_INPUT_READONLY | FL_INPUT_WRAP)
00040
00041 class Fl_Input_Undo_Action;
00042 class Fl_Input_Undo_Action_List;
00043
00044 class FL_EXPORT Fl_Input_ : public Fl_Widget {
00045
00046     const char* value_;
00047
00048     char* buffer;
00049
00050     int size_;
00051
00052     int bufsize;
00053
00054     int position_;
00055
00056     int mark_;
00057
00058     int tab_nav_;
00059
00060     int xscroll_, yscroll_;
00061
00062     int mu_p;
00063
00064     int maximum_size_;
00065
00066     int shortcut_;
00067
00068     uchar erase_cursor_only;
00069
00070     Fl_Font textfont_;
00071
00072 };

```



```

00142 Fl_Fontsize textsize_;
00143
00145 Fl_Color textcolor_;
00146
00148 Fl_Color cursor_color_;
00149
00151 Fl_Input_Undo_Action* undo_;
00152 Fl_Input_Undo_Action_List* undo_list_;
00153 Fl_Input_Undo_Action_List* redo_list_;
00154
00156 static double up_down_pos;
00157
00159 static int was_up_down;
00160
00161 /* Convert a given text segment into the text that will be rendered on screen. */
00162 const char* expand(const char*, char*) const;
00163
00164 /* Calculates the width in pixels of part of a text buffer. */
00165 double expandpos(const char*, const char*, const char*, int*) const;
00166
00167 /* Mark a range of characters for update. */
00168 void minimal_update(int, int);
00169
00170 /* Mark a range of characters for update. */
00171 void minimal_update(int p);
00172
00173 /* Copy the value from a possibly static entry into the internal buffer. */
00174 void put_in_buffer(int newsize);
00175
00176 /* Set the current font and font size. */
00177 void setfont() const;
00178
00179 protected:
00180
00181 /* Find the start of a word. */
00182 int word_start(int i) const;
00183
00184 /* Find the end of a word. */
00185 int word_end(int i) const;
00186
00187 /* Find the start of a line. */
00188 int line_start(int i) const;
00189
00190 /* Find the end of a line. */
00191 int line_end(int i) const;
00192
00193 /* Draw the text in the passed bounding box. */
00194 void drawtext(int, int, int, int);
00195
00196 /* Draw the text in the passed bounding box. */
00197 void drawtext(int, int, int, int, bool draw_active);
00198
00199 /* Move the cursor to the column given by up_down_pos. */
00200 int up_down_position(int, int keepmark=0);
00201
00202 /* Handle mouse clicks and mouse moves. */
00203 void handle_mouse(int, int, int, int, int keepmark=0);
00204
00205 /* Handle all kinds of text field related events. */
00206 int handletext(int e, int, int, int, int);
00207
00208 /* Check the when() field and do a callback if indicated. */
00209 void maybe_do_callback(Fl_Callback_Reason reason = FL_REASON_UNKNOWN);
00210
00212 int xscroll() const {return xscroll_;}
00213
00215 int yscroll() const {return yscroll_;}
00216 void yscroll(int yOffset) { yscroll_ = yOffset; damage(FL_DAMAGE_EXPOSE);}
00217
00218 /* Return the number of lines displayed on a single page. */
00219 int linesPerPage();
00220
00221 /* Apply the current undo/redo operation, called from undo() or redo() */
00222 int apply_undo();
00223
00224 public:
00225
00226 /* Change the size of the widget. */
00227 void resize(int, int, int, int) FL_OVERRIDE;
00228
00229 /* Constructor */
00230 Fl_Input_(int, int, int, int, const char* = 0);
00231
00232 /* Destructor */
00233 ~Fl_Input_();
00234
00235 /* Changes the widget text. */

```

```

00236 int value(const char*);
00237
00238 /* Changes the widget text. */
00239 int value(const char*, int);
00240
00241 /* Changes the widget text. */
00242 int value(int value);
00243
00244 /* Changes the widget text. */
00245 int value(double value);
00246
00247 /* Changes the widget text. */
00248 int static_value(const char*);
00249
00250 /* Changes the widget text. */
00251 int static_value(const char*, int);
00252
00263 const char* value() const {return value_;}
00264
00265 int ivalue() const;
00266
00267 double dvalue() const;
00268
00269 /* Returns the Unicode character at index \p i. */
00270 unsigned int index(int i) const;
00271
00280 int size() const {return size_;}
00281
00285 void size(int W, int H) { Fl_Widget::size(W, H); }
00286
00289 int maximum_size() const {return maximum_size_;}
00290
00300 void maximum_size(int m) {maximum_size_ = m;}
00301
00306 int insert_position() const { return position_; }
00307 FL_DEPRECATED("in 1.4.0 - use insert_position() instead",
00308 int position() const ) { return insert_position(); }
00309
00312 int mark() const {return mark_;}
00313
00314 /* Sets the index for the cursor and mark. */
00315 int insert_position(int p, int m);
00316 FL_DEPRECATED("in 1.4.0 - use insert_position(p, m) or Fl_Widget::position(x, y) instead",
00317 int position(int p, int m) ) { return insert_position(p, m); }
00318
00325 int insert_position(int p) { return insert_position(p, p); }
00326 FL_DEPRECATED("in 1.4.0 - use insert_position(p) instead",
00327 int position(int p) ) { return insert_position(p); }
00328
00334 int mark(int m) {return insert_position(insert_position(), m);}
00335
00336 /* Deletes text from \p b to \p e and inserts the new string \p text. */
00337 int replace(int b, int e, const char *text, int ilen=0);
00338
00349 int cut() {return replace(insert_position(), mark(), 0);}
00350
00363 int cut(int n) {return replace(insert_position(), insert_position()+n, 0);}
00364
00376 int cut(int a, int b) {return replace(a, b, 0);}
00377
00389 int insert(const char* t, int l=0){return replace(position_, mark_, t, l);}
00390
00391 /* Append text at the end. */
00392 int append(const char* t, int l=0, char keep_selection=0);
00393
00394 /* Put the current selection into the clipboard. */
00395 int copy(int clipboard);
00396
00397 /* Undo previous changes to the text buffer. */
00398 int undo();
00399
00400 /* Return true if the last operation can be undone. */
00401 bool can_undo() const;
00402
00403 /* Redo previous undo operations. */
00404 int redo();
00405
00406 /* Return true if there is a redo action in the list. */
00407 bool can_redo() const;
00408
00409 /* Copy the yank buffer to the clipboard. */
00410 int copy_cuts();
00411
00415 int shortcut() const {return shortcut_;}
00416
00423 void shortcut(int s) {shortcut_ = s;}
00424

```

```

00427 Fl_Font textfont() const {return textfont_;}
00428
00432 void textfont(Fl_Font s) {textfont_ = s;}
00433
00436 Fl_Fontsize textsize() const {return textsize_;}
00437
00441 void textsize(Fl_Fontsize s) {textsize_ = s;}
00442
00446 Fl_Color textcolor() const {return textcolor_;}
00447
00452 void textcolor(Fl_Color n) {textcolor_ = n;}
00453
00456 Fl_Color cursor_color() const {return cursor_color_;}
00457
00461 void cursor_color(Fl_Color n) {cursor_color_ = n;}
00462
00465 int input_type() const {return type() & FL_INPUT_TYPE; }
00466
00470 void input_type(int t) { type((uchar)(t | readonly())); }
00471
00474 int readonly() const { return type() & FL_INPUT_READONLY; }
00475
00478 void readonly(int b) { if (b) type((uchar)(type() | FL_INPUT_READONLY));
00479                       else type((uchar)(type() & ~FL_INPUT_READONLY)); }
00480
00485 int wrap() const { return type() & FL_INPUT_WRAP; }
00486
00491 void wrap(int b) { if (b) type((uchar)(type() | FL_INPUT_WRAP));
00492                       else type((uchar)(type() & ~FL_INPUT_WRAP)); }
00493
00517 void tab_nav(int val) {
00518     tab_nav_ = val;
00519 }
00520
00531 int tab_nav() const {
00532     return tab_nav_;
00533 }
00534 };
00535
00536 #endif

```

13.76 Fl_Input_Choice.H

```

00001 //
00002 // An input/chooser widget.
00003 //
00004 //      |-----| |-----|
00005 //      | input area | | √ |
00006 //      |-----| |-----|
00007 //
00008 // Copyright 2004 by Greg Ercolano.
00009 // Copyright 1998-2021 by Bill Spitzak and others.
00010 //
00011 // This library is free software. Distribution and use rights are outlined in
00012 // the file "COPYING" which should have been included with this file. If this
00013 // file is missing or damaged, see the license at:
00014 //
00015 //      https://www.fltk.org/COPYING.php
00016 //
00017 // Please see the following page on how to report bugs and issues:
00018 //
00019 //      https://www.fltk.org/bugs.php
00020 //
00021
00022 /* \file
00023     Fl_Input_Choice widget . */
00024
00025 #ifndef Fl_Input_Choice_H
00026 #define Fl_Input_Choice_H
00027
00028 #include <FL/Fl.H>
00029 #include <FL/Fl_Group.H>
00030 #include <FL/Fl_Input.H>
00031 #include <FL/Fl_Menu_Button.H>
00032
00033 /*
00034     A combination of the input widget and a menu button.
00035
00036     The user can either type into the input area, or use the
00037     menu button chooser on the right to choose an item which loads
00038     the input area with the selected text.
00039
00040     Note: doxygen docs in src/Fl_Input_Choice.cxx
00041 */
00042

```

```

00043 class FL_EXPORT Fl_Input_Choice : public Fl_Group {
00044
00045     // Private class to handle slightly 'special' behavior of menu button
00046     class InputMenuButton : public Fl_Menu_Button {
00047         void draw() FL_OVERRIDE;
00048         const Fl_Menu_Item* popup();
00049     public:
00050         InputMenuButton(int X, int Y, int W, int H, const char *L=0);
00051         int handle(int e) FL_OVERRIDE;
00052     };
00053
00054     Fl_Input *inp_;
00055     InputMenuButton *menu_;
00056
00057     // note: this is used by the Fl_Input_Choice ctor.
00058     static void menu_cb(Fl_Widget*, void *data);
00059
00060     // note: this is used by the Fl_Input_Choice ctor.
00061     static void inp_cb(Fl_Widget*, void *data);
00062
00063 protected:
00064     // Custom resize behavior -- input stretches, menu button doesn't
00065
00071     virtual int inp_x() const { return(x() + Fl::box_dx(box())); }
00073     virtual int inp_y() const { return(y() + Fl::box_dy(box())); }
00075     virtual int inp_w() const { return(w() - Fl::box_dw(box()) - 20); }
00077     virtual int inp_h() const { return(h() - Fl::box_dh(box())); }
00078
00084     virtual int menu_x() const { return(x() + w() - 20 - Fl::box_dx(box())); }
00086     virtual int menu_y() const { return(y() + Fl::box_dy(box())); }
00088     virtual int menu_w() const { return(20); }
00090     virtual int menu_h() const { return(h() - Fl::box_dh(box())); }
00091
00092 public:
00093
00094     Fl_Input_Choice(int X, int Y, int W, int H, const char *L=0);
00095
00096     void resize(int X, int Y, int W, int H) FL_OVERRIDE;
00097
00112     void add(const char *s) { menu_->add(s); }
00113
00115     int changed() const { return inp_->changed() | Fl_Widget::changed(); }
00116
00117     // Clears the changed() state of both input and menu button widgets.
00118     void clear_changed();
00119
00120     // Sets the changed() state of both input and menu button widgets.
00121     void set_changed();
00122
00124     void clear() { menu_->clear(); }
00125
00127     Fl_Boxtype down_box() const { return (menu_->down_box()); }
00128
00130     void down_box(Fl_Boxtype b) { menu_->down_box(b); }
00131
00133     const Fl_Menu_Item *menu() { return (menu_->menu()); }
00134
00136     void menu(const Fl_Menu_Item *m) { menu_->menu(m); }
00137
00139     Fl_Color textcolor() const { return (inp_->textcolor()); }
00140
00142     void textcolor(Fl_Color c) { inp_->textcolor(c); }
00143
00145     Fl_Font textfont() const { return (inp_->textfont()); }
00146
00148     void textfont(Fl_Font f) { inp_->textfont(f); }
00149
00151     Fl_Fonsize textsize() const { return (inp_->textsize()); }
00152
00154     void textsize(Fl_Fonsize s) { inp_->textsize(s); }
00155
00157     const char* value() const { return (inp_->value()); }
00158
00169     void value(const char *val) { inp_->value(val); }
00170
00171     /* Chooses item# \p val in the menu, and sets the Fl_Input text field
00172        to that value. Any previous text is cleared. */
00173     void value(int val);
00174
00175     int update_menubutton();
00176
00189     Fl_Menu_Button *menubutton() { return menu_; }
00190
00194     Fl_Input *input() { return inp_; }
00195 };
00196
00197 #endif // !Fl_Input_Choice_H

```

13.77 Fl_Int_Input.H

```

00001 //
00002 // Integer input header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018    Fl_Int_Input widget . */
00019 //
00020 #ifndef Fl_Int_Input_H
00021 #define Fl_Int_Input_H
00022 //
00023 #include "Fl_Input.H"
00024 //
00029 class FL_EXPORT Fl_Int_Input : public Fl_Input {
00030 public:
00037    Fl_Int_Input(int X,int Y,int W,int H,const char *l = 0);
00038 };
00039 //
00040 #endif

```

13.78 Fl_JPEG_Image.H

```

00001 //
00002 // JPEG image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018    Fl_JPEG_Image class . */
00019 //
00020 #ifndef Fl_JPEG_Image_H
00021 #define Fl_JPEG_Image_H
00022 # include "Fl_Image.H"
00023 //
00030 class FL_EXPORT Fl_JPEG_Image : public Fl_RGB_Image {
00031 //
00032 public:
00033 //
00034    Fl_JPEG_Image(const char *filename);
00035    Fl_JPEG_Image(const char *name, const unsigned char *data, int data_length=-1);
00036 //
00037 protected:
00038 //
00039    void load_jpg_(const char *filename, const char *sharename, const unsigned char *data, int
    data_length=-1);
00040 //
00041 };
00042 //
00043 #endif

```

13.79 Fl_Light_Button.H

```

00001 //
00002 // Lighted button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in

```

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00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
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00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Light_Button widget . */
00019
00020 #ifndef Fl_Light_Button_H
00021 #define Fl_Light_Button_H
00022
00023 #include "Fl_Button.H"
00024
00036 class FL_EXPORT Fl_Light_Button : public Fl_Button {
00037 protected:
00038     void draw() FL_OVERRIDE;
00039 public:
00040     int handle(int) FL_OVERRIDE;
00041     Fl_Light_Button(int x,int y,int w,int h,const char *l = 0);
00042 };
00043
00044 #endif

```

13.80 Fl_Line_Dial.H

```

00001 //
00002 // Line dial header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Line_Dial widget . */
00019
00020 #ifndef Fl_Line_Dial_H
00021 #define Fl_Line_Dial_H
00022
00023 #include "Fl_Dial.H"
00024
00025 class FL_EXPORT Fl_Line_Dial : public Fl_Dial {
00026 public:
00027     Fl_Line_Dial(int X,int Y,int W,int H, const char *L = 0);
00028 };
00029
00030 #endif

```

13.81 Fl_Menu.H

```

00001 //
00002 // Old menu header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 // this include file is for back compatibility only
00018 #include "Fl_Menu_Item.H"

```

13.82 Fl_Menu_.H

```

00001 //
00002 // Menu base class header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2019 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
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00010 //     https://www.fltk.org/COPYING.php
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00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018    Fl_Menu_ widget . */
00019
00020 #ifndef Fl_Menu__H
00021 #define Fl_Menu__H
00022
00023 #ifndef Fl_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026 #include "Fl_Menu_Item.H"
00027
00053 class FL_EXPORT Fl_Menu_ : public Fl_Widget {
00054
00055     Fl_Menu_Item *menu_;
00056     const Fl_Menu_Item *value_;
00057     const Fl_Menu_Item *prev_value_;
00058
00059 protected:
00060
00061     uchar alloc;                // flag indicates if menu_ is a dynamic copy (=1) or not (=0)
00062     uchar down_box_;
00063     Fl_Boxtype menu_box_;
00064     Fl_Font textfont_;
00065     Fl_Fonsize textsize_;
00066     Fl_Color textcolor_;
00067
00068     int item_pathname(char *name, int namelen, const Fl_Menu_Item *finditem,
00069                     const Fl_Menu_Item *menu=0) const;
00070 public:
00071     Fl_Menu_(int,int,int,int,const char * =0);
00072     ~Fl_Menu_();
00073
00074     int item_pathname(char *name, int namelen, const Fl_Menu_Item *finditem=0) const;
00075     const Fl_Menu_Item* picked(const Fl_Menu_Item*);
00076     const Fl_Menu_Item* find_item(const char *name);
00077     const Fl_Menu_Item* find_item(Fl_Callback*);
00078     const Fl_Menu_Item* find_item_with_user_data(void*);
00079     const Fl_Menu_Item* find_item_with_argument(long);
00080     int find_index(const char *name) const;
00081     int find_index(const Fl_Menu_Item *item) const;
00082     int find_index(Fl_Callback *cb) const;
00083
00095     const Fl_Menu_Item* test_shortcut() {return picked(menu()->test_shortcut());}
00096     void global();
00097
00133     const Fl_Menu_Item *menu() const {return menu_;}
00134     const Fl_Menu_Item *menu_end(); // in src/Fl_Menu_add.cxx
00135     void menu(const Fl_Menu_Item *m);
00136     void copy(const Fl_Menu_Item *m, void* user_data = 0);
00137     int insert(int index, const char*, int shortcut, Fl_Callback*, void* = 0, int = 0);
00138     int add(const char*, int shortcut, Fl_Callback*, void* = 0, int = 0); // see src/Fl_Menu_add.cxx
00140     int add(const char* a, const char* b, Fl_Callback* c, void* d = 0, int e = 0) {
00141         return add(a,fl_old_shortcut(b),c,d,e);
00142     }
00144     int insert(int index, const char* a, const char* b, Fl_Callback* c, void* d = 0, int e = 0) {
00145         return insert(index,a,fl_old_shortcut(b),c,d,e);
00146     }
00147     int add(const char *);
00148     int size() const ;
00149     void size(int W, int H) { Fl_Widget::size(W, H); }
00150     void clear();
00151     int clear_submenu(int index);
00152     void replace(int,const char *);
00153     void remove(int);
00155     void shortcut(int i, int s) {menu_[i].shortcut(s);}
00157     void mode(int i,int fl) {menu_[i].flags = fl;}
00159     int mode(int i) const {return menu_[i].flags;}
00160
00162     const Fl_Menu_Item *mvalue() const {return value_;}

```

```

00166     const Fl_Menu_Item *prev_mvalue() const {return prev_value_;}
00168     int value() const {return value_ ? (int)(value_-menu_) : -1;}
00169     int value(const Fl_Menu_Item*);
00176     int value(int i) {return value(menu_+i);}
00178     const char *text() const {return value_ ? value_->text : 0;}
00180     const char *text(int i) const {return menu_[i].text;}
00181
00183     Fl_Font textfont() const {return textfont_;}
00185     void textfont(Fl_Font c) {textfont_=c;}
00187     Fl_Fontsize textsize() const {return textsize_;}
00189     void textsize(Fl_Fontsize c) {textsize_=c;}
00191     Fl_Color textcolor() const {return textcolor_;}
00193     void textcolor(Fl_Color c) {textcolor_=c;}
00194
00201     Fl_Boxtype down_box() const {return (Fl_Boxtype)down_box_;}
00203     void down_box(Fl_Boxtype b) {down_box_ = b;}
00204
00208     Fl_Boxtype menu_box() const { return menu_box_; }
00213     void menu_box(Fl_Boxtype b) { menu_box_ = b; }
00214
00216     Fl_Color down_color() const {return selection_color();}
00218     void down_color(unsigned c) {selection_color(c);}
00219     void setonly(Fl_Menu_Item* item);
00220 };
00221
00222 #endif

```

13.83 Fl_Menu_Bar.H

```

00001 //
00002 // Menu bar header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2017 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
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00012 // Please see the following page on how to report bugs and issues:
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Menu_Bar widget . */
00019
00020 #ifndef Fl_Menu_Bar_H
00021 #define Fl_Menu_Bar_H
00022
00023 #include "Fl_Menu_.H"
00024
00065 class FL_EXPORT Fl_Menu_Bar : public Fl_Menu_ {
00066     friend class Fl_Sys_Menu_Bar_Driver;
00067 protected:
00068     void draw() FL_OVERRIDE;
00069 public:
00070     int handle(int) FL_OVERRIDE;
00089     Fl_Menu_Bar(int X, int Y, int W, int H, const char *l=0);
00093     virtual void update() {}
00094 };
00095
00096 #endif

```

13.84 Fl_Menu_Button.H

```

00001 //
00002 // Menu button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
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00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //

```



```

00016
00017 /* \file
00018     Fl_Menu_Button widget . */
00019
00020 #ifndef Fl_Menu_Button_H
00021 #define Fl_Menu_Button_H
00022
00023 #include "Fl_Menu_.H"
00024
00056 class FL_EXPORT Fl_Menu_Button : public Fl_Menu_ {
00057 protected:
00058     void draw() FL_OVERRIDE;
00059     static Fl_Menu_Button* pressed_menu_button_;
00060 public:
00067     enum popup_buttons {POPUP1 = 1,
00068         POPUP2,
00069         POPUP12,
00070         POPUP3,
00071         POPUP13,
00072         POPUP23,
00073         POPUP123
00074     };
00075     int handle(int) FL_OVERRIDE;
00076     const Fl_Menu_Item* popup();
00077     Fl_Menu_Button(int,int,int,int,int,const char * =0);
00078 };
00079
00080 #endif

```

13.85 Fl_Menu_Item.H File Reference

```

#include <FL/Fl_Widget.H>
#include <FL/Fl_Image.H>
#include <FL/Fl_Multi_Label.H>
#include <FL/platform_types.h>

```

Classes

- struct [Fl_Menu_Item](#)

The *Fl_Menu_Item* structure defines a single menu item that is used by the *Fl_Menu* class.

Typedefs

- typedef [Fl_Menu_Item](#) **Fl_Menu**

Enumerations

- enum {
[FL_MENU_INACTIVE](#) = 1 , [FL_MENU_TOGGLE](#) = 2 , [FL_MENU_VALUE](#) = 4 , [FL_MENU_RADIO](#) = 8 ,
[FL_MENU_INVISIBLE](#) = 0x10 , [FL_SUBMENU_POINTER](#) = 0x20 , [FL_SUBMENU](#) = 0x40 , [FL_MENU_DIVIDER](#)
= 0x80 ,
[FL_MENU_HORIZONTAL](#) = 0x100 , [FL_MENU_RESERVED](#) = 0xfffff00 }
- enum {
[FL_PUP_NONE](#) = 0 , [FL_PUP_GREY](#) = [FL_MENU_INACTIVE](#) , [FL_PUP_GRAY](#) = [FL_MENU_INACTIVE](#) ,
[FL_MENU_BOX](#) = [FL_MENU_TOGGLE](#) ,
[FL_PUP_BOX](#) = [FL_MENU_TOGGLE](#) , [FL_MENU_CHECK](#) = [FL_MENU_VALUE](#) , [FL_PUP_CHECK](#) = [FL_MENU_VALUE](#) , [FL_PUP_RADIO](#) = [FL_MENU_RADIO](#) ,
[FL_PUP_INVISIBLE](#) = [FL_MENU_INVISIBLE](#) , [FL_PUP_SUBMENU](#) = [FL_SUBMENU_POINTER](#) }

Functions

- [Fl_Shortcut fl_old_shortcut](#) (const char *)

Emulation of XForms named shortcuts.

13.85.1 Enumeration Type Documentation

13.85.1.1 anonymous enum

anonymous enum

Enumerator

FL_MENU_INACTIVE	Deactivate menu item (gray out)
FL_MENU_TOGGLE	Item is a checkbox toggle (shows checkbox for on/off state)
FL_MENU_VALUE	The on/off state for checkbox/radio buttons (if set, state is 'on')
FL_MENU_RADIO	Item is a radio button (one checkbox of many can be on)
FL_MENU_INVISIBLE	Item will not show up (shortcut will work)
FL_SUBMENU_POINTER	Indicates user_data() is a pointer to another menu array.
FL_SUBMENU	Item is a submenu to other items.
FL_MENU_DIVIDER	Creates divider line below this item. Also ends a group of radio buttons.
FL_MENU_HORIZONTAL	??? – reserved, internal (do not use)
FL_MENU_RESERVED	These bits are reserved for internal or future usage (do not use)

13.86 Fl_Menu_Item.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Menu item header file for the Fast Light Tool Kit (FLTK).
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00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Menu_Item_H
00018 #define Fl_Menu_Item_H
00019
00020 #include <FL/Fl_Widget.H>
00021 #include <FL/Fl_Image.H>
00022 #include <FL/Fl_Multi_Label.H>
00023 #include <FL/platform_types.h> // for FL_COMMAND and FL_CONTROL
00024
00025 // doxygen needs the following line to enable e.g. ::FL_MENU_TOGGLE to link to the enums
00026
00027 enum { // values for flags:
00028     FL_MENU_INACTIVE   = 1,
00029     FL_MENU_TOGGLE     = 2,
00030     FL_MENU_VALUE      = 4,
00031     FL_MENU_RADIO      = 8,
00032     FL_MENU_INVISIBLE  = 0x10,
00033     FL_SUBMENU_POINTER = 0x20,
00034     FL_SUBMENU         = 0x40,
00035     FL_MENU_DIVIDER    = 0x80,
00036     FL_MENU_HORIZONTAL = 0x100,
00037     FL_MENU_RESERVED   = 0xfffff00
00038 };
00039
00040 extern FL_EXPORT Fl_Shortcut fl_old_shortcut(const char*);
00041
00042 class Fl_Menu_;
00043
00044 struct FL_EXPORT Fl_Menu_Item {
00045     const char *text;
00046     int shortcut_;
00047     Fl_Callback *callback_;
00048     void *user_data_;
00049     int flags;
00050     uchar labeltype_;

```

```

00122 Fl_Font labelfont_;
00123 Fl_Fontsize labelsize_;
00124 Fl_Color labelcolor_;
00125
00126 // advance N items, skipping submenus:
00127 const Fl_Menu_Item *next(int=1) const;
00128
00134 Fl_Menu_Item *next(int i=1) {
00135     return (Fl_Menu_Item*)((const Fl_Menu_Item*)this)->next(i);}
00136
00138 const Fl_Menu_Item *first() const { return next(0); }
00139
00141 Fl_Menu_Item *first() { return next(0); }
00142
00143 // methods on menu items:
00168 const char* label() const { return text; }
00169
00182 void label(const char* a) { text = a; }
00183
00199 void label(Fl_Labeltype a, const char* b) {
00200     labeltype_ = a;
00201     text = b;
00202 }
00203
00218 void multi_label(const Fl_Multi_Label *ml) {
00219     label(FL_MULTI_LABEL, (const char *)ml);
00220 }
00221
00236 void image_label(const Fl_Image *image) {
00237     label(FL_IMAGE_LABEL, (const char *)image);
00238 }
00239
00247 Fl_Labeltype labeltype() const {return (Fl_Labeltype)labeltype_;}
00248
00256 void labeltype(Fl_Labeltype a) {labeltype_ = a;}
00257
00265 Fl_Color labelcolor() const {return labelcolor_;}
00266
00271 void labelcolor(Fl_Color a) {labelcolor_ = a;}
00278 Fl_Font labelfont() const {return labelfont_;}
00279
00286 void labelfont(Fl_Font a) {labelfont_ = a;}
00287
00289 Fl_Fontsize labelsize() const {return labelsize_;}
00290
00292 void labelsize(Fl_Fontsize a) {labelsize_ = a;}
00293
00301 Fl_Callback_p callback() const {return callback_;}
00302
00307 void callback(Fl_Callback* c, void* p) {callback_=c; user_data_=p;}
00308
00314 void callback(Fl_Callback* c) {callback_=c;}
00315
00321 void callback(Fl_Callback0*c) {callback_=(Fl_Callback*)c;}
00322
00329 void callback(Fl_Callback1*c, long p=0) {callback_=(Fl_Callback*)c;
user_data_=(void*)(fl_intptr_t)p;}
00330
00334 void* user_data() const {return user_data_;}
00338 void user_data(void* v) {user_data_ = v;}
00345 long argument() const {return (long)(fl_intptr_t)user_data_;}
00353 void argument(long v) {user_data_ = (void*)(fl_intptr_t)v;}
00354
00356 int shortcut() const {return shortcut_;}
00357
00373 void shortcut(int s) {shortcut_ = s;}
00381 int submenu() const {return flags&(FL_SUBMENU|FL_SUBMENU_POINTER);}
00386 int checkbox() const {return flags&FL_MENU_TOGGLE;}
00393 int radio() const {return flags&FL_MENU_RADIO;}
00401 int value() const {return (flags & FL_MENU_VALUE) ? 1 : 0;}
00402
00404 void value(int v) { v ? set() : clear(); }
00405
00410 void set() {flags |= FL_MENU_VALUE;}
00411
00413 void clear() {flags &= ~FL_MENU_VALUE;}
00414
00415 void setonly(Fl_Menu_Item const* first = NULL);
00416
00418 int visible() const {return !(flags&FL_MENU_INVISIBLE);}
00419
00421 void show() {flags &= ~FL_MENU_INVISIBLE;}
00422
00424 void hide() {flags |= FL_MENU_INVISIBLE;}
00425
00427 int active() const {return !(flags&FL_MENU_INACTIVE);}
00428

```

```

00430 void activate() {flags &= ~FL_MENU_INACTIVE;}
00435 void deactivate() {flags |= FL_MENU_INACTIVE;}
00437 int activevisible() const {return !(flags & (FL_MENU_INACTIVE|FL_MENU_INVISIBLE));}
00438
00439 // compatibility for FLUID so it can set the image of a menu item...
00440
00446 void image(Fl_Image* image) {image->label(this);}
00447
00453 void image(Fl_Image& image) {image.label(this);}
00454
00455 // used by menubar:
00456 int measure(int* h, const Fl_Menu_*) const;
00457 void draw(int x, int y, int w, int h, const Fl_Menu_*, int t=0) const;
00458
00459 // popup menus without using an Fl_Menu_ widget:
00460 const Fl_Menu_Item* popup(
00461     int X, int Y,
00462     const char *title = 0,
00463     const Fl_Menu_Item* picked=0,
00464     const Fl_Menu_* = 0) const;
00465 const Fl_Menu_Item* pulldown(
00466     int X, int Y, int W, int H,
00467     const Fl_Menu_Item* picked = 0,
00468     const Fl_Menu_* = 0,
00469     const Fl_Menu_Item* title = 0,
00470     int menubar=0) const;
00471 const Fl_Menu_Item* test_shortcut() const;
00472 const Fl_Menu_Item* find_shortcut(int *ip=0, const bool require_alt = false) const;
00473
00479 void do_callback(Fl_Widget* o) const {Fl::callback_reason_=FL_REASON_SELECTED; callback_(o,
user_data_);}
00480
00486 void do_callback(Fl_Widget* o,void* arg) const {Fl::callback_reason_=FL_REASON_SELECTED;
callback_(o, arg);}
00487
00495 void do_callback(Fl_Widget* o,long arg) const {Fl::callback_reason_=FL_REASON_SELECTED; callback_(o,
(void*)(fl_intptr_t)arg);}
00496
00503 inline int checked() const {return value();}
00504
00511 inline void check() {set();}
00512
00519 inline void uncheck() {clear();}
00520
00521 int insert(int,const char*,int,Fl_Callback*,void* =0, int =0);
00522 int add(const char*, int shortcut, Fl_Callback*, void* =0, int = 0);
00523
00525 int add(const char*a, const char* b, Fl_Callback* c,
00526         void* d = 0, int e = 0) {
00527     return add(a,fl_old_shortcut(b),c,d,e);}
00528
00529 int size() const ;
00530 };
00531
00532 typedef Fl_Menu_Item Fl_Menu; // back compatibility
00533
00534 enum { // back-compatibility enum:
00535     FL_PUP_NONE = 0,
00536     FL_PUP_GREY = FL_MENU_INACTIVE,
00537     FL_PUP_GRAY = FL_MENU_INACTIVE,
00538     FL_MENU_BOX = FL_MENU_TOGGLE,
00539     FL_PUP_BOX = FL_MENU_TOGGLE,
00540     FL_MENU_CHECK = FL_MENU_VALUE,
00541     FL_PUP_CHECK = FL_MENU_VALUE,
00542     FL_PUP_RADIO = FL_MENU_RADIO,
00543     FL_PUP_INVISIBLE = FL_MENU_INVISIBLE,
00544     FL_PUP_SUBMENU = FL_SUBMENU_POINTER
00545 };
00546
00547 #endif

```

13.87 Fl_Menu_Window.H

```

00001 //
00002 // Menu window header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:

```

```

00013 //
00014 //   https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018   Fl_Menu_Window widget . */
00019
00020 #ifndef Fl_Menu_Window_H
00021 #define Fl_Menu_Window_H
00022
00023 #include "Fl_Single_Window.H"
00024
00031 class FL_EXPORT Fl_Menu_Window : public Fl_Single_Window {
00032 public:
00033   ~Fl_Menu_Window();
00035   Fl_Menu_Window(int W, int H, const char *l = 0);
00037   Fl_Menu_Window(int X, int Y, int W, int H, const char *l = 0);
00038 };
00039
00040 #endif

```

13.88 fl_message.H

```

00001 //
00002 // Standard message header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //   https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //   https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef _FL_fl_message_H_
00018 #define _FL_fl_message_H_
00019
00020 #include "fl_ask.H"
00021
00022 #endif

```

13.89 Fl_Multi_Browser.H

```

00001 //
00002 // Multi browser header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //   https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //   https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018   Fl_Multi_Browser widget . */
00019
00020 #ifndef Fl_Multi_Browser_H
00021 #define Fl_Multi_Browser_H
00022
00023 #include "Fl_Browser.H"
00024
00041 class FL_EXPORT Fl_Multi_Browser : public Fl_Browser {
00042 public:
00049   Fl_Multi_Browser(int X,int Y,int W,int H,const char *L=0);
00050 };
00051
00052 #endif

```

13.90 Fl_Multi_Label.H

```

00001 //
00002 // Multi-label header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Multi_Label_H
00018 #define Fl_Multi_Label_H
00019
00020 class Fl_Widget;
00021 struct Fl_Menu_Item;
00022
00023 struct FL_EXPORT Fl_Multi_Label {
00024     const char* labela;
00025     const char* labelb;
00026     uchar typea;
00027     uchar typeb;
00028
00029     // This method is used to associate a Fl_Multi_Label with a Fl_Widget.
00030     void label(Fl_Widget*);
00031
00032     // This method is used to associate a Fl_Multi_Label with a Fl_Menu_Item.
00033     void label(Fl_Menu_Item*);
00034 };
00035
00036 #endif

```

13.91 Fl_Multiline_Input.H

```

00001 //
00002 // Multiline input header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2011 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018    Fl_Multiline_Input widget . */
00019
00020 #ifndef Fl_Multiline_Input_H
00021 #define Fl_Multiline_Input_H
00022
00023 #include "Fl_Input.H"
00024
00025 class FL_EXPORT Fl_Multiline_Input : public Fl_Input {
00026 public:
00027     Fl_Multiline_Input(int X,int Y,int W,int H,const char *l = 0);
00028 };
00029
00030 #endif

```

13.92 Fl_Multiline_Output.H

```

00001 //
00002 // Multi line output header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2011 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:

```

```

00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Multiline_Output widget . */
00019 //
00020 #ifndef Fl_Multiline_Output_H
00021 #define Fl_Multiline_Output_H
00022 //
00023 #include "Fl_Output.H"
00024 //
00047 class FL_EXPORT Fl_Multiline_Output : public Fl_Output {
00048 public:
00049 //
00056     Fl_Multiline_Output(int X,int Y,int W,int H,const char *l = 0);
00057 };
00058 //
00059 #endif

```

13.93 Fl_Native_File_Chooser.H File Reference

[Fl_Native_File_Chooser](#) widget.

```
#include <FL/Fl_Export.H>
```

```
#include <FL/Fl_File_Chooser.H>
```

Classes

- class [Fl_Native_File_Chooser](#)

This class lets an FLTK application easily and consistently access the operating system's native file chooser.

13.93.1 Detailed Description

[Fl_Native_File_Chooser](#) widget.

13.94 Fl_Native_File_Chooser.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // FLTK native OS file chooser widget
00003 //
00004 // Copyright 2004 Greg Ercolano.
00005 // Copyright 2005-2024 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017 //
00021 /* Implementation note:
00022 //
00023 class Fl_Native_File_Chooser <== public API used by applications
00024 //
00025 class Fl_Native_File_Chooser_Driver <== virtual API that a platform may implement
00026                                     this API has a do-nothing default implementation
00027 //
00028 class Fl_Native_File_Chooser_FLTK_Driver <== this API implementation is the default FLTK
file chooser
00029 class Fl_GTK_Native_File_Chooser_Driver <== this API implementation runs a GTK file
chooser
00030 class Fl_Kdialog_Native_File_Chooser_Driver <== this API implementation runs a KDE
file chooser
00031                                     it is determined at run-time if the GTK dynamic libraries are
available

```

```

00032                                     and the KDE file chooser runs under the KDE desktop
00033
00034     class Fl_Quartz_Native_File_Chooser_Driver <== this API implementation runs a Mac OS X file
chooser
00035
00036     class Fl_WinAPI_Native_File_Chooser_Driver <== this API implementation runs a Windows file
chooser
00037
00038
00039 Each platform must implement the constructor of the Fl_Native_File_Chooser class.
00040 This particular implementation:
00041
00042 Fl_Native_File_Chooser::Fl_Native_File_Chooser(int val) {
00043     platform_fnfc = new Fl_Native_File_Chooser_FLTK_Driver(val);
00044 }
00045
00046 can be used by any platform.
00047 No more code is required. The cross-platform Fl_Native_File_Chooser_FLTK.cxx file must be compiled in
libfltk,
00048 and the default FLTK file chooser will be used.
00049
00050 This other implementation:
00051 Fl_Native_File_Chooser::Fl_Native_File_Chooser(int val) {
00052     platform_fnfc = 0;
00053 }
00054 can be used by a platform that needs no file chooser.
00055 */
00056
00057 #ifndef FL_NATIVE_FILE_CHOOSER_H
00058 #define FL_NATIVE_FILE_CHOOSER_H
00059
00060 #include <FL/Fl_Export.H>
00061 #include <FL/Fl_File_Chooser.H>
00062
00063 class Fl_Native_File_Chooser_Driver;
00064
00131 class FL_EXPORT Fl_Native_File_Chooser {
00132 private:
00133     Fl_Native_File_Chooser_Driver *platform_fnfc;
00134 public:
00135     enum Type {
00136         BROWSE_FILE = 0,
00137         BROWSE_DIRECTORY,
00138         BROWSE_MULTI_FILE,
00139         BROWSE_MULTI_DIRECTORY,
00140         BROWSE_SAVE_FILE,
00141         BROWSE_SAVE_DIRECTORY
00142     };
00143     enum Option {
00144         NO_OPTIONS = 0x0000,
00145         SAVEAS_CONFIRM = 0x0001,
00146         NEW_FOLDER = 0x0002,
00147         PREVIEW = 0x0004,
00148         USE_FILTER_EXT = 0x0008
00149     };
00150     static const char *file_exists_message;
00151
00152     Fl_Native_File_Chooser(int val = BROWSE_FILE); // each platform implements it
00153     ~Fl_Native_File_Chooser();
00154     void type(int t);
00155     int type() const;
00156     void options(int o);
00157     int options() const;
00158     int count() const;
00159     const char *filename() const;
00160     const char *filename(int i) const;
00161     void directory(const char *val);
00162     const char *directory() const;
00163     void title(const char *t);
00164     const char* title() const;
00165     const char *filter() const;
00166     void filter(const char *f);
00167     int filters() const;
00168     void filter_value(int i);
00169     int filter_value() const;
00170     void preset_file(const char*f);
00171     const char* preset_file() const;
00172     const char *errmsg() const;
00173     int show();
00174 };
00175
00180
00193 class Fl_Native_File_Chooser_Driver {
00194 protected:
00195     static void chrcat(char *s, char c);
00196     static char *strapp(char *s, const char *val);
00197     static char *strfree(char *val);
00198     static char *strnew(const char *val);

```



```

00199 public:
00200     Fl_Native_File_Chooser_Driver(int) {}
00201     virtual ~Fl_Native_File_Chooser_Driver() {}
00202     virtual void type(int) {}
00203     virtual int type() const {return 0;}
00204     virtual void options(int) {}
00205     virtual int options() const {return 0;}
00206     virtual int count() const {return 0;}
00207     virtual const char *filename() const {return 0;}
00208     virtual const char *filename(int) const {return 0;}
00209     virtual void directory(const char *) {}
00210     virtual const char *directory() const {return 0;}
00211     virtual void title(const char *) {}
00212     virtual const char* title() const {return 0;}
00213     virtual const char *filter() const {return 0;}
00214     virtual void filter(const char *) {}
00215     virtual int filters() const {return 0;}
00216     virtual void filter_value(int) {}
00217     virtual int filter_value() const {return 0;}
00218     virtual void preset_file(const char*) {}
00219     virtual const char* preset_file() const {return 0;}
00220     virtual const char *errmsg() const {return 0;}
00221     virtual int show() {return 1;}
00222 };
00223
00235 class Fl_Native_File_Chooser_FLTK_Driver : public Fl_Native_File_Chooser_Driver {
00236 private:
00237     void errmsg(const char *msg);
00238     int type_fl_file(int val);
00239     int exist_dialog();
00240     void parse_filter();
00241 protected:
00242     int _btype; // kind-of browser to show()
00243     int _options; // general options
00244     int _nfilters;
00245     char *_filter; // user supplied filter
00246     char *_parsedfilt; // parsed filter
00247     int _filtvalue; // selected filter
00248     char *_preset_file;
00249     char *_prevvalue; // Returned filename
00250     char *_directory;
00251     char *_errmsg; // error message
00252     Fl_File_Chooser *_file_chooser;
00253 public:
00254     Fl_Native_File_Chooser_FLTK_Driver(int val);
00255     virtual ~Fl_Native_File_Chooser_FLTK_Driver();
00256     void type(int t) FL_OVERRIDE;
00257     int type() const FL_OVERRIDE;
00258     void options(int o) FL_OVERRIDE;
00259     int options() const FL_OVERRIDE;
00260     int count() const FL_OVERRIDE;
00261     const char *filename() const FL_OVERRIDE;
00262     const char *filename(int i) const FL_OVERRIDE;
00263     void directory(const char *val) FL_OVERRIDE;
00264     const char *directory() const FL_OVERRIDE;
00265     void title(const char *t) FL_OVERRIDE;
00266     const char* title() const FL_OVERRIDE;
00267     const char *filter() const FL_OVERRIDE;
00268     void filter(const char *f) FL_OVERRIDE;
00269     int filters() const FL_OVERRIDE;
00270     void filter_value(int i) FL_OVERRIDE;
00271     int filter_value() const FL_OVERRIDE;
00272     void preset_file(const char*f) FL_OVERRIDE;
00273     const char* preset_file() const FL_OVERRIDE;
00274     const char *errmsg() const FL_OVERRIDE;
00275     int show() FL_OVERRIDE;
00276 };
00277
00284 #endif /*FL_NATIVE_FILE_CHOOSER_H*/

```

13.95 Fl_Nice_Slider.H

```

00001 //
00002 // "Nice" slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //

```

```

00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Nice_Slider widget . */
00019
00020 #ifndef Fl_Nice_Slider_H
00021 #define Fl_Nice_Slider_H
00022
00023 #include "Fl_Slider.H"
00024
00025 class FL_EXPORT Fl_Nice_Slider : public Fl_Slider {
00026 public:
00027     Fl_Nice_Slider(int X,int Y,int W,int H,const char *L=0);
00028 };
00029
00030 #endif

```

13.96 Fl_Object.H

```

00001 //
00002 // Old Fl_Object header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 // This file is provided for back compatibility only.  Please use Fl_Widget
00018 #ifndef Fl_Object
00019 #define Fl_Object Fl_Widget
00020 #endif
00021 #include "Fl_Widget.H"

```

13.97 Fl_Output.H

```

00001 //
00002 // Output header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Output widget . */
00019
00020 #ifndef Fl_Output_H
00021 #define Fl_Output_H
00022
00023 #include "Fl_Input.H"
00024
00025 class FL_EXPORT Fl_Output : public Fl_Input {
00026 public:
00027     Fl_Output(int X,int Y,int W,int H, const char *l = 0);
00028 };
00029
00030 #endif

```

13.98 Fl_Overlay_Window.H

```

00001 //
00002 // Overlay window header file for the Fast Light Tool Kit (FLTK).
00003 //

```

```

00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Overlay_Window class . */
00019 //
00020 #ifndef Fl_Overlay_Window_H
00021 #define Fl_Overlay_Window_H
00022 //
00023 #include "Fl_Double_Window.H"
00024 //
00036 class FL_EXPORT Fl_Overlay_Window : public Fl_Double_Window {
00037 #ifndef FL_DOXYGEN
00038     friend class _Fl_Overlay;
00039     friend class Fl_Window_Driver;
00040 #endif
00041 public:
00048     virtual void draw_overlay() = 0;
00049 private:
00050     Fl_Window *overlay_;
00051 public:
00052     void show() FL_OVERRIDE;
00053     void hide() FL_OVERRIDE;
00054     void flush() FL_OVERRIDE;
00055     void resize(int,int,int,int) FL_OVERRIDE;
00056     ~Fl_Overlay_Window();
00058     int can_do_overlay();
00059     void redraw_overlay();
00060 protected:
00064     Fl_Overlay_Window(int W, int H, const char *l=0);
00071     Fl_Overlay_Window(int X, int Y, int W, int H, const char *l=0);
00072 public:
00074     void show(int a, char **b) {Fl_Double_Window::show(a,b);}
00075     Fl_Overlay_Window *as_overlay_window() FL_OVERRIDE {return this; }
00076 };
00077 //
00078 #endif

```

13.99 Fl_Pack.H

```

00001 //
00002 // Pack header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2020 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
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00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Pack widget . */
00019 //
00020 #ifndef Fl_Pack_H
00021 #define Fl_Pack_H
00022 //
00023 #include <FL/Fl_Group.H>
00024 //
00054 class FL_EXPORT Fl_Pack : public Fl_Group {
00055     int spacing_;
00056 //
00057 public:
00058     enum { // values for type(int)
00059         VERTICAL = 0,
00060         HORIZONTAL = 1
00061     };
00062 //
00063 protected:
00064     void draw() FL_OVERRIDE;

```

```

00065
00066 public:
00067     Fl_Pack(int X, int Y, int W, int H, const char *L = 0);
00068
00073     int spacing() const {return spacing_;}
00074
00079     void spacing(int i) {spacing_ = i;}
00080
00093     uchar horizontal() const {return type();}
00094
00095     void resize(int X, int Y, int W, int H) FL_OVERRIDE;
00096 };
00097
00098 #endif

```

13.100 FI_Paged_Device.H File Reference

declaration of class [Fl_Paged_Device](#).

```
#include <FL/Fl_Widget_Surface.H>
```

Classes

- class [Fl_Paged_Device](#)
Represents page-structured drawing surfaces.
- struct [Fl_Paged_Device::page_format](#)
width, height and name of a page format

Macros

- `#define NO_PAGE_FORMATS 30` /* MSVC6 compilation fix */
Number of elements in enum Page_Format.

13.100.1 Detailed Description

declaration of class [Fl_Paged_Device](#).

13.101 FI_Paged_Device.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Printing support for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2010-2016 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00021 #ifndef Fl_Paged_Device_H
00022 #define Fl_Paged_Device_H
00023
00024 #include <FL/Fl_Widget_Surface.H>
00025
00026
00028 #define NO_PAGE_FORMATS 30 /* MSVC6 compilation fix */
00029
00036 class FL_EXPORT Fl_Paged_Device : public Fl_Widget_Surface {
00037 protected:
00039     Fl_Paged_Device() : Fl_Widget_Surface(NULL) {}
00040 public:
00045     enum Page_Format {
00046         A0 = 0,
00047         A1,

```

```

00048     A2,
00049     A3,
00050     A4,
00051     A5,
00052     A6,
00053     A7,
00054     A8,
00055     A9,
00056     B0,
00057     B1,
00058     B2,
00059     B3,
00060     B4,
00061     B5,
00062     B6,
00063     B7,
00064     B8,
00065     B9,
00066     B10,
00067     C5E,
00068     DLE,
00069     EXECUTIVE,
00070     FOLIO,
00071     LEDGER,
00072     LEGAL,
00073     LETTER,
00074     TABLOID,
00075     ENVELOPE,
00076     MEDIA = 0x1000
00077 };
00081 enum Page_Layout {
00082     PORTRAIT = 0,
00083     LANDSCAPE = 0x100,
00084     REVERSED = 0x200,
00085     ORIENTATION = 0x300
00086 };
00087
00090 typedef struct {
00092     int width;
00094     int height;
00096     const char *name;
00097 } page_format;
00100 static const page_format page_formats[NO_PAGE_FORMATS];
00102 virtual ~Fl_Paged_Device() {}
00103 virtual int begin_job(int pagecount = 0, int *frompage = NULL, int *topage = NULL, char
**perr_message = NULL);
00106 int start_job(int pagecount = 0, int *frompage = NULL, int *topage = NULL, char **perr_message =
NULL) {
00107     return begin_job(pagecount, frompage, topage, perr_message);
00108 }
00109 virtual int begin_page(void);
00112 int start_page() {return begin_page();}
00113 virtual void margins(int *left, int *top, int *right, int *bottom);
00114 virtual void scale(float scale_x, float scale_y = 0.);
00115 virtual void rotate(float angle);
00117 void print_widget(Fl_Widget* widget, int delta_x = 0, int delta_y = 0) {draw(widget, delta_x,
delta_y);}
00119 void print_window(Fl_Window *win, int x_offset = 0, int y_offset = 0) {
00120     draw_decorated_window(win, x_offset, y_offset);
00121 }
00122 virtual int end_page (void);
00123 virtual void end_job (void);
00124 };
00125
00126 #endif // Fl_Paged_Device_H
00127

```

13.102 Fl_Pixmap.H

```

00001 //
00002 // Pixmap header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2017 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //

```

```

00017 /* \file
00018     Fl_Pixmap widget . */
00019
00020 #ifndef Fl_Pixmap_H
00021 #define Fl_Pixmap_H
00022 # include "Fl_Image.H"
00023
00024 class Fl_Widget;
00025 struct Fl_Menu_Item;
00026
00027 // Older C++ compilers don't support the explicit keyword... :(
00028 # if defined(__sgi) && !defined(_COMPILER_VERSION)
00029 #   define explicit
00030 # endif // __sgi && !_COMPILER_VERSION
00031
00032 class FL_EXPORT Fl_Pixmap : public Fl_Image {
00033     friend class Fl_Graphics_Driver;
00034     void copy_data();
00035     void delete_data();
00036     void set_data(const char * const *p);
00037
00038 protected:
00039     void measure();
00040
00041 public:
00042     int alloc_data; // Non-zero if data was allocated
00043
00044 private:
00045     // for internal use
00046     fl_uintptr_t id_;
00047     fl_uintptr_t mask_;
00048     int cache_w_, cache_h_; // size of pixmap when cached
00049
00050 public:
00051     explicit Fl_Pixmap(char * const * D) : Fl_Image(-1,0,1), alloc_data(0), id_(0), mask_(0)
00052     {set_data((const char*const*)D); measure();}
00053     explicit Fl_Pixmap(uchar* const * D) : Fl_Image(-1,0,1), alloc_data(0), id_(0), mask_(0)
00054     {set_data((const char*const*)D); measure();}
00055     explicit Fl_Pixmap(const char * const * D) : Fl_Image(-1,0,1), alloc_data(0), id_(0), mask_(0)
00056     {set_data((const char*const*)D); measure();}
00057     explicit Fl_Pixmap(const uchar* const * D) : Fl_Image(-1,0,1), alloc_data(0), id_(0), mask_(0)
00058     {set_data((const char*const*)D); measure();}
00059     virtual ~Fl_Pixmap();
00060     Fl_Image *copy(int W, int H) const FL_OVERRIDE;
00061     Fl_Image *copy() const { return Fl_Image::copy(); }
00062     void color_average(Fl_Color c, float i) FL_OVERRIDE;
00063     void desaturate() FL_OVERRIDE;
00064     void draw(int X, int Y, int W, int H, int cx=0, int cy=0) FL_OVERRIDE;
00065     void draw(int X, int Y) {draw(X, Y, w(), h(), 0, 0);}
00066     void label(Fl_Widget*w) FL_OVERRIDE;
00067     void label(Fl_Menu_Item*m) FL_OVERRIDE;
00068     void uncache() FL_OVERRIDE;
00069     int cache_w() {return cache_w_;}
00070     int cache_h() {return cache_h_;}
00071 };
00072
00073 #endif

```

13.103 Fl_Plugin.H

```

00001 //
00002 // A Plugin system for FLTK, implemented in Fl_Preferences.cxx.
00003 //
00004 // Copyright 2002-2023 by Matthias Melcher.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
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00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Plugin class . */
00019
00020 #ifndef Fl_Plugin_H
00021 # define Fl_Plugin_H
00022
00023 # include "Fl_Preferences.H"

```

```

00024
00025
00059 class FL_EXPORT Fl_Plugin {
00060     Fl_Preferences::ID id;
00061 public:
00062     Fl_Plugin(const char *klass, const char *name);
00063     virtual ~Fl_Plugin();
00064 };
00065
00066
00071 class FL_EXPORT Fl_Plugin_Manager : public Fl_Preferences {
00072 public:
00073     Fl_Plugin_Manager(const char *klass);
00074     ~Fl_Plugin_Manager();
00075
00078     int plugins() { return groups(); }
00079     Fl_Plugin *plugin(int index);
00080     Fl_Plugin *plugin(const char *name);
00081     Fl_Preferences::ID addPlugin(const char *name, Fl_Plugin *plugin);
00082
00083     static void removePlugin(Fl_Preferences::ID id);
00084     static int load(const char *filename);
00085     static int loadAll(const char *dirpath, const char *pattern=0);
00086 };
00087
00088
00089 #endif // !Fl_Preferences_H

```

13.104 Fl_PNG_Image.H

```

00001 //
00002 // PNG image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_PNG_Image class . */
00019
00020 #ifndef Fl_PNG_Image_H
00021 #define Fl_PNG_Image_H
00022 # include "Fl_Image.H"
00023
00030 class FL_EXPORT Fl_PNG_Image : public Fl_RGB_Image {
00031     friend class Fl_ICO_Image;
00032 public:
00033
00034     Fl_PNG_Image(const char* filename);
00035     Fl_PNG_Image (const char *name_png, const unsigned char *buffer, int datasize);
00036 private:
00037     Fl_PNG_Image(const char *filename, int offset); // used by Fl_ICO_Image
00038     void load_png(const char *name_png, int offset, const unsigned char *buffer_png, int datasize);
00039 };
00040
00041 // Support functions to write PNG image files (since 1.4.0)
00042
00043 FL_EXPORT int fl_write_png(const char *filename, Fl_RGB_Image *img);
00044 FL_EXPORT int fl_write_png(const char *filename, const char *pixels, int w, int h, int d=3, int ld=0);
00045 FL_EXPORT int fl_write_png(const char *filename, const unsigned char *pixels, int w, int h, int d=3,
00046                             int ld=0);
00047 #endif

```

13.105 Fl_PNM_Image.H

```

00001 //
00002 // PNM image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this

```

```

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00011 //
00012 // Please see the following page on how to report bugs and issues:
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_PNM_Image class . */
00019
00020 #ifndef Fl_PNM_Image_H
00021 #define Fl_PNM_Image_H
00022 # include "Fl_Image.H"
00023
00030 class FL_EXPORT Fl_PNM_Image : public Fl_RGB_Image {
00031
00032     public:
00033
00034     Fl_PNM_Image(const char* filename);
00035 };
00036
00037 #endif

```

13.106 Fl_Positioner.H

```

00001 //
00002 // Positioner header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
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00007 // the file "COPYING" which should have been included with this file. If this
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00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Positioner widget . */
00019
00020 #ifndef Fl_Positioner_H
00021 #define Fl_Positioner_H
00022
00023 #ifndef Fl_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026
00035 class FL_EXPORT Fl_Positioner : public Fl_Widget {
00036
00037     double xmin, ymin;
00038     double xmax, ymax;
00039     double xvalue_, yvalue_;
00040     double xstep_, ystep_;
00041
00042     protected:
00043
00044     // these allow subclasses to put the dial in a smaller area:
00045     void draw(int, int, int, int);
00046     int handle(int, int, int, int, int);
00047     void draw() FL_OVERRIDE;
00048
00049     public:
00050
00051     int handle(int) FL_OVERRIDE;
00052     Fl_Positioner(int x,int y,int w,int h, const char *l=0);
00053     double xvalue() const {return xvalue_;}
00054     double yvalue() const {return yvalue_;}
00055     int xvalue(double);
00056     int yvalue(double);
00057     int value(double,double);
00058     void xbounds(double, double);
00059     double xminimum() const {return xmin;}
00060     void xminimum(double a) {xbounds(a,xmax);}
00061     double xmaximum() const {return xmax;}
00062     void xmaximum(double a) {xbounds(xmin,a);}
00063     void ybounds(double, double);
00064     double yminimum() const {return ymin;}
00065     void yminimum(double a) {ybounds(a,ymax);}
00066     double ymaximum() const {return ymax;}

```



```

00081 void ymaximum(double a) {ybounds(ymin, a);}
00083 void xstep(double a) {xstep_ = a;}
00085 void ystep(double a) {ystep_ = a;}
00086 };
00087
00088 #endif

```

13.107 Fl_PostScript.H File Reference

declaration of classes [Fl_PostScript_File_Device](#) and [Fl_EPS_File_Surface](#).

```

#include <FL/Fl_Paged_Device.H>
#include <FL/fl_draw.H>
#include <stdarg.h>

```

Classes

- class [Fl_EPS_File_Surface](#)
Encapsulated PostScript drawing surface.
- class [Fl_PostScript_File_Device](#)
To send graphical output to a PostScript file.

Typedefs

- typedef int(* [Fl_PostScript_Close_Command](#)) (FILE *)
Signature of functions FLTK may use to close FILE variables after PostScript/EPS output.

13.107.1 Detailed Description

declaration of classes [Fl_PostScript_File_Device](#) and [Fl_EPS_File_Surface](#).

13.107.2 Typedef Documentation

13.107.2.1 Fl_PostScript_Close_Command

```
typedef int(* Fl_PostScript_Close_Command) (FILE *)
```

Signature of functions FLTK may use to close FILE variables after PostScript/EPS output.
A non-null return value indicates output error.

See also

[Fl_PostScript_File_Device::close_command\(\)](#) and [Fl_EPS_File_Surface::Fl_EPS_File_Surface\(\)](#).

13.108 Fl_PostScript.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Support for graphics output to PostScript file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2010-2020 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00021 #ifndef Fl_PostScript_H
00022 #define Fl_PostScript_H
00023
00024 #include <FL/Fl_Paged_Device.H>

```

```

00025 #include <FL/fl_draw.H>
00026 #include <stdarg.h>
00027
00032 extern "C" {
00033     typedef int (*Fl_PostScript_Close_Command)(FILE *);
00034 }
00035
00036 class Fl_PostScript_Graphics_Driver;
00037
00078 class FL_EXPORT Fl_PostScript_File_Device : public Fl_Paged_Device {
00079 private:
00080     // memorize the display's current font to restore it when the object ceases being current
00081     Fl_Font display_font_;
00082     Fl_Fontsize display_size_;
00083 protected:
00087     inline Fl_PostScript_Graphics_Driver *driver() { return
        (Fl_PostScript_Graphics_Driver*)Fl_Surface_Device::driver(); }
00088 public:
00090     Fl_PostScript_File_Device();
00092     ~Fl_PostScript_File_Device();
00094     int begin_job(int pagecount, int* from, int* to, char **perr_message) FL_OVERRIDE;
00104     int begin_job(int pagecount = 0, enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
00105                 enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT);
00108     int start_job(int pagecount = 0, enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
00109                 enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT) {
00110         return begin_job(pagecount, format, layout);
00111     }
00122     int begin_job(FILE *ps_output, int pagecount = 0, enum Fl_Paged_Device::Page_Format format =
        Fl_Paged_Device::A4,
00123                 enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT);
00126     int start_job(FILE *ps_output, int pagecount = 0, enum Fl_Paged_Device::Page_Format format =
        Fl_Paged_Device::A4,
00127                 enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT) {
00128         return begin_job(ps_output, pagecount, format, layout);
00129     }
00130
00131     int begin_page(void) FL_OVERRIDE;
00132     int printable_rect(int *w, int *h) FL_OVERRIDE;
00133     void margins(int *left, int *top, int *right, int *bottom) FL_OVERRIDE;
00134     void origin(int *x, int *y) FL_OVERRIDE;
00135     void origin(int x, int y) FL_OVERRIDE;
00136     void scale(float scale_x, float scale_y = 0.) FL_OVERRIDE;
00137     void rotate(float angle) FL_OVERRIDE;
00138     void translate(int x, int y) FL_OVERRIDE;
00139     void untranslate(void) FL_OVERRIDE;
00140     int end_page(void) FL_OVERRIDE;
00144     void end_job(void) FL_OVERRIDE;
00146     static const char *file_chooser_title;
00148     FILE *file();
00150     void close_command(Fl_PostScript_Close_Command cmd);
00151     void set_current() FL_OVERRIDE;
00152     void end_current() FL_OVERRIDE;
00153 };
00154
00172 class FL_EXPORT Fl_EPS_File_Surface : public Fl_Widget_Surface {
00173 protected:
00175     inline Fl_PostScript_Graphics_Driver *driver() { return
        (Fl_PostScript_Graphics_Driver*)Fl_Surface_Device::driver(); }
00176 public:
00191     Fl_EPS_File_Surface(int width, int height, FILE *eps_output,
00192                       Fl_Color background = FL_WHITE, Fl_PostScript_Close_Command closef = NULL);
00200     ~Fl_EPS_File_Surface();
00201     int printable_rect(int *w, int *h) FL_OVERRIDE;
00203     FILE *file();
00204     void origin(int x, int y) FL_OVERRIDE;
00205     void origin(int *px, int *py) FL_OVERRIDE;
00206     void translate(int x, int y) FL_OVERRIDE;
00207     void untranslate() FL_OVERRIDE;
00211     int close();
00212 };
00213
00214 #endif // Fl_PostScript_H

```

13.109 Fl_Preferences.H

```

00001 //
00002 // Preferences implementation for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2002-2023 by Matthias Melcher.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php

```

```

00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Preferences class . */
00019
00020 #ifndef Fl_Preferences_H
00021 # define Fl_Preferences_H
00022
00023 # include <stdio.h>
00024 # include "Fl_Export.H"
00025 # include "fl_attr.h"
00026
00027 //class Fl_String;
00028 #if (FLTK_USE_STD)
00029 #include <string>
00030 #endif
00031
00124 class FL_EXPORT Fl_Preferences {
00125
00126 public:
00130     enum Root {
00131         UNKNOWN_ROOT_TYPE = -1,
00132         SYSTEM             = 0,
00133         USER,
00134         MEMORY,
00135         ROOT_MASK         = 0x00FF,
00136         CORE               = 0x0100,
00137         C_LOCALE          = 0x1000,
00138         CLEAR              = 0x2000,
00140         SYSTEM_L          = SYSTEM | C_LOCALE,
00141         USER_L            = USER | C_LOCALE,
00142         CORE_SYSTEM_L     = CORE | SYSTEM_L,
00143         CORE_USER_L       = CORE | USER_L,
00144         CORE_SYSTEM       = CORE | SYSTEM,
00145         CORE_USER         = CORE | USER
00146     };
00147
00155     typedef void *ID;
00156
00157     static const char *new_UUID();
00158
00163     static const unsigned int NONE = 0x0000;
00165     static const unsigned int USER_READ_OK = 0x0001;
00167     static const unsigned int USER_WRITE_OK = 0x0002;
00169     static const unsigned int USER_OK = USER_READ_OK | USER_WRITE_OK;
00171     static const unsigned int SYSTEM_READ_OK = 0x0004;
00173     static const unsigned int SYSTEM_WRITE_OK = 0x0008;
00175     static const unsigned int SYSTEM_OK = SYSTEM_READ_OK | SYSTEM_WRITE_OK;
00177     static const unsigned int APP_OK = SYSTEM_OK | USER_OK;
00179     static const unsigned int CORE_READ_OK = 0x0010;
00181     static const unsigned int CORE_WRITE_OK = 0x0020;
00183     static const unsigned int CORE_OK = CORE_READ_OK | CORE_WRITE_OK;
00185     static const unsigned int ALL_READ_OK = USER_READ_OK | SYSTEM_READ_OK | CORE_READ_OK;
00187     static const unsigned int ALL_WRITE_OK = USER_WRITE_OK | SYSTEM_WRITE_OK | CORE_WRITE_OK;
00189     static const unsigned int ALL = ALL_READ_OK | ALL_WRITE_OK;
00190
00191     static void file_access(unsigned int flags);
00192     static unsigned int file_access();
00193     static Root filename( char *buffer, size_t buffer_size, Root root, const char *vendor, const char
*application );
00194
00195     Fl_Preferences( Root root, const char *vendor, const char *application );
00196     Fl_Preferences( const char *path, const char *vendor, const char *application, Root flags );
00197     Fl_Preferences( Fl_Preferences &parent, const char *group );
00198     Fl_Preferences( Fl_Preferences *parent, const char *group );
00199     Fl_Preferences( Fl_Preferences &parent, int groupIndex );
00200     Fl_Preferences( Fl_Preferences *parent, int groupIndex );
00201     Fl_Preferences(const Fl_Preferences&);
00202     Fl_Preferences( ID id );
00203     virtual ~Fl_Preferences();
00204
00205     FL_DEPRECATED("in 1.4.0 - use Fl_Preferences(path, vendor, application, flags) instead",
00206                 Fl_Preferences( const char *path, const char *vendor, const char *application ) );
00207
00208     Root filename( char *buffer, size_t buffer_size);
00209
00212     ID id() { return (ID)node; }
00213
00216     static char remove(ID id_) { return ((Node*)id_)->remove(); }
00217
00220     const char *name() { return node->name(); }
00221
00224     const char *path() { return node->path(); }

```

```

00225
00226 int groups();
00227 const char *group( int num_group );
00228 char group_exists( const char *key );
00229 char delete_group( const char *group );
00230 char delete_all_groups();
00231
00232 int entries();
00233 const char *entry( int index );
00234 char entry_exists( const char *key );
00235 char delete_entry( const char *entry );
00236 char delete_all_entries();
00237
00238 char clear();
00239
00240 char set( const char *entry, int value );
00241 char set( const char *entry, float value );
00242 char set( const char *entry, float value, int precision );
00243 char set( const char *entry, double value );
00244 char set( const char *entry, double value, int precision );
00245 char set( const char *entry, const char *value );
00246 char set( const char *entry, const void *value, int size );
00247
00248 char get( const char *entry, int &value, int defaultValue );
00249 char get( const char *entry, float &value, float defaultValue );
00250 char get( const char *entry, double &value, double defaultValue );
00251 char get( const char *entry, char *&value, const char *defaultValue );
00252 char get( const char *entry, char *value, const char *defaultValue, int maxSize );
00253 char get( const char *entry, void *&value, const void *defaultValue, int defaultSize );
00254 char get( const char *entry, void *value, const void *defaultValue, int defaultSize, int maxSize
);
00255 char get( const char *entry, void *value, const void *defaultValue, int defaultSize, int *size );
00256
00257 // char set( const char *entry, const Fl_String &value );
00258 // char get( const char *entry, Fl_String &value, const Fl_String &defaultValue );
00259
00260 #if (FLTK_USE_STD)
00261 char set( const char *entry, const std::string &value );
00262 char get( const char *entry, std::string &value, const std::string &defaultValue );
00263 #endif
00264
00265 int size( const char *entry );
00266
00267 char get_userdata_path( char *path, int pathlen );
00268
00269 int flush();
00270
00271 int dirty();
00272
00273 static const char *newUUID() { return new_UUID(); }
00274 char groupExists( const char *key ) { return group_exists(key); }
00275 char deleteGroup( const char *group ) { return delete_group(group); }
00276 char deleteAllGroups() { return delete_all_groups(); }
00277 char entryExists( const char *key ) { return entry_exists(key); }
00278 char deleteEntry( const char *entry ) { return delete_entry(entry); }
00279 char deleteAllEntries() { return delete_all_entries(); }
00280 char getUserdataPath( char *path, int pathlen ) { return get_userdata_path(path, pathlen); }
00281
00282 class FL_EXPORT Name {
00283     char *data_;
00284
00285 public:
00286     Name( unsigned int n );
00287     Name( const char *format, ... );
00288
00289     operator const char *() { return data_; }
00290     ~Name();
00291 };
00292
00293 struct Entry {
00294     char *name, *value;
00295 };
00296
00297 private:
00298     Fl_Preferences() : node(0), rootNode(0) { }
00299     Fl_Preferences &operator=(const Fl_Preferences&);
00300
00301     static char nameBuffer[128];
00302     static char uuidBuffer[40];
00303     static Fl_Preferences *runtimePrefs;
00304     static unsigned int fileAccess_;
00305
00306 public: // older Sun compilers need this (public definition of the following classes)
00307     class RootNode;
00308
00309     class FL_EXPORT Node { // a node contains a list to all its entries
00310         // and all means to manage the tree structure

```

```

00331     Node *first_child_, *next_;
00332     union {
00333         Node *parent_;           // these two are mutually exclusive
00334         RootNode *root_node_;   // top_ bit clear
00335     };
00336     char *path_;
00337     Entry *entry_;
00338     int nEntry_, NEntry_;
00339     unsigned char dirty_:1;
00340     unsigned char top_:1;
00341     unsigned char indexed_:1;
00342     // indexing routines
00343     Node **index_;
00344     int nIndex_, NIndex_;
00345     void createIndex();
00346     void updateIndex();
00347     void deleteIndex();
00348 public:
00349     static int lastEntrySet;
00350 public:
00351     Node( const char *path );
00352     ~Node();
00353     // node methods
00354     int write( FILE *f );
00355     const char *name();
00356     const char *path() { return path_; }
00357     Node *find( const char *path );
00358     Node *search( const char *path, int offset=0 );
00359     Node *childNode( int ix );
00360     Node *addChild( const char *path );
00361     void setParent( Node *parent );
00362     Node *parent() { return top_?0L:parent_; }
00363     void setRoot(RootNode *r) { root_node_ = r; top_ = 1; }
00364     RootNode *findRoot();
00365     char remove();
00366     char dirty();
00367     void clearDirtyFlags();
00368     void deleteAllChildren();
00369     // entry methods
00370     int nChildren();
00371     const char *child( int ix );
00372     void set( const char *name, const char *value );
00373     void set( const char *line );
00374     void add( const char *line );
00375     const char *get( const char *name );
00376     int getEntry( const char *name );
00377     char deleteEntry( const char *name );
00378     void deleteAllEntries();
00379     int nEntry() { return nEntry_; }
00380     Entry &entry(int i) { return entry_[i]; }
00381 };
00382 friend class Node;
00383
00384 class FL_EXPORT RootNode { // the root node manages file paths and basic reading and writing
00385     Fl_Preferences *prefs_;
00386     char *filename_;
00387     char *vendor_, *application_;
00388     Root root_type_;
00389 public:
00390     RootNode( Fl_Preferences *, Root root, const char *vendor, const char *application );
00391     RootNode( Fl_Preferences *, const char *path, const char *vendor, const char *application, Root
flags );
00392     RootNode( Fl_Preferences * );
00393     ~RootNode();
00394     int read();
00395     int write();
00396     char getPath( char *path, int pathlen );
00397     char *filename() { return filename_; }
00398     Root root() { return root_type_; }
00399 };
00400 friend class RootNode;
00401
00402 protected:
00403     Node *node;
00404     RootNode *rootNode;
00405 };
00406
00407 #endif // !Fl_Preferences_H

```

13.110 Fl_Printer.H File Reference

declaration of class [Fl_Printer](#).

```
#include <FL/Fl_Paged_Device.H>
```

Classes

- class [Fl_Printer](#)
OS-independent print support.

13.110.1 Detailed Description

declaration of class [Fl_Printer](#).

13.111 Fl_Printer.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // Printing support for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2010-2016 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00021 #ifndef Fl_Printer_H
00022 #define Fl_Printer_H
00023
00024 #include <FL/Fl_Paged_Device.H>
00025
00104 class FL_EXPORT Fl_Printer : public Fl_Paged_Device {
00105 private:
00106     Fl_Paged_Device *printer;
00108     static Fl_Paged_Device* newPrinterDriver(void);
00109 public:
00111     Fl_Printer(void);
00112     int begin_job(int pagecount = 0, int *frompage = NULL, int *topage = NULL, char **perr_message =
00113     NULL) FL_OVERRIDE;
00114     int begin_page(void) FL_OVERRIDE;
00115     void printable_rect(int *w, int *h) FL_OVERRIDE;
00116     void margins(int *left, int *top, int *right, int *bottom) FL_OVERRIDE;
00117     void origin(int *x, int *y) FL_OVERRIDE;
00118     void scale(float scale_x, float scale_y = 0.) FL_OVERRIDE;
00119     void rotate(float angle) FL_OVERRIDE;
00120     void translate(int x, int y) FL_OVERRIDE;
00121     void untranslate(void) FL_OVERRIDE;
00122     int end_page(void) FL_OVERRIDE;
00123     void end_job(void) FL_OVERRIDE;
00124     void set_current(void) FL_OVERRIDE;
00125     bool is_current() FL_OVERRIDE;
00126
00130     static const char *dialog_title;
00131     static const char *dialog_printer;
00132     static const char *dialog_range;
00133     static const char *dialog_copies;
00134     static const char *dialog_all;
00135     static const char *dialog_pages;
00136     static const char *dialog_from;
00137     static const char *dialog_to;
00138     static const char *dialog_properties;
00139     static const char *dialog_copyNo;
00140     static const char *dialog_print_button;
00141     static const char *dialog_cancel_button;
00142     static const char *dialog_print_to_file;
00143     static const char *property_title;
00144     static const char *property_pagesize;
00145     static const char *property_mode;
00146     static const char *property_use;
00147     static const char *property_save;
00148     static const char *property_cancel;
00151     ~Fl_Printer(void);
00152 };
```

```
00153
00154 #endif // Fl_Printer_H
```

13.112 Fl_Progress.H

```
00001 //
00002 // Progress bar widget definitions.
00003 //
00004 // Copyright 2000-2010 by Michael Sweet.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018    Fl_Progress widget . */
00019
00020 #ifndef _Fl_Progress_H_
00021 # define _Fl_Progress_H_
00022
00023 //
00024 // Include necessary headers.
00025 //
00026
00027 #include "Fl_Widget.H"
00028
00029
00030 //
00031 // Progress class...
00032 //
00036 class FL_EXPORT Fl_Progress : public Fl_Widget {
00037
00038     float value_,
00039           minimum_,
00040           maximum_;
00041
00042     protected:
00043
00044     void draw() FL_OVERRIDE;
00045
00046     public:
00047
00048     Fl_Progress(int x, int y, int w, int h, const char *l = 0);
00049
00051     void maximum(float v) { maximum_ = v; redraw(); }
00053     float maximum() const { return (maximum_); }
00054
00056     void minimum(float v) { minimum_ = v; redraw(); }
00058     float minimum() const { return (minimum_); }
00059
00061     void value(float v) { value_ = v; redraw(); }
00063     float value() const { return (value_); }
00064 };
00065
00066 #endif // !_Fl_Progress_H_
```

13.113 Fl_Radio_Button.H

```
00001 //
00002 // Radio button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2014 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
```

```

00018     Fl_Radio_Button widget . */
00019
00020 #ifndef Fl_Radio_Button_H
00021 #define Fl_Radio_Button_H
00022
00023 #include "Fl_Button.H"
00024
00025 class FL_EXPORT Fl_Radio_Button : public Fl_Button {
00026 public:
00027     Fl_Radio_Button(int X,int Y,int W,int H,const char *L=0);
00028 };
00029
00030 #endif

```

13.114 Fl_Radio_Light_Button.H

```

00001 //
00002 // Radio light button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2014 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Radio_Light_Button widget . */
00019
00020 #ifndef Fl_Radio_Light_Button_H
00021 #define Fl_Radio_Light_Button_H
00022
00023 #include "Fl_Light_Button.H"
00024
00025 class FL_EXPORT Fl_Radio_Light_Button : public Fl_Light_Button {
00026 public:
00027     Fl_Radio_Light_Button(int X,int Y,int W,int H,const char *l=0);
00028 };
00029
00030 #endif

```

13.115 Fl_Radio_Round_Button.H

```

00001 //
00002 // Radio round button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2014 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Radio_Round_Button widget . */
00019
00020 #ifndef Fl_Radio_Round_Button_H
00021 #define Fl_Radio_Round_Button_H
00022
00023 #include "Fl_Round_Button.H"
00024
00025 class FL_EXPORT Fl_Radio_Round_Button : public Fl_Round_Button {
00026 public:
00027     Fl_Radio_Round_Button(int X,int Y,int W,int H,const char *L=0);
00028 };
00029
00030 #endif

```


13.116 Fl_Rect.H

```

00001 //
00002 // Fl_Rect header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Rect_H
00018 #define Fl_Rect_H
00019
00020 #include <FL/Fl_Widget.H>          // for c'tor based on Fl_Widget
00021
00022 class FL_EXPORT Fl_Rect {
00023     int x_;
00024     int y_;
00025     int w_;
00026     int h_;
00027 public:
00028     Fl_Rect()
00029         : x_(0), y_(0), w_(0), h_(0) {}
00030     Fl_Rect(int W, int H)
00031         : x_(0), y_(0), w_(W), h_(H) {}
00032     Fl_Rect(int X, int Y, int W, int H)
00033         : x_(X), y_(Y), w_(W), h_(H) {}
00034     Fl_Rect(int X, int Y, int W, int H, Fl_Boxtype bt)
00035         : x_(X), y_(Y), w_(W), h_(H) {
00036         inset(bt);
00037     }
00038     Fl_Rect(const Fl_Widget& widget)
00039         : x_(widget.x()), y_(widget.y()), w_(widget.w()), h_(widget.h()) {}
00040     Fl_Rect(const Fl_Widget* const widget)
00041         : x_(widget->x()), y_(widget->y()), w_(widget->w()), h_(widget->h()) {}
00042     int x() const { return x_; }
00043     int y() const { return y_; }
00044     int w() const { return w_; }
00045     int h() const { return h_; }
00046     int r() const { return x_ + w_; }
00047     int b() const { return y_ + h_; }
00048     void x(int X) { x_ = X; }
00049     void y(int Y) { y_ = Y; }
00050     void w(int W) { w_ = W; }
00051     void h(int H) { h_ = H; }
00052     void r(int R) { w_ = R - x_; }
00053     void b(int B) { h_ = B - y_; }
00054     void inset(int d) {
00055         x_ += d;
00056         y_ += d;
00057         w_ -= 2 * d;
00058         h_ -= 2 * d;
00059     }
00060     void inset(Fl_Boxtype bt) {
00061         x_ += Fl::box_dx(bt);
00062         y_ += Fl::box_dy(bt);
00063         w_ -= Fl::box_dw(bt);
00064         h_ -= Fl::box_dh(bt);
00065     }
00066     void inset(int left, int top, int right, int bottom) {
00067         x_ += left;
00068         y_ += top;
00069         w_ -= (left + right);
00070         h_ -= (top + bottom);

```

```

00147     }
00148
00149     friend bool operator==(const Fl_Rect& lhs, const Fl_Rect& rhs) {
00150         return (lhs.x_==rhs.x_) && (lhs.y_==rhs.y_) && (lhs.w_==rhs.w_) && (lhs.h_==rhs.h_);
00151     }
00152
00153     friend bool operator!=(const Fl_Rect& lhs, const Fl_Rect& rhs) {
00154         return !(lhs==rhs);
00155     }
00156
00157 }; // class Fl_Rect
00158
00159 #endif // Fl_Rect_H

```

13.117 Fl_Repeat_Button.H

```

00001 //
00002 // Repeat button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Repeat_Button widget . */
00019
00020 #ifndef Fl_Repeat_Button_H
00021 #define Fl_Repeat_Button_H
00022 #include "Fl.H"
00023 #include "Fl_Button.H"
00024
00031 class FL_EXPORT Fl_Repeat_Button : public Fl_Button {
00032     static void repeat_callback(void *);
00033 public:
00034     int handle(int) FL_OVERRIDE;
00040     Fl_Repeat_Button(int X,int Y,int W,int H,const char *l=0);
00041
00042     void deactivate() {
00043         Fl::remove_timeout(repeat_callback,this);
00044         Fl_Button::deactivate();
00045     }
00046 };
00047
00048 #endif

```

13.118 Fl_Return_Button.H

```

00001 //
00002 // Return button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
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00010 //     https://www.fltk.org/COPYING.php
00011 //
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00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Return_Button widget . */
00019
00020 #ifndef Fl_Return_Button_H
00021 #define Fl_Return_Button_H
00022 #include "Fl_Button.H"
00023
00031 class FL_EXPORT Fl_Return_Button : public Fl_Button {
00032 protected:
00033     void draw() FL_OVERRIDE;

```

```
00034 public:
00035     int handle(int) FL_OVERRIDE;
00041     Fl_Return_Button(int X, int Y, int W, int H, const char *l=0);
00042 };
00043
00044 #endif
```

13.119 Fl_RGB_Image.H

```
00001 //
00002 // RGB Image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_RGB_Image_H
00018 # define Fl_RGB_Image_H
00019 # include "Fl_Image.H"
00020 #endif // !Fl_RGB_Image_H
```

13.120 Fl_Roller.H

```
00001 //
00002 // Roller header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Roller widget . */
00019
00020 #ifndef Fl_Roller_H
00021 #define Fl_Roller_H
00022
00023 #ifndef Fl_Valuator_H
00024 #include "Fl_Valuator.H"
00025 #endif
00026
00038 class FL_EXPORT Fl_Roller : public Fl_Valuator {
00039 protected:
00040     void draw() FL_OVERRIDE;
00041 public:
00042     int handle(int) FL_OVERRIDE;
00043     Fl_Roller(int X, int Y, int W, int H, const char* L=0);
00044 };
00045
00046 #endif
```

13.121 Fl_Round_Button.H

```
00001 //
00002 // Round button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
```

```

00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Round_Button_H
00018 #define Fl_Round_Button_H
00019
00020 #include "Fl_Light_Button.H"
00021
00024 class FL_EXPORT Fl_Round_Button : public Fl_Light_Button {
00025 public:
00026     Fl_Round_Button(int x,int y,int w,int h,const char *l = 0);
00027 };
00028
00029 #endif

```

13.122 Fl_Round_Clock.H

```

00001 //
00002 // Round clock header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Round_Clock widget . */
00019
00020 #ifndef Fl_Round_Clock_H
00021 #define Fl_Round_Clock_H
00022
00023 #include "Fl_Clock.H"
00024
00026 class FL_EXPORT Fl_Round_Clock : public Fl_Clock {
00027 public:
00028     Fl_Round_Clock(int X,int Y,int W,int H, const char *L = 0);
00029 };
00030
00031
00032 #endif

```

13.123 Fl_Scheme.H

```

00001 //
00002 // Scheme header for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2022-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef FL_Fl_Scheme_H_
00018 #define FL_Fl_Scheme_H_
00019
00020 #include <FL/Fl.H>
00021
00022 class Fl_Scheme {
00023 private:
00024     static const char **names_;           // registered scheme names
00025     static int num_schemes_;             // number of registered schemes
00026     static int alloc_size_;              // number of allocated scheme name entries

```

```

00029
00030 protected:
00031
00032 // const char *name_; // the scheme's name
00033
00034 // protected constructor - not yet implemented
00035 // Fl_Scheme(const char *name);
00036
00037 public:
00038
00039 // Static methods.
00040
00041 // Some of these methods will replace the scheme related methods of class Fl,
00042 // for instance Fl::scheme() and Fl::is_scheme().
00043 // Backwards compatibility must be kept though.
00044
00045 static const char **names();
00046
00052 static int num_schemes() {
00053     if (!names_) names(); // force initialization
00054     return num_schemes_;
00055 }
00056
00057 // Adding a scheme name must be a public static method in FLTK 1.4.0.
00058 // This will later be protected or replaced by another method name.
00059
00060 static int add_scheme_name(const char *name);
00061
00062 }; // class Fl_Scheme
00063
00064 #endif // FL_Fl_Scheme_H_

```

13.124 Fl_Scheme_Choice.H

```

00001 //
00002 // Scheme Choice header for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2022-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef FL_Fl_Scheme_Choice_H_
00018 #define FL_Fl_Scheme_Choice_H_
00019
00020 #include <FL/Fl.H>
00021 #include <FL/Fl_Scheme.H>
00022 #include <FL/Fl_Choice.H>
00023
00024 class FL_EXPORT Fl_Scheme_Choice : public Fl_Choice {
00025
00026 protected:
00027     static void scheme_cb_(Fl_Widget *w, void *);
00028
00029 public:
00030     Fl_Scheme_Choice(int X, int Y, int W, int H, const char *L = 0);
00031     int handle(int event) FL_OVERRIDE;
00032
00033     // set the current value according to the active scheme
00034     virtual void init_value();
00035
00036 }; // class Fl_Scheme_Choice
00037
00038 #endif // FL_Fl_Scheme_Choice_H_

```

13.125 Fl_Scroll.H

```

00001 //
00002 // Fl_Scroll header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this

```

```

00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Scroll widget . */
00019
00020 #ifndef FL_SCROLL_H
00021 #define FL_SCROLL_H
00022
00023 #include "Fl_Group.H"
00024 #include "Fl_Scrollbar.H"
00025
00098 class FL_EXPORT Fl_Scroll : public Fl_Group {
00099
00100     int xposition_, yposition_;
00101     int oldx, oldy;
00102     int scrollbar_size_;
00103     static void hscrollbar_cb(Fl_Widget*, void*);
00104     static void scrollbar_cb(Fl_Widget*, void*);
00105     static void draw_clip(void*,int,int,int,int);
00106
00107 protected:      // (STR#1895)
00108
00110     typedef struct { int x,y,w,h; } Fl_Region_XYWH;
00111
00113     typedef struct {
00114         int l;
00115         int r;
00116         int t;
00117         int b;
00118     } Fl_Region_LRTB;
00119
00121     typedef struct {
00122         int x,y,w,h;
00123         int pos;
00124         int size;
00125         int first;
00126         int total;
00127     } Fl_Scrollbar_Data;
00128
00135     typedef struct {
00136         int scrollsize;
00137         Fl_Region_XYWH innerbox;
00138         Fl_Region_XYWH innerchild;
00139         Fl_Region_LRTB child;
00140         int hneeded;
00141         int vneeded;
00142         Fl_Scrollbar_Data hscroll;
00143         Fl_Scrollbar_Data vscroll;
00144     } ScrollInfo;
00145     void recalc_scrollbars(ScrollInfo &si) const;
00146
00147 protected:
00148
00149     int on_insert(Fl_Widget*, int) FL_OVERRIDE;
00150     int on_move(int, int) FL_OVERRIDE;
00151     void fix_scrollbar_order();
00152     void bbox(int&,int&,int&,int&) const;
00153     void draw() FL_OVERRIDE;
00154
00155 public:
00156
00157     Fl_Scrollbar scrollbar;
00158     Fl_Scrollbar hscrollbar;
00159
00160     void resize(int X, int Y, int W, int H) FL_OVERRIDE;
00161     int handle(int) FL_OVERRIDE;
00162
00163     Fl_Scroll(int X, int Y, int W, int H, const char *L = 0);
00164     virtual ~Fl_Scroll();
00165
00166     enum { // values for type()
00167         HORIZONTAL = 1,
00168         VERTICAL = 2,
00169         BOTH = 3,
00170         ALWAYS_ON = 4,
00171         HORIZONTAL_ALWAYS = 5,
00172         VERTICAL_ALWAYS = 6,
00173         BOTH_ALWAYS = 7
00174     };
00175

```

```

00177 int xposition() const {return xposition_;}
00179 int yposition() const {return yposition_;}
00180 void scroll_to(int, int);
00181 void clear();
00182
00183 /* delete child n (by index) */
00184 int delete_child(int n) FL_OVERRIDE;
00185
00195 int scrollbar_size() const {
00196     return(scrollbar_size_);
00197 }
00217 void scrollbar_size(int newSize) {
00218     if ( newSize != scrollbar_size_ ) redraw();
00219     scrollbar_size_ = newSize;
00220 }
00221 };
00222
00223 #endif

```

13.126 Fl_Scrollbar.H

```

00001 //
00002 // Scroll bar header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Scrollbar widget . */
00019
00020 #ifndef Fl_Scrollbar_H
00021 #define Fl_Scrollbar_H
00022
00023 #include "Fl_Slider.H"
00024
00041 class FL_EXPORT Fl_Scrollbar : public Fl_Slider {
00042
00043     int linesize_;
00044     int pushed_;
00045     static void timeout_cb(void*);
00046     void increment_cb();
00047 protected:
00048     void draw() FL_OVERRIDE;
00049
00050 public:
00051
00052     Fl_Scrollbar(int X,int Y,int W,int H, const char *L = 0);
00053     ~Fl_Scrollbar();
00054     int handle(int) FL_OVERRIDE;
00055
00063     int value() const {return int(Fl_Slider::value());}
00064
00071     int value(int p) {return int(Fl_Slider::value((double)p));}
00072
00087     int value(int pos, int windowSize, int first_line, int total_lines) {
00088         return scrollvalue(pos, windowSize, first_line, total_lines);
00089     }
00090
00094     int linesize() const {return linesize_;}
00095
00101     void linesize(int i) {linesize_ = i;}
00102
00103 };
00104
00105 #endif

```

13.127 Fl_Secret_Input.H

```

00001 //
00002 // Secret input header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2011 by Bill Spitzak and others.

```

```

00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Secret_Input widget . */
00019
00020 #ifndef Fl_Secret_Input_H
00021 #define Fl_Secret_Input_H
00022
00023 #include "Fl_Input.H"
00024
00025 class FL_EXPORT Fl_Secret_Input : public Fl_Input {
00026 public:
00027     Fl_Secret_Input(int X,int Y,int W,int H,const char *l = 0);
00028     int handle(int) FL_OVERRIDE;
00029 };
00030 #endif

```

13.128 Fl_Select_Browser.H

```

00001 //
00002 // Select browser header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Select_Browser widget . */
00019
00020 #ifndef Fl_Select_Browser_H
00021 #define Fl_Select_Browser_H
00022
00023 #include "Fl_Browser.H"
00024
00025 class FL_EXPORT Fl_Select_Browser : public Fl_Browser {
00026 public:
00027     Fl_Select_Browser(int X,int Y,int W,int H,const char *L=0);
00028 };
00029 #endif

```

13.129 Fl_Shared_Image.H File Reference

[Fl_Shared_Image](#) class.

```
#include "Fl_Image.H"
```

Classes

- class [Fl_Shared_Image](#)

This class supports caching, loading, and drawing of image files.

Typedefs

- typedef [Fl_Image](#) *(* [Fl_Shared_Handler](#)) (const char *name, uchar *header, int headerlen)

Test function (typedef) for adding new shared image formats.

Functions

- void [fl_register_images](#) ()
Register the known image formats.

13.129.1 Detailed Description

[FI_Shared_Image](#) class.

13.129.2 Typedef Documentation

13.129.2.1 FI_Shared_Handler

```
typedef FI\_Image *(* FI\_Shared\_Handler) (const char *name, uchar *header, int headerlen)
```

Test function (typedef) for adding new shared image formats.

This defines the function type you can use to add a handler for unknown image formats that can be opened and loaded as an [FI_Shared_Image](#).

[fl_register_images](#)() adds all image formats known to FLTK. Call [FI_Shared_Image::add_handler](#)() to add your own check function to the list of known image formats.

Your function will be passed the filename (*name*), some *header* bytes already read from the image file and the size *headerlen* of the data read. The max value of size is implementation dependent. If your handler function needs to check more bytes you must open the image file yourself.

The provided buffer *header* must not be overwritten.

If your handler function can identify the file type you must open the file and return a valid [FI_Image](#) or derived type, otherwise you must return NULL. Example:

```
static FI\_Image *check_my_image(const char *name,
                               uchar *header,
                               int headerlen) {
    // (test image type using header and headerlen)
    if (known) {
        // (load image data from file \p name)
        return new FI\_RGB\_Image(data, ...);
    } else
        return 0;
}
// add your handler:
FI\_Shared\_Image::add\_handler(check_my_image);
```

Parameters

in	<i>name</i>	filename to be checked and opened if applicable
in	<i>header</i>	portion of the file that has already been read
in	<i>headerlen</i>	length of provided <i>header</i> data

Returns

valid [FI_Image](#) or NULL.

See also

[FI_Shared_Image::add_handler](#)()

13.129.3 Function Documentation

13.129.3.1 fl_register_images()

```
void fl_register_images ( ) [extern]
```

Register the known image formats.

This function is provided in the `fltk_images` library and registers all of the "extra" image file formats known to FLTK that are not part of the core FLTK library.

You may add your own image formats with [FI_Shared_Image::add_handler](#)()

13.130 Fl_Shared_Image.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Shared image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2024 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00020 #ifndef Fl_Shared_Image_H
00021 # define Fl_Shared_Image_H
00022
00023 # include "Fl_Image.H"
00024
00025 #undef SHIM_DEBUG
00026
00071 typedef Fl_Image *(*Fl_Shared_Handler)(const char *name,
00072                                         uchar *header,
00073                                         int headerlen);
00074
00094 class FL_EXPORT Fl_Shared_Image : public Fl_Image {
00095
00096     friend class Fl_JPEG_Image;
00097     friend class Fl_PNG_Image;
00098     friend class Fl_SVG_Image;
00099     friend class Fl_Graphics_Driver;
00100
00101 protected:
00102
00103     static Fl_Shared_Image **images_; // Shared images
00104     static int num_images_; // Number of shared images
00105     static int alloc_images_; // Allocated shared images
00106     static Fl_Shared_Handler *handlers_; // Additional format handlers
00107     static int num_handlers_; // Number of format handlers
00108     static int alloc_handlers_; // Allocated format handlers
00109
00110     const char *name_; // Name of image file
00111     int original_; // Original image?
00112     int refcount_; // Number of times this image has been used
00113     Fl_Image *image_; // The image that is shared
00114     int alloc_image_; // Was the image allocated?
00115
00116     static int compare(Fl_Shared_Image **i0, Fl_Shared_Image **i1);
00117
00118     // Use get() and release() to load/delete images in memory...
00119     Fl_Shared_Image();
00120     Fl_Shared_Image(const char *n, Fl_Image *img = 0);
00121     virtual ~Fl_Shared_Image();
00122     void add();
00123     void update();
00124     Fl_Shared_Image *copy_(int W, int H) const;
00125
00126 public:
00127 #ifdef SHIM_DEBUG
00128     static void print_pool();
00129 #endif
00130
00132     const char *name() { return name_; }
00133
00137     int refcount() { return refcount_; }
00138
00146     int original() { return original_; }
00147
00148     void release() FL_OVERRIDE;
00149     virtual void reload();
00150
00151     Fl_Shared_Image *as_shared_image() FL_OVERRIDE {
00152         return this;
00153     }
00154
00155     Fl_Image *copy(int W, int H) const FL_OVERRIDE;
00156     Fl_Image *copy() const;
00157     Fl_Image *copy();
00158
00159     void color_average(Fl_Color c, float i) FL_OVERRIDE;
00160     void desaturate() FL_OVERRIDE;

```

```

00161 void draw(int X, int Y, int W, int H, int cx = 0, int cy = 0) FL_OVERRIDE;
00162 void draw(int X, int Y) { draw(X, Y, w(), h(), 0, 0); }
00163 void uncache() FL_OVERRIDE;
00164
00165 static Fl_Shared_Image *find(const char *name, int W = 0, int H = 0);
00166 static Fl_Shared_Image *get(const char *name, int W = 0, int H = 0);
00167 static Fl_Shared_Image *get(Fl_RGB_Image *rgb, int own_it = 1);
00168 static Fl_Shared_Image **images();
00169 static int num_images();
00170 static void add_handler(Fl_Shared_Handler f);
00171 static void remove_handler(Fl_Shared_Handler f);
00172
00194 const Fl_Image *image() const { return image_; }
00195
00196 }; // class Fl_Shared_Image
00197
00198 //
00199 // The following function is provided in the fltk_images library and
00200 // registers all of the "extra" image file formats that are not part
00201 // of the core FLTK library...
00202 //
00203
00204 FL_EXPORT extern void fl_register_images();
00205
00206 #endif // !Fl_Shared_Image_H

```

13.131 Fl_Shortcut_Button.H

```

00001 //
00002 // Shortcut Button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Shortcut_Button_H
00018 #define Fl_Shortcut_Button_H
00019
00020 #include <FL/Fl_Button.H>
00021
00022 class FL_EXPORT Fl_Shortcut_Button : public Fl_Button {
00023 private:
00024     bool hot_, pre_hot_, default_set_, handle_default_button_;
00025     Fl_Shortcut pre_esc_;
00026     Fl_Shortcut default_shortcut_;
00027 protected:
00028     Fl_Shortcut shortcut_value;
00029     void do_end_hot_callback();
00030     int handle(int) FL_OVERRIDE;
00031     void draw() FL_OVERRIDE;
00032 public:
00033     Fl_Shortcut_Button(int X,int Y,int W,int H, const char* l = 0);
00034     void value(Fl_Shortcut shortcut);
00035     Fl_Shortcut value();
00036 #if 0
00037     // Default shortcut settings are disabled until successful review of the UI
00038     void default_value(Fl_Shortcut shortcut);
00039     Fl_Shortcut default_value();
00040     void default_clear();
00041 #endif
00042 };
00043
00044 #endif // Fl_Shortcut_Button_H
00045

```

13.132 fl_show_colormap.H File Reference

The `fl_show_colormap()` function hides the implementation classes used to provide the popup window and color selection mechanism.

Functions

- [Fl_Color fl_show_colormap](#) ([Fl_Color](#) oldcol)
Pops up a window to let the user pick a colormap entry.

13.132.1 Detailed Description

The [fl_show_colormap\(\)](#) function hides the implementation classes used to provide the popup window and color selection mechanism.

13.133 fl_show_colormap.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // Colormap picker header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00022 #ifndef fl_show_colormap_H
00023 #define fl_show_colormap_H
00024
00025 /* doxygen comment here to avoid exposing ColorMenu in fl_show_colormap.cxx
00026 */
00027
00039 FL_EXPORT Fl_Color fl_show_colormap(Fl_Color oldcol);
00040
00043 #endif
```

13.134 fl_show_input.H

```
00001 //
00002 // Standard input dialog header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #include "fl_ask.H"
```

13.135 Fl_Simple_Counter.H

```
00001 //
00002 // Simple counter header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
```

```

00015 //
00016
00017 /* \file
00018     Fl_Simple_Counter widget . */
00019
00020 #ifndef Fl_Simple_Counter_H
00021 #define Fl_Simple_Counter_H
00022
00023 #include "Fl_Counter.H"
00029 class FL_EXPORT Fl_Simple_Counter : public Fl_Counter {
00030 public:
00031     Fl_Simple_Counter(int X,int Y,int W,int H, const char *L = 0);
00032 };
00033
00034 #endif

```

13.136 Fl_Single_Window.H

```

00001 //
00002 // Single-buffered window header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2015 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Single_Window class . */
00019
00020 #ifndef Fl_Single_Window_H
00021 #define Fl_Single_Window_H
00022
00023 #include "Fl_Window.H"
00024
00032 class FL_EXPORT Fl_Single_Window : public Fl_Window {
00033 public:
00034     void show() FL_OVERRIDE;
00036     void show(int a, char **b) {Fl_Window::show(a,b);}
00037
00042     Fl_Single_Window(int W, int H, const char *l=0);
00043
00048     Fl_Single_Window(int X, int Y, int W, int H, const char *l=0);
00049 };
00050
00051 #endif

```

13.137 Fl_Slider.H

```

00001 //
00002 // Slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Slider widget . */
00019
00020 #ifndef Fl_Slider_H
00021 #define Fl_Slider_H
00022
00023 #ifndef Fl_Valuator_H
00024 #include "Fl_Valuator.H"
00025 #endif
00026

```

```

00027 // values for type(), lowest bit indicate horizontal:
00028 #define FL_VERT_SLIDER          0
00029 #define FL_HOR_SLIDER          1
00030 #define FL_VERT_FILL_SLIDER    2
00031 #define FL_HOR_FILL_SLIDER     3
00032 #define FL_VERT_NICE_SLIDER   4
00033 #define FL_HOR_NICE_SLIDER     5
00034
00059 class FL_EXPORT Fl_Slider : public Fl_Valuator {
00060
00061     float slider_size_;
00062     uchar slider_;
00063     void _Fl_Slider();
00064     void draw_bg(int, int, int, int);
00065
00066 protected:
00067
00068     // these allow subclasses to put the slider in a smaller area:
00069     void draw(int, int, int, int);
00070     int handle(int, int, int, int, int);
00071     void draw() FL_OVERRIDE;
00072
00073 public:
00074
00075     int handle(int) FL_OVERRIDE;
00076     Fl_Slider(int X,int Y,int W,int H, const char *L = 0);
00077     Fl_Slider(uchar t,int X,int Y,int W,int H, const char *L);
00078
00079     int scrollvalue(int pos,int size,int first,int total);
00080     void bounds(double a, double b);
00081
00085     float slider_size() const {return slider_size_;}
00086
00096     void slider_size(double v);
00097
00099     Fl_Boxtype slider() const {return (Fl_Boxtype)slider_;}
00100
00102     void slider(Fl_Boxtype c) {slider_ = c;}
00103 };
00104
00105 #endif

```

13.138 Fl_Spinner.H

```

00001 //
00002 // Spinner widget for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Spinner widget . */
00019
00020 #ifndef Fl_Spinner_H
00021 #define Fl_Spinner_H
00022
00023 #include <FL/Enumerations.H>
00024 #include <FL/Fl_Group.H>
00025 #include <FL/Fl_Input.H>
00026 #include <FL/Fl_Repeat_Button.H>
00027
00037 class FL_EXPORT Fl_Spinner : public Fl_Group {
00038
00039     double          value_;           // Current value
00040     double          minimum_;        // Minimum value
00041     double          maximum_;        // Maximum value
00042     double          step_;           // Amount to add/subtract for up/down
00043     const char     *format_;         // Format string for input field
00044     int            wrap_;            // wrap around at bounds (1/0)
00045
00046 private:
00047
00048     static void sb_cb(Fl_Widget *w, Fl_Spinner *sb); // internal callback
00049     void update(); // update input field
00050

```

```

00051 protected:
00052
00053 // This class works like Fl_Input but ignores FL_Up and FL_Down key
00054 // presses so they are handled by its parent, the Fl_Spinner widget.
00055 // See STR #2989.
00056
00057 class FL_EXPORT Fl_Spinner_Input : public Fl_Input {
00058 public:
00059     Fl_Spinner_Input(int X, int Y, int W, int H)
00060     : Fl_Input(X, Y, W, H) {}
00061     int handle(int event) FL_OVERRIDE; // implemented in src/Fl_Spinner.cxx
00062 };
00063
00064 Fl_Spinner_Input input_; // Input field for the value
00065 Fl_Repeat_Button
00066     up_button_, // Up button
00067     down_button_; // Down button
00068
00069 void draw() FL_OVERRIDE;
00070
00071 public:
00072
00073 // Constructor
00074 Fl_Spinner(int X, int Y, int W, int H, const char *L = 0);
00075 // Event handling
00076 int handle(int event) FL_OVERRIDE;
00077 // Resize group and subwidgets
00078 void resize(int X, int Y, int W, int H) FL_OVERRIDE;
00079
00081 const char *format() const { return (format_); }
00082
00084 void format(const char *f) { format_ = f; update(); }
00085
00087 double maximum() const { return (maximum_); }
00088
00090 void maximum(double m) { maximum_ = m; }
00091
00093 double minimum() const { return (minimum_); }
00094
00096 void minimum(double m) { minimum_ = m; }
00097
00099 void range(double a, double b) { minimum_ = a; maximum_ = b; }
00100
00101 // Sets the amount to change the value when the user clicks a button.
00102 // Docs in src/Fl_Spinner.cxx
00103 void step(double s);
00104
00109 double step() const { return (step_); }
00110
00133 void wrap(int set) { wrap_ = set ? 1 : 0; }
00134
00139 int wrap() const { return wrap_; }
00140
00142 Fl_Color textcolor() const { return (input_.textcolor()); }
00143
00145 void textcolor(Fl_Color c) { input_.textcolor(c); }
00146
00148 Fl_Font textfont() const { return (input_.textfont()); }
00149
00151 void textfont(Fl_Font f) { input_.textfont(f); }
00152
00154 Fl_Fontsize textsize() const { return (input_.textsize()); }
00155
00157 void textsize(Fl_Fontsize s) { input_.textsize(s); }
00158
00159 // Sets the numeric representation in the input field.
00160 // Docs see src/Fl_Spinner.cxx
00161 void type(uchar v);
00162
00166 uchar type() const { return (input_.type()); }
00167
00169 double value() const { return (value_); }
00170
00176 void value(double v) { value_ = v; update(); }
00177
00181 void color(Fl_Color v) { input_.color(v); }
00182
00186 Fl_Color color() const { return (input_.color()); }
00187
00191 void selection_color(Fl_Color val) { input_.selection_color(val); }
00192
00196 Fl_Color selection_color() const { return input_.selection_color(); }
00197
00201 void maximum_size(int m) { if (m > 0) input_.maximum_size(m); }
00202
00206 int maximum_size() const { return input_.maximum_size(); }
00207 };

```

```
00208
00209 #endif // !Fl_Spinner_H
```

13.139 fl_string_functions.h File Reference

Public header for FLTK's platform-agnostic string handling.

```
#include "Fl_Export.H"
```

Functions

- char * [fl_strdup](#) (const char *s)
Cross platform interface to POSIX function strdup().

13.139.1 Detailed Description

Public header for FLTK's platform-agnostic string handling.

13.140 fl_string_functions.h

[Go to the documentation of this file.](#)

```
00001 /*
00002  * Platform agnostic string portability functions for the Fast Light Tool Kit (FLTK).
00003  *
00004  * Copyright 2020-2022 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  *     https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *
00014  *     https://www.fltk.org/bugs.php
00015  */
00016
00022 #ifndef _FL_fl_string_functions_h_
00023 #define _FL_fl_string_functions_h_
00024
00025 #include "Fl_Export.H"
00026
00027 #ifdef __cplusplus
00028 extern "C" {
00029 #endif
00030
00036 FL_EXPORT char* fl_strdup(const char *s);
00037
00040 #ifdef __cplusplus
00041 }
00042 #endif /* __cplusplus */
00043
00044
00045 #endif /* _FL_fl_string_functions_h_ */
```

13.141 Fl_SVG_File_Surface.H

```
00001 //
00002 // Declaration of Fl_SVG_File_Surface in the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2020 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
```



```

00017 #ifndef Fl_SVG_File_Surface_H
00018 #define Fl_SVG_File_Surface_H
00019
00020 #include <FL/Fl_Widget_Surface.H>
00021 #include <stdio.h>
00022
00047 class FL_EXPORT Fl_SVG_File_Surface : public Fl_Widget_Surface {
00048     int width_, height_;
00049     int (*closef_)(FILE*);
00050 public:
00060     Fl_SVG_File_Surface(int width, int height, FILE *svg, int (*closef)(FILE*) = NULL);
00065     ~Fl_SVG_File_Surface();
00067     FILE *file();
00068     void origin(int x, int y) FL_OVERRIDE;
00069     void origin(int *x, int *y) FL_OVERRIDE;
00070     void translate(int x, int y) FL_OVERRIDE;
00071     void untranslate() FL_OVERRIDE;
00072     int printable_rect(int *w, int *h) FL_OVERRIDE;
00077     int close();
00078 };
00079
00080 #endif /* Fl_SVG_File_Surface_H */

```

13.142 Fl_SVG_Image.H

```

00001 //
00002 // SVG Image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2017-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef FL_SVG_IMAGE_H
00018 #define FL_SVG_IMAGE_H
00019
00020 #include <FL/Fl_Image.H>
00021
00022 struct NSVGImage;
00023
00035 class FL_EXPORT Fl_SVG_Image : public Fl_RGB_Image {
00036 private:
00037     typedef struct {
00038         NSVGImage* svg_image;
00039         int ref_count;
00040     } counted_NSVGImage;
00041     counted_NSVGImage* counted_svg_image_;
00042     bool rasterized_;
00043     int raster_w_, raster_h_;
00044     bool to_desaturate_;
00045     Fl_Color average_color_;
00046     float average_weight_;
00047     float svg_scaling_(int W, int H);
00048     void rasterize_(int W, int H);
00049     void cache_size_(int &width, int &height) FL_OVERRIDE;
00050     void init_(const char *name, const unsigned char *filedata, size_t length);
00051     Fl_SVG_Image(const Fl_SVG_Image *source);
00052 public:
00053     bool proportional;
00054     Fl_SVG_Image(const char *filename);
00055     Fl_SVG_Image(const char *sharedname, const char *svg_data);
00056     Fl_SVG_Image(const char *sharedname, const unsigned char *svg_data, size_t length);
00057     virtual ~Fl_SVG_Image();
00058     Fl_Image *copy(int W, int H) const FL_OVERRIDE;
00059     Fl_Image *copy() const {
00060         return Fl_Image::copy();
00061     }
00062     void resize(int width, int height);
00063     void desaturate() FL_OVERRIDE;
00064     void color_average(Fl_Color c, float i) FL_OVERRIDE;
00065     void draw(int X, int Y, int W, int H, int cx = 0, int cy = 0) FL_OVERRIDE;
00066     void draw(int X, int Y) { draw(X, Y, w(), h(), 0, 0); }
00067     Fl_SVG_Image *as_svg_image() FL_OVERRIDE { return this; }
00068     void normalize() FL_OVERRIDE;
00069 };
00070
00071 #endif // FL_SVG_IMAGE_H

```

13.143 Fl_Sys_Menu_Bar.H File Reference

Definition of class [Fl_Sys_Menu_Bar](#).

```
#include <FL/Fl_Menu_Bar.H>
```

Classes

- class [Fl_Sys_Menu_Bar](#)

A class to create and modify menus that appear on macOS in the menu bar at the top of the screen.

Variables

- [Fl_Sys_Menu_Bar](#) * `fl_sys_menu_bar`

The system menu bar.

13.143.1 Detailed Description

Definition of class [Fl_Sys_Menu_Bar](#).

13.144 Fl_Sys_Menu_Bar.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // MacOS system menu bar header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2017 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00022 #ifndef Fl_Sys_Menu_Bar_H
00023 #define Fl_Sys_Menu_Bar_H
00024
00025 #include <FL/Fl_Menu_Bar.H>
00026
00027 class Fl_Sys_Menu_Bar_Driver;
00028
00095 class FL_EXPORT Fl_Sys_Menu_Bar : public Fl_Menu_Bar {
00096     static Fl_Sys_Menu_Bar_Driver *driver();
00097 protected:
00098     void draw() FL_OVERRIDE;
00099 public:
00101     typedef enum {
00102         no_window_menu = 0,
00103         tabbing_mode_none,
00104         tabbing_mode_automatic,
00105         tabbing_mode_preferred
00106     } window_menu_style_enum;
00107     Fl_Sys_Menu_Bar(int x,int y,int w,int h,const char *l=0);
00108     virtual ~Fl_Sys_Menu_Bar();
00111     const Fl_Menu_Item *menu() const {return Fl_Menu_::menu();}
00112     void menu(const Fl_Menu_Item *m);
00113     void update() FL_OVERRIDE;
00114     int add(const char* label, int shortcut, Fl_Callback*, void *user_data=0, int flags=0);
00118     int add(const char* label, const char* shortcut, Fl_Callback* cb, void *user_data=0, int flags=0) {
00119         return add(label, fl_old_shortcut(shortcut), cb, user_data, flags);
00120     }
00121     int add(const char* str);
00122     int insert(int index, const char* label, int shortcut, Fl_Callback *cb, void *user_data=0, int
00126     int insert(int index, const char* label, const char* shortcut, Fl_Callback *cb, void *user_data=0,
00127     int flags=0) {
00127         return insert(index, label, fl_old_shortcut(shortcut), cb, user_data, flags);
00128     }
00129     void remove(int n);
00130     void replace(int index, const char *name);
```

```

00131 void clear();
00132 int clear_submenu(int index);
00133 void mode (int i, int fl);
00136 int mode(int i) const { return Fl_Menu_::mode(i); }
00137 void shortcut (int i, int s);
00138 void setonly (Fl_Menu_Item *item);
00139 static void about(Fl_Callback *cb, void *data);
00140
00141 static window_menu_style_enum window_menu_style();
00142 static void window_menu_style(window_menu_style_enum style);
00143 static void create_window_menu();
00144 };
00145
00148 extern Fl_Sys_Menu_Bar *fl_sys_menu_bar;
00149
00150 #endif // Fl_Sys_Menu_Bar_H

```

13.145 Fl_Table.H

```

00001 //
00002 // Fl_Table -- A table widget for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2002 by Greg Ercolano.
00005 // Copyright (c) 2004 O'ksi'D
00006 // Copyright 2023 by Bill Spitzak and others.
00007 //
00008 // This library is free software. Distribution and use rights are outlined in
00009 // the file "COPYING" which should have been included with this file. If this
00010 // file is missing or damaged, see the license at:
00011 //
00012 //     https://www.fltk.org/COPYING.php
00013 //
00014 // Please see the following page on how to report bugs and issues:
00015 //
00016 //     https://www.fltk.org/bugs.php
00017 //
00018
00019 #ifndef _FL_TABLE_H
00020 #define _FL_TABLE_H
00021
00022 #include <FL/Fl_Group.H>
00023 #include <FL/Fl_Scroll.H>
00024
00025 // EXPERIMENTAL
00026 // We use either std::vector or the private class Fl_Int_Vector
00027 // depending on the build option FLTK_OPTION_STD or --enable-use_std.
00028 // This option allows to use std::string and std::vector in FLTK 1.4.x
00029
00030 #if (FLTK_USE_STD)
00031 #include <vector>
00032 typedef std::vector<int> Fl_Int_Vector;
00033 #else
00034 class Fl_Int_Vector; // private class declared in src/Fl_Int_Vector.H
00035 #endif
00036
00121 class FL_EXPORT Fl_Table : public Fl_Group {
00122 public:
00129 enum TableContext {
00130     CONTEXT_NONE           = 0,
00131     CONTEXT_STARTPAGE     = 0x01,
00132     CONTEXT_ENDPAGE       = 0x02,
00133     CONTEXT_ROW_HEADER    = 0x04,
00134     CONTEXT_COL_HEADER    = 0x08,
00135     CONTEXT_CELL          = 0x10,
00136     CONTEXT_TABLE         = 0x20,
00137     CONTEXT_RC_RESIZE     = 0x40
00138 };
00139
00140 private:
00141 int _rows, _cols; // total rows/cols
00142 int _row_header_w; // width of row header
00143 int _col_header_h; // height of column header
00144 int _row_position; // last row_position set (not necessarily == toprow!)
00145 int _col_position; // last col_position set (not necessarily == leftcol!)
00146
00147 char _row_header; // row header enabled?
00148 char _col_header; // col header enabled?
00149 char _row_resize; // row resizing enabled?
00150 char _col_resize; // col resizing enabled?
00151 int _row_resize_min; // row minimum resizing height (default=1)
00152 int _col_resize_min; // col minimum resizing width (default=1)
00153
00154 // OPTIMIZATION: partial row/column redraw variables
00155 int _redraw_toprow;
00156 int _redraw_botrow;

```

```

00157 int _redraw_leftcol;
00158 int _redraw_rightcol;
00159 Fl_Color _row_header_color;
00160 Fl_Color _col_header_color;
00161
00162 int _auto_drag;
00163 int _selecting;
00164 int _scrollbar_size;
00165 enum {
00166     TABCELLNAV = 1<<0
00167 };
00168 unsigned int flags_;
00169
00170 Fl_Int_Vector *_colwidths; // column widths in pixels
00171 Fl_Int_Vector *_rowheights; // row heights in pixels
00172
00173 // number of columns and rows == size of corresponding vectors
00174 int col_size(); // size of the column widths vector
00175 int row_size(); // size of the row heights vector
00176
00177 Fl_Cursor _last_cursor; // last mouse cursor before changed to 'resize' cursor
00178
00179 // EVENT CALLBACK DATA
00180 TableContext _callback_context; // event context
00181 int _callback_row, _callback_col; // event row/col
00182
00183 // handle() state variables.
00184 // Put here instead of local statics in handle(), so more
00185 // than one Fl_Table can exist without crosstalk between them.
00186 //
00187 int _resizing_col; // column being dragged
00188 int _resizing_row; // row being dragged
00189 int _dragging_x; // starting x position for horiz drag
00190 int _dragging_y; // starting y position for vert drag
00191 int _last_row; // last row we FL_PUSH'ed
00192
00193 // Redraw single cell
00194 void _redraw_cell(TableContext context, int R, int C);
00195
00196 void _start_auto_drag();
00197 void _stop_auto_drag();
00198 void _auto_drag_cb();
00199 static void _auto_drag_cb2(void *d);
00200
00201 protected:
00202 enum ResizeFlag {
00203     RESIZE_NONE = 0,
00204     RESIZE_COL_LEFT = 1,
00205     RESIZE_COL_RIGHT = 2,
00206     RESIZE_ROW_ABOVE = 3,
00207     RESIZE_ROW_BELOW = 4
00208 };
00209
00210 int table_w;
00211 int table_h;
00212 int toprow;
00213 int botrow;
00214 int leftcol;
00215 int rightcol;
00216
00217 // selection
00218 int current_row;
00219 int current_col;
00220 int select_row;
00221 int select_col;
00222
00223 // OPTIMIZATION: Precomputed scroll positions for the toprow/leftcol
00224 int toprow_scrollpos;
00225 int leftcol_scrollpos;
00226
00227 // Data table's inner dimension
00228 int tix;
00229 int tiy;
00230 int tiw;
00231 int tih;
00232
00233 // Data table's outer dimension
00234 int tox;
00235 int toy;
00236 int tow;
00237 int toh;
00238
00239 // Table widget's inner dimension
00240 int wix;
00241 int wiy;
00242 int wiw;
00243 int wih;

```

```

00244
00245 Fl_Scroll *table;
00246 Fl_Scrollbar *vscrollbar;
00247 Fl_Scrollbar *hscrollbar;
00248
00249 // Fltk
00250 int handle(int e) FL_OVERRIDE; // fltk handle() FL_OVERRIDE
00251
00252 // Class maintenance
00253 void recalc_dimensions();
00254 void table_resized(); // table resized; recalc
00255 void table_scrolled(); // table scrolled; recalc
00256 void get_bounds(TableContext context, // return x/y/w/h bounds for context
00257                 int &X, int &Y, int &W, int &H);
00258 void change_cursor(Fl_Cursor newcursor); // change mouse cursor to some other shape
00259 TableContext cursor2rowcol(int &R, int &C, ResizeFlag &resizeflag);
00260 int find_cell(TableContext context, // find cell's x/y/w/h given r/c
00261              int R, int C, int &X, int &Y, int &W, int &H);
00262 int row_col_clamp(TableContext context, int &R, int &C);
00263 // clamp r/c to known universe
00264
00375 virtual void draw_cell(TableContext context, int R=0, int C=0,
00376                       int X=0, int Y=0, int W=0, int H=0)
00377 { (void)context; (void)R; (void)C; (void)X; (void)Y; (void)W; (void)H; }
// overridden by deriving class
00378
00379 long row_scroll_position(int row); // find scroll position of row (in pixels)
00380 long col_scroll_position(int col); // find scroll position of col (in pixels)
00381
00385 int is_fltk_container() { // does table contain fltk widgets?
00386     return( Fl_Group::children() > 3 ); // (ie. more than box and 2 scrollbars?)
00387 }
00388
00389 static void scroll_cb(Fl_Widget*,void*); // h/v scrollbar callback
00390
00391 void damage_zone(int r1, int c1, int r2, int c2, int r3 = 0, int c3 = 0);
00392
00397 void redraw_range(int topRow, int botRow, int leftCol, int rightCol) {
00398     if ( _redraw_toprow == -1 ) {
00399         // Initialize redraw range
00400         _redraw_toprow = topRow;
00401         _redraw_botrow = botRow;
00402         _redraw_leftcol = leftCol;
00403         _redraw_rightcol = rightCol;
00404     } else {
00405         // Extend redraw range
00406         if ( topRow < _redraw_toprow ) _redraw_toprow = topRow;
00407         if ( botRow > _redraw_botrow ) _redraw_botrow = botRow;
00408         if ( leftCol < _redraw_leftcol ) _redraw_leftcol = leftCol;
00409         if ( rightCol > _redraw_rightcol ) _redraw_rightcol = rightCol;
00410     }
00411     // Indicate partial redraw needed of some cells
00412     damage(FL_DAMAGE_CHILD);
00413 }
00414
00415 // draw() has to be protected per FLTK convention (was public in 1.3.x)
00416 void draw() FL_OVERRIDE;
00417
00418 public:
00419 Fl_Table(int X, int Y, int W, int H, const char *l=0);
00420 ~Fl_Table();
00421
00427 virtual void clear() {
00428     rows(0);
00429     cols(0);
00430     table->clear();
00431 }
00432
00433 // \todo: add topline(), middleline(), bottomline()
00434
00440 inline void table_box(Fl_Boxtype val) {
00441     table->box(val);
00442     table_resized();
00443 }
00444
00448 inline Fl_Boxtype table_box( void ) {
00449     return(table->box());
00450 }
00451
00452 virtual void rows(int val); // set number of rows
00453
00457 inline int rows() {
00458     return(_rows);
00459 }
00460
00461 virtual void cols(int val); // set number of columns
00462

```

```

00466 inline int cols() {
00467     return(_cols);
00468 }
00469
00498 inline void visible_cells(int& r1, int& r2, int& c1, int& c2) {
00499     r1 = toprow;
00500     r2 = botrow;
00501     c1 = leftcol;
00502     c2 = rightcol;
00503 }
00504
00509 int is_interactive_resize() {
00510     return(_resizing_row != -1 || _resizing_col != -1);
00511 }
00512
00516 inline int row_resize() {
00517     return(_row_resize);
00518 }
00519
00526 void row_resize(int flag) { // enable row resizing
00527     _row_resize = flag;
00528 }
00529
00533 inline int col_resize() {
00534     return(_col_resize);
00535 }
00536
00543 void col_resize(int flag) { // enable col resizing
00544     _col_resize = flag;
00545 }
00546
00550 inline int col_resize_min() { // column minimum resizing width
00551     return(_col_resize_min);
00552 }
00553
00559 void col_resize_min(int val) {
00560     _col_resize_min = ( val < 1 ) ? 1 : val;
00561 }
00562
00566 inline int row_resize_min() { // column minimum resizing width
00567     return(_row_resize_min);
00568 }
00569
00575 void row_resize_min(int val) {
00576     _row_resize_min = ( val < 1 ) ? 1 : val;
00577 }
00578
00582 inline int row_header() { // set/get row header enable flag
00583     return(_row_header);
00584 }
00585
00590 void row_header(int flag) {
00591     _row_header = flag;
00592     table_resized();
00593     redraw();
00594 }
00595
00599 inline int col_header() { // set/get col header enable flag
00600     return(_col_header);
00601 }
00602
00607 void col_header(int flag) {
00608     _col_header = flag;
00609     table_resized();
00610     redraw();
00611 }
00612
00616 inline void col_header_height(int height) { // set/get col header height
00617     _col_header_h = height;
00618     table_resized();
00619     redraw();
00620 }
00621
00625 inline int col_header_height() {
00626     return(_col_header_h);
00627 }
00628
00632 inline void row_header_width(int width) { // set/get row header width
00633     _row_header_w = width;
00634     table_resized();
00635     redraw();
00636 }
00637
00641 inline int row_header_width() {
00642     return(_row_header_w);
00643 }
00644

```

```

00648 inline void row_header_color(Fl_Color val) { // set/get row header color
00649     _row_header_color = val;
00650     redraw();
00651 }
00652
00656 inline Fl_Color row_header_color() {
00657     return(_row_header_color);
00658 }
00659
00663 inline void col_header_color(Fl_Color val) { // set/get col header color
00664     _col_header_color = val;
00665     redraw();
00666 }
00667
00671 inline Fl_Color col_header_color() {
00672     return(_col_header_color);
00673 }
00674
00675 void row_height(int row, int height); // set row height in pixels
00676
00677 // Returns the current height of the specified row as a value in pixels.
00678 int row_height(int row);
00679
00680 void col_width(int col, int width); // set a column's width in pixels
00681
00682 // Returns the current width of the specified column in pixels.
00683 int col_width(int col);
00684
00689 void row_height_all(int height) { // set all row/col heights
00690     for ( int r=0; r<rows(); r++ ) {
00691         row_height(r, height);
00692     }
00693 }
00694
00699 void col_width_all(int width) {
00700     for ( int c=0; c<cols(); c++ ) {
00701         col_width(c, width);
00702     }
00703 }
00704
00705 void row_position(int row); // set/get table's current scroll position
00706 void col_position(int col);
00707
00711 int row_position() {
00712     return(_row_position);
00713 }
00714
00718 int col_position() {
00719     return(_col_position);
00720 }
00721
00727 inline void top_row(int row) { // set/get top row (deprecated)
00728     row_position(row);
00729 }
00730
00735 inline int top_row() {
00736     return(row_position());
00737 }
00738
00738 int is_selected(int r, int c); // selected cell
00739 void get_selection(int &row_top, int &col_left, int &row_bot, int &col_right);
00740 void set_selection(int row_top, int col_left, int row_bot, int col_right);
00741 int move_cursor(int R, int C, int shiftselect);
00742 int move_cursor(int R, int C);
00743 void resize(int X, int Y, int W, int H) FL_OVERRIDE; // fltk resize() FL_OVERRIDE
00744
00745 // This crashes sortapp() during init.
00746 // void box(Fl_Boxtype val) {
00747 //     Fl_Group::box(val);
00748 //     if ( table ) {
00749 //         resize(x(), y(), w(), h());
00750 //     }
00751 // }
00752 // Fl_Boxtype box(void) const {
00753 //     return(Fl_Group::box());
00754 // }
00755
00756 // Child group management
00757
00762 void init_sizes() {
00763     table->init_sizes();
00764     table->redraw();
00765 }
00766
00771 void add(Fl_Widget& wgt) {
00772     table->add(wgt);
00773     if ( table->children() > 2 ) {
00774         table->show();

```

```

00775     } else {
00776         table->hide();
00777     }
00778 }
00779
00784 void add(Fl_Widget* wgt) {
00785     add(*wgt);
00786 }
00787
00792 void insert(Fl_Widget& wgt, int n) {
00793     table->insert(wgt,n);
00794 }
00795
00801 void insert(Fl_Widget& wgt, Fl_Widget* w2) {
00802     table->insert(wgt,w2);
00803 }
00804
00808 void remove(Fl_Widget& wgt) {
00809     table->remove(wgt);
00810 }
00811
00812 // (doxygen will substitute Fl_Group's docs here)
00813 void begin() {
00814     table->begin();
00815 }
00816
00817 // (doxygen will substitute Fl_Group's docs here)
00818 void end() {
00819     table->end();
00820     // HACK: Avoid showing Fl_Scroll; seems to erase screen
00821     //         causing unnecessary flicker, even if its box() is FL_NO_BOX.
00822     //
00823     if ( table->children() > 2 ) {
00824         table->show();
00825     } else {
00826         table->hide();
00827     }
00828     Fl_Group::current(Fl_Group::parent());
00829 }
00830
00835 Fl_Widget*const* array() {
00836     return(table->array());
00837 }
00838
00853 Fl_Widget *child(int n) const {
00854     return(table->child(n));
00855 }
00856
00865 int children() const {
00866     return(table->children()-2);    // -2: skip Fl_Scroll's h/v scrollbar widgets
00867 }
00868
00869 // (doxygen will substitute Fl_Group's docs here)
00870 int find(const Fl_Widget *wgt) const {
00871     return(table->find(wgt));
00872 }
00873
00874 // (doxygen will substitute Fl_Group's docs here)
00875 int find(const Fl_Widget &wgt) const {
00876     return(table->find(wgt));
00877 }
00878
00879 // CALLBACKS
00880
00886 int callback_row() {
00887     return(_callback_row);
00888 }
00889
00895 int callback_col() {
00896     return(_callback_col);
00897 }
00898
00904 TableContext callback_context() {
00905     return(_callback_context);
00906 }
00907
00915 void do_callback(TableContext context, int row, int col) {
00916     _callback_context = context;
00917     _callback_row = row;
00918     _callback_col = col;
00919     Fl_Widget::do_callback();
00920 }
00921
00922 #ifdef FL_DOXYGEN
00951     void when(Fl_When flags);
00952 #endif
00953

```



```

00954 #ifdef FL_DOXYGEN
01032 void callback(Fl_Widget*, void*);
01033 #endif
01034
01044 int scrollbar_size() const {
01045     return(_scrollbar_size);
01046 }
01047
01066 void scrollbar_size(int newSize) {
01067     if ( newSize != _scrollbar_size ) redraw();
01068     _scrollbar_size = newSize;
01069 }
01070
01084 void tab_cell_nav(int val) {
01085     if ( val ) flags_ |= TABCELLNAV;
01086     else      flags_ &= ~TABCELLNAV;
01087 }
01088
01096 int tab_cell_nav() const {
01097     return(flags_ & TABCELLNAV ? 1 : 0);
01098 }
01099 };
01100
01101 #endif /*_FL_TABLE_H*/

```

13.146 Fl_Table_Row.H

```

00001 //
00002
00003 #ifndef _FL_TABLE_ROW_H
00004 #define _FL_TABLE_ROW_H
00005
00006 //
00007 // Fl_Table_Row -- A row oriented table widget for the Fast Light Tool Kit (FLTK).
00008 //
00009 //     A class specializing in a table of rows.
00010 //     Handles row-specific selection behavior.
00011 //
00012 // Copyright 2002 by Greg Ercolano.
00013 //
00014 // This library is free software. Distribution and use rights are outlined in
00015 // the file "COPYING" which should have been included with this file.  If this
00016 // file is missing or damaged, see the license at:
00017 //
00018 //     https://www.fltk.org/COPYING.php
00019 //
00020 // Please see the following page on how to report bugs and issues:
00021 //
00022 //     https://www.fltk.org/bugs.php
00023 //
00024
00025 #include <FL/Fl_Table.H>
00026
00044 class FL_EXPORT Fl_Table_Row : public Fl_Table {
00045 public:
00046     enum TableRowSelectMode {
00047         SELECT_NONE,           // no selection allowed
00048         SELECT_SINGLE,        // single row selection
00049         SELECT_MULTII         // multiple row selection (default)
00050     };
00051 private:
00052     // An STL-ish vector without templates
00053     class FL_EXPORT CharVector {
00054     public:
00055         char *arr;
00056         int _size;
00057         void init() {
00058             arr = 0;
00059             _size = 0;
00060         }
00061         void copy(char *newarr, int newsz);
00062     };
00063     CharVector() {
00064         init();
00065     }
00066     ~CharVector();
00067     CharVector(CharVector&o) {
00068         init();
00069         copy(o.arr, o._size);
00070     }
00071     CharVector& operator=(CharVector&o) {
00072         init();
00073         copy(o.arr, o._size);
00074         return(*this);
00075     }
00076     char operator[](int x) const {

```

```

00076     return(arr[x]);
00077 }
00078 char& operator[](int x) {
00079     return(arr[x]);
00080 }
00081 int size() {
00082     return(_size);
00083 }
00084 void size(int count);
00085 char pop_back() {
00086     char tmp = arr[_size-1];
00087     _size--;
00088     return(tmp);
00089 }
00090 void push_back(char val) {
00091     int x = _size;
00092     size(_size+1);
00093     arr[x] = val;
00094 }
00095 char back() {
00096     return(arr[_size-1]);
00097 }
00098 };
00099
00100 CharVector _rowselect;           // selection flag for each row
00101
00102 // handle() state variables.
00103 //   Put here instead of local statics in handle(), so more
00104 //   than one instance can exist without crosstalk between.
00105 //
00106 int _dragging_select;           // dragging out a selection?
00107 int _last_row;
00108 int _last_y;                    // last event's Y position
00109 int _last_push_x;              // last PUSH event's X position
00110 int _last_push_y;              // last PUSH event's Y position
00111
00112 TableRowSelectMode _selectmode;
00113
00114 protected:
00115 int handle(int event) FL_OVERRIDE;
00116 int find_cell(TableContext context,           // find cell's x/y/w/h given r/c
00117             int R, int C, int &X, int &Y, int &W, int &H) {
00118     return(Fl_Table::find_cell(context, R, C, X, Y, W, H));
00119 }
00120
00121 public:
00122 Fl_Table_Row(int X, int Y, int W, int H, const char *l=0) : Fl_Table(X,Y,W,H,l) {
00123     _dragging_select = 0;
00124     _last_row        = -1;
00125     _last_y          = -1;
00126     _last_push_x     = -1;
00127     _last_push_y     = -1;
00128     _selectmode      = SELECT_MULTI;
00129 }
00130
00131 ~Fl_Table_Row() { }
00132
00133 void rows(int val) FL_OVERRIDE; // set number of rows
00134 int rows() {                    // get number of rows
00135     return(Fl_Table::rows());
00136 }
00137
00138 void type(TableRowSelectMode val); // set selection mode
00139 TableRowSelectMode type() const { // get selection mode
00140     return(_selectmode);
00141 }
00142
00143 int row_selected(int row);       // is row selected? (0=no, 1=yes, -1=range err)
00144
00145 int select_row(int row, int flag=1); // select state for row: flag:0=off, 1=on, 2=toggle
00146 // returns: 0=no change, 1=changed, -1=range err
00147
00148 void select_all_rows(int flag=1); // all rows to a known state
00149
00150 void clear() FL_OVERRIDE {
00151     rows(0); // implies clearing selection
00152     cols(0);
00153     Fl_Table::clear(); // clear the table
00154 }
00155 };
00156
00157 #endif /*_FL_TABLE_ROW_H*/

```

13.147 Fl_Tabs.H

```

00001 //
00002 // Tab header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018    Fl_Tabs widget . */
00019
00020 #ifndef Fl_Tabs_H
00021 #define Fl_Tabs_H
00022
00023 #include "Fl_Group.H"
00024
00025 struct Fl_Menu_Item;
00026
00027 class FL_EXPORT Fl_Tabs : public Fl_Group {
00028     Fl_Widget *push_;
00029
00030 protected:
00031     int overflow_type;
00032     int tab_offset;
00033     int *tab_pos;
00034     int *tab_width;
00035     int *tab_flags;
00036     int tab_count;
00037     Fl_Align tab_align_;
00038     int has_overflow_menu;
00039
00040     void check_overflow_menu();
00041     void handle_overflow_menu();
00042     void draw_overflow_menu_button();
00043
00044     int on_insert(Fl_Widget*, int) FL_OVERRIDE;
00045     int on_move(int, int) FL_OVERRIDE;
00046     void on_remove(int) FL_OVERRIDE;
00047     void resize(int, int, int, int) FL_OVERRIDE;
00048
00049     virtual void redraw_tabs();
00050     virtual int tab_positions(); // allocate and calculate tab positions
00051     virtual void clear_tab_positions();
00052     virtual void draw_tab(int x1, int x2, int W, int H, Fl_Widget* o, int flags, int sel);
00053     virtual int tab_height();
00054     virtual int hit_close(Fl_Widget *o, int event_x, int event_y);
00055     virtual int hit_overflow_menu(int event_x, int event_y);
00056     virtual int hit_tabs_area(int event_x, int event_y);
00057
00058     void draw() FL_OVERRIDE;
00059
00060 public:
00061     Fl_Tabs(int X, int Y, int W, int H, const char *L = 0);
00062     virtual ~Fl_Tabs();
00063
00064     int handle(int) FL_OVERRIDE;
00065     Fl_Widget *value();
00066     int value(Fl_Widget *);
00067
00068     Fl_Widget *push() const { return push_; }
00069     int push(Fl_Widget *);
00070
00071     virtual Fl_Widget *which(int event_x, int event_y);
00072     void client_area(int &rx, int &ry, int &rw, int &rh, int tabh=0);
00073
00074     void tab_align(Fl_Align a) { tab_align_ = a; }
00075
00076     Fl_Align tab_align() const { return tab_align_; }
00077
00078     enum {
00079         OVERFLOW_COMPRESS = 0,
00080         OVERFLOW_CLIP,
00081         OVERFLOW_PULLDOWN,
00082         OVERFLOW_DRAG
00083     };

```

```

00324     };
00325
00326     void handle_overflow(int ov);
00327
00328 };
00329
00330 #endif

```

13.148 FL_Terminal.H File Reference

[FL_Terminal](#) widget.

```

#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Group.H>
#include <FL/Fl_Scrollbar.H>
#include <FL/Fl_Rect.H>
#include <stdarg.h>

```

Classes

- class [FL_Terminal::CharStyle](#)
- class [FL_Terminal::Cursor](#)
- class [FL_Terminal::EscapeSeq](#)
- class [FL_Terminal](#)

Terminal widget supporting Unicode/utf-8, ANSI/xterm escape codes with full RGB color control.

- class [FL_Terminal::Margin](#)
- class [FL_Terminal::PartialUtf8Buf](#)
- class [FL_Terminal::RingBuffer](#)
- class [FL_Terminal::Selection](#)
- class [FL_Terminal::Utf8Char](#)

13.148.1 Detailed Description

[FL_Terminal](#) widget.

13.149 FL_Terminal.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Fl_Terminal.cxx - A terminal widget for Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2022 by Greg Ercolano.
00005 // Copyright 2023 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00022 #ifndef FL_Terminal_H
00023 #define FL_Terminal_H
00024
00025 #include <FL/Fl.H>
00026 #include <FL/Fl_Window.H>
00027 #include <FL/Fl_Group.H>
00028 #include <FL/Fl_Scrollbar.H>
00029 #include <FL/Fl_Rect.H>
00030
00031 #include <stdarg.h>           // va_list (MinGW)
00032
00031 class FL_EXPORT Fl_Terminal : public Fl_Group {

```

```

00315 public:
00323     enum RedrawStyle {
00324         NO_REDRAW=0,
00325         RATE_LIMITED,
00326         PER_WRITE
00327     };
00328
00337     enum Attrib {
00338         NORMAL      = 0x00,
00339         BOLD        = 0x01,
00340         DIM         = 0x02,
00341         ITALIC     = 0x04,
00342         UNDERLINE  = 0x08,
00343         _RESERVED_1 = 0x10,
00344         INVERSE    = 0x20,
00345         _RESERVED_2 = 0x40,
00346         STRIKEOUT  = 0x80
00347     };
00348
00353     enum CharFlags {
00354         FG_XTERM   = 0x01,
00355         BG_XTERM   = 0x02,
00356         EOL        = 0x04,
00357         RESV_A     = 0x08,
00358         RESV_B     = 0x10,
00359         RESV_C     = 0x20,
00360         RESV_D     = 0x40,
00361         RESV_E     = 0x80,
00362         COLORMASK  = (FG_XTERM | BG_XTERM)
00363     };
00364
00369     enum OutFlags {
00370         OFF        = 0x00,
00371         CR_TO_LF  = 0x01,
00372         LF_TO_CR  = 0x02,
00373         LF_TO_CRLF = 0x04
00374     };
00375
00381 protected:
00382     // Margin Class //////////////////////////////////////
00383     //
00384     // Class to manage the terminal's margins
00385     //
00386     class FL_EXPORT Margin {
00387     int left_, right_, top_, bottom_;
00388     public:
00389         Margin(void) { left_ = right_ = top_ = bottom_ = 3; }
00390         int left(void) const { return left_; }
00391         int right(void) const { return right_; }
00392         int top(void) const { return top_; }
00393         int bottom(void) const { return bottom_; }
00394         void left(int val) { left_ = val; }
00395         void right(int val) { right_ = val; }
00396         void top(int val) { top_ = val; }
00397         void bottom(int val) { bottom_ = val; }
00398     };
00399
00400     // CharStyle Class //////////////////////////////////////
00401     //
00402     // Class to manage the terminal's character style
00403     // This includes the font, color, and some cached internal
00404     // info for optimized drawing speed.
00405     //
00406     class FL_EXPORT CharStyle {
00407     uchar attrib_; // bold, underline..
00408     uchar charflags_; // CharFlags (xterm color management)
00409     Fl_Color fgcolor_; // foreground color for text
00410     Fl_Color bgcolor_; // background color for text
00411     Fl_Color defaultfgcolor_; // default fg color used by ESC[0m
00412     Fl_Color defaultbgcolor_; // default bg color used by ESC[0m
00413     Fl_Font fontface_; // font face
00414     Fl_Fontsize fontsize_; // font size
00415     int fontheight_; // font height (in pixels)
00416     int fontdescent_; // font descent (pixels below font baseline)
00417     int charwidth_; // width of a fixed width ASCII character
00418     public:
00419         CharStyle(bool fontsize_defer);
00420         uchar attrib(void) const { return attrib_; }
00421         uchar charflags(void) const { return charflags_; }
00422         Fl_Color fgcolor(void) const;
00423         Fl_Color bgcolor(void) const;
00424         Fl_Color defaultfgcolor(void) const { return defaultfgcolor_; }
00425         Fl_Color defaultbgcolor(void) const { return defaultbgcolor_; }
00426         Fl_Font fontface(void) const { return fontface_; }
00427         Fl_Fontsize fontsize(void) const { return fontsize_; }
00428         int fontheight(void) const { return fontheight_; }
00429         int fontdescent(void) const { return fontdescent_; }

```

```

00430     int charwidth(void) const           { return charwidth_; }
00431     uchar colorbits_only(uchar inflags) const;
00432     void attrib(uchar val)               { attrib_ = val; }
00433     void charflags(uchar val)            { charflags_ = val; }
00434     void set_charflag(uchar val)         { charflags_ |= val; }
00435     void clr_charflag(uchar val)         { charflags_ &= ~val; }
00436     void fgcolor_uchar(uchar val);
00437     void bgcolor_uchar(uchar val);
00438     void fgcolor(int r,int g,int b)      { fgcolor_ = (r<<24) | (g<<16) | (b<<8); clr_charflag(FG_XTERM); }
}
00439     void bgcolor(int r,int g,int b)      { bgcolor_ = (r<<24) | (g<<16) | (b<<8); clr_charflag(BG_XTERM); }
}
00440     void fgcolor(Fl_Color val)           { fgcolor_ = val; }
clr_charflag(FG_XTERM); }
00441     void bgcolor(Fl_Color val)           { bgcolor_ = val; }
clr_charflag(BG_XTERM); }
00442     void defaultfgcolor(Fl_Color val)    { defaultfgcolor_ = val; }
00443     void defaultbgcolor(Fl_Color val)    { defaultbgcolor_ = val; }
00444     void fontface(Fl_Font val)           { fontface_ = val; update(); }
00445     void fontsize(Fl_Fontsize val)      { fontsize_ = val; update(); }
00446     void update(void);
00447     void update_fake(void);
00448     // SGR MODES: Set Graphics Rendition
00449     void sgr_reset(void) { // e.g. ESC[0m
00450         attrib(Fl_Terminal::NORMAL);
00451         fgcolor(defaultfgcolor_);
00452         bgcolor(defaultbgcolor_);
00453     }
00454     int onoff(bool flag, Attrib a) { return (flag ? (attrib_ | a) : (attrib_ & ~a)); }
00455     void sgr_bold(bool val)              { attrib_ = onoff(val, Fl_Terminal::BOLD); } // e.g. ESC[1m
00456     void sgr_dim(bool val)               { attrib_ = onoff(val, Fl_Terminal::DIM); } // e.g. ESC[2m
00457     void sgr_italic(bool val)            { attrib_ = onoff(val, Fl_Terminal::ITALIC); } // e.g. ESC[3m
00458     void sgr_underline(bool val)         { attrib_ = onoff(val, Fl_Terminal::UNDERLINE); } // e.g. ESC[3m
00459     void sgr_dbl_under(bool val)         { attrib_ = onoff(val, Fl_Terminal::UNDERLINE); } // e.g. ESC[21m
(TODO!)
00460     void sgr_blink(bool val)             { (void)val; /* NOT IMPLEMENTED */ } // e.g. ESC[5m
00461     void sgr_inverse(bool val)           { attrib_ = onoff(val, Fl_Terminal::INVERSE); } // e.g. ESC[7m
00462     void sgr_strike(bool val)           { attrib_ = onoff(val, Fl_Terminal::STRIKEOUT); } // e.g. ESC[9m
00463 };
00464
00465 protected:
00466 // Cursor Class ////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00467 //
00468 // Class to manage the terminal's cursor position, color, etc.
00469 //
00470 class FL_EXPORT Cursor {
00471     int col_; // cursor's current col (x) position on display
00472     int row_; // cursor's current row (y) position on display
00473     int h_; // cursor's height (affected by font size)
00474     Fl_Color fgcolor_; // cursor's fg color (color of text, if any)
00475     Fl_Color bgcolor_; // cursor's bg color
00476 public:
00477     Cursor(void) {
00478         col_ = 0;
00479         row_ = 0;
00480         h_ = 10;
00481         fgcolor_ = 0xffffffff; // wht
00482         bgcolor_ = 0x00d00000; // grn
00483     }
00484     int col(void) const { return col_; }
00485     int row(void) const { return row_; }
00486     int h(void) const { return h_; }
00487     Fl_Color fgcolor(void) const { return fgcolor_; }
00488     Fl_Color bgcolor(void) const { return bgcolor_; }
00489     void col(int val) { col_ = val >= 0 ? val : 0; }
00490     void row(int val) { row_ = val >= 0 ? val : 0; }
00491     void h(int val) { h_ = val; }
00492     void fgcolor(Fl_Color val) { fgcolor_ = val; }
00493     void bgcolor(Fl_Color val) { bgcolor_ = val; }
00494     int left(void) { col_ = (col_>0) ? (col_-1) : 0; return col_; }
00495     int right(void) { return ++col_; }
00496     int up(void) { row_ = (row_>0) ? (row_-1) : 0; return row_; }
00497     int down(void) { return ++row_; }
00498     bool is_rowcol(int drow,int dcol) const;
00499     void scroll(int nrows);
00500     void home(void) { row_ = 0; col_ = 0; }
00501 };
00502
00503 // Utf8Char Class ////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00504 //
00505 // Class to manage the terminal's individual UTF-8 characters.
00506 // Includes fg/bg color, attributes (BOLD, UNDERLINE..)
00507 //
00508 class FL_EXPORT Utf8Char {
00509     static const int max_utf8_ = 4; // RFC 3629 paraphrased: In UTF-8, chars are encoded with 1 to 4
octets
00510     char text_[max_utf8_]; // memory for actual ASCII or UTF-8 byte contents

```

```

00511     uchar   len_;           // length of bytes in text_[] buffer; 1 for ASCII, >1 for UTF-8
00512     uchar   attrib_;       // attribute bits for this char (bold, underline..)
00513     uchar   charflags_;    // CharFlags (xterm colors management)
00514     Fl_Color fgcolor_;     // fltk fg color (supports 8color or 24bit color set
w/ESC[37;<r>;<g>;<b>m)
00515     Fl_Color bgcolor_;     // fltk bg color (supports 8color or 24bit color set
w/ESC[47;<r>;<g>;<b>m)
00516     // Private methods
00517     void text_utf8(const char *text, int len);
00518 public:
00519     // Public methods
00520     Utf8Char(void);         // ctor
00521     Utf8Char(const Utf8Char& o); // copy ctor
00522     ~Utf8Char(void);       // dtor
00523     Utf8Char& operator=(const Utf8Char& o); // assignment
00524     inline int max_utf8() const { return max_utf8_; }
00525     void text_utf8(const char *text, int len, const CharStyle& style);
00526     void text_ascii(char c, const CharStyle& style);
00527     void fl_font_set(const CharStyle& style) const;
00528
00529     // Return the UTF-8 text string for this character.
00530     // Use length() to get number of bytes in string, which will be 1 for ASCII chars.
00531     //
00532     const char* text_utf8(void) const { return text_; }
00533     // Return the attribute for this char
00534     uchar attrib(void) const { return attrib_; }
00535     uchar charflags(void) const { return charflags_; }
00536     Fl_Color fgcolor(void) const;
00537     Fl_Color bgcolor(void) const;
00538     // Return the length of this character in bytes (UTF-8 can be multibyte..)
00539     int length(void) const { return int(len_); }
00540     double pwidth(void) const;
00541     int pwidth_int(void) const;
00542     // Clear the character to a 'space'
00543     void clear(const CharStyle& style) { text_ascii(' ', style); }
00544     bool is_char(char c) const { return *text_ == c; }
00545     void show_char(void) const { ::printf("%.*s", len_, text_); }
00546     void show_char_info(void) const { ::fprintf(stderr, "UTF-8('%.*s', len=%d)\n", len_, text_, len_); }
}

00547
00548     Fl_Color attr_color(Fl_Color col, const Fl_Widget *grp) const;
00549     Fl_Color attr_fg_color(const Fl_Widget *grp) const;
00550     Fl_Color attr_bg_color(const Fl_Widget *grp) const;
00551 };
00552
00553 // RingBuffer Class //////////////////////////////////////
00554 //
00555 // Manages ring with indexed row/col and "history" vs. "display" concepts.
00556 //
00557 class FL_EXPORT RingBuffer {
00558     Utf8Char *ring_chars_; // the ring UTF-8 char buffer
00559     int ring_rows_;       // #rows in ring total
00560     int ring_cols_;      // #columns in ring/hist/disp
00561     int nchars_;         // #chars in ring (ring_rows*ring_cols)
00562     int hist_rows_;     // #rows in history
00563     int hist_use_;      // #rows in use by history
00564     int disp_rows_;    // #rows in display
00565     int offset_;       // index offset (used for 'scrolling')
00566
00567 private:
00568     void new_copy(int drows, int dcols, int hrows, const CharStyle& style);
00569     //DEBUG void write_row(FILE *fp, Utf8Char *u8c, int cols) const {
00570     //DEBUG     cols = (cols != 0) ? cols : ring_cols();
00571     //DEBUG     for ( int col=0; col<cols; col++, u8c++ ) {
00572     //DEBUG         ::fprintf(fp, "%.*s", u8c->length(), u8c->text_utf8());
00573     //DEBUG     }
00574     //DEBUG }
00575 public:
00576     void clear(void);
00577     void clear_hist(void);
00578     RingBuffer(void);
00579     RingBuffer(int drows, int dcols, int hrows);
00580     ~RingBuffer(void);
00581
00582     // Methods to access ring
00583     //
00584     // The 'offset' concept allows the 'history' and 'display'
00585     // to be scrolled indefinitely. The 'offset' is applied
00586     // to all the row accesses, and are clamped to within their bounds.
00587     //
00588     // For 'raw' access to the ring (without the offset concept),
00589     // use the ring_chars() method, and walk from 0 - ring_rows().
00590     //
00591     //
00592     // |-----|
00593     // |   H i s t   | <- hist_srow() <- ring_srow()
00594     // |-----|

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```

00595 //      |-----| <- hist_erow()
00596 //      |-----| <- disp_srow()
00597 //      |   D i s p   |
00598 //      |-----|
00599 //      |-----| <- disp_erow() <- ring_erow()
00600 //
00601 //      \-----/
00602 //      ring_cols()
00603 //      hist_cols()
00604 //      disp_cols()
00605 //
00606 inline int ring_rows(void) const { return ring_rows_; }
00607 inline int ring_cols(void) const { return ring_cols_; }
00608 inline int ring_srow(void) const { return 0; }
00609 inline int ring_erow(void) const { return (ring_rows_ - 1); }
00610 inline int hist_rows(void) const { return hist_rows_; }
00611 inline int hist_cols(void) const { return ring_cols_; }
00612 inline int hist_srow(void) const { return ((offset_ + 0) % ring_rows_); }
00613 inline int hist_erow(void) const { return ((offset_ + hist_rows_ - 1) % ring_rows_); }
00614 inline int disp_rows(void) const { return disp_rows_; }
00615 inline int disp_cols(void) const { return ring_cols_; }
00616 inline int disp_srow(void) const { return ((offset_ + hist_rows_) % ring_rows_); }
00617 inline int disp_erow(void) const { return ((offset_ + hist_rows_ + disp_rows_ - 1) % ring_rows_); }
00618 inline int offset(void) const { return offset_; }
00619 void offset_adjust(int rows);
00620 void hist_rows(int val) { hist_rows_ = val; }
00621 void disp_rows(int val) { disp_rows_ = val; }
00622
00623 // History use
00624 inline int hist_use(void) const { return hist_use_; }
00625 inline void hist_use(int val) { hist_use_ = val; }
00626 inline int hist_use_srow(void) const { return ((offset_ + hist_rows_ - hist_use_) % ring_rows_); }
}
00627 inline Utf8Char *ring_chars(void) { return ring_chars_; } // access ring buffer directly
00628 inline Utf8Char *ring_chars(void) const { return ring_chars_; } // access ring buffer directly
00629
00630 bool is_hist_ring_row(int grow) const;
00631 bool is_disp_ring_row(int grow) const;
00632 //DEBUG void show_ring_info(void) const;
00633 void move_disp_row(int src_row, int dst_row);
00634 void clear_disp_rows(int sdraw, int edrow, const CharStyle& style);
00635 void scroll(int rows, const CharStyle& style);
00636
00637 const Utf8Char* u8c_ring_row(int row) const;
00638 const Utf8Char* u8c_hist_row(int hrow) const;
00639 const Utf8Char* u8c_hist_use_row(int hurow) const;
00640 const Utf8Char* u8c_disp_row(int draw) const;
00641 // Non-const versions of the above methods
00642 // Using "Effective C++" ugly-as-hell syntax technique.
00643 //
00644 Utf8Char* u8c_ring_row(int row);
00645 Utf8Char* u8c_hist_row(int hrow);
00646 Utf8Char* u8c_hist_use_row(int hurow);
00647 Utf8Char* u8c_disp_row(int draw);
00648
00649 void create(int drows, int dcols, int hrows);
00650 void resize(int drows, int dcols, int hrows, const CharStyle& style);
00651
00652 void change_disp_rows(int drows, const CharStyle& style);
00653 void change_disp_cols(int dcols, const CharStyle& style);
00654 };
00655
00656 // Selection Class //////////////////////////////////////
00657 //
00658 // Class to manage mouse selection
00659 //
00660 class FL_EXPORT Selection {
00661     int srow_, scol_, erow_, ecol_; // selection start/end. NOTE: start *might* be > end
00662     int push_row_, push_col_; // global row/col for last FL_PUSH
00663     Fl_Color selectionbgcolor_;
00664     Fl_Color selectionfgcolor_;
00665     int state_; // 0=none, 1=started, 2=extended, 3=done
00666     bool is_selection_; // false: no selection
00667 public:
00668     Selection(void);
00669     int srow(void) const { return srow_; }
00670     int scol(void) const { return scol_; }
00671     int erow(void) const { return erow_; }
00672     int ecol(void) const { return ecol_; }
00673     void push_clear() { push_row_ = push_col_ = -1; }
00674     void push_rowcol(int row, int col) { push_row_ = row; push_col_ = col; }
00675     void start_push() { start(push_row_, push_col_); }
00676     bool dragged_off(int row, int col) { return (push_row_ != row) || (push_col_ != col); }
00677     void selectionfgcolor(Fl_Color val) { selectionfgcolor_ = val; }
00678     void selectionbgcolor(Fl_Color val) { selectionbgcolor_ = val; }
00679     Fl_Color selectionfgcolor(void) const { return selectionfgcolor_; }
00680     Fl_Color selectionbgcolor(void) const { return selectionbgcolor_; }

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00681     bool is_selection(void) const { return is_selection_; }
00682     bool get_selection(int &srow,int &scol,int &erow,int &ecol) const; // guarantees return (start <
end)
00683     bool start(int row, int col);
00684     bool extend(int row, int col);
00685     void end(void);
00686     void select(int srow, int scol, int erow, int ecol);
00687     bool clear(void);
00688     int state(void) const { return state_; }
00689     void scroll(int nrows);
00690 };
00691
00692 // EscapeSeq Class //////////////////////////////////////
00693 //
00694 // Class to handle parsing ESC sequences
00695 //
00696 // Holds all state information for parsing esc sequences,
00697 // so sequences can span multiple block read(2) operations, etc.
00698 // Handling of parsed sequences is NOT handled in this class,
00699 // just the parsing of the sequences and managing generic integers.
00700 //
00701 class FL_EXPORT EscapeSeq {
00702 public:
00703     // EscapeSeq Constants
00704     // Maximums
00705     static const int maxbuff = 80; // character buffer
00706     static const int maxvals = 20; // integer value buffer
00707     // Return codes
00708     static const int success = 0; // operation succeeded
00709     static const int fail = -1; // operation failed
00710     static const int completed = 1; // multi-step operation completed successfully
00711 private:
00712     char esc_mode_; // escape parsing mode state
00713     char csi_; // This is an ESC[.. sequence (Ctrl Seq Introductor)
00714     char buff_[maxbuff]; // escape sequence being parsed
00715     char *buffp_; // parsing ptr into buff[]
00716     char *buffendp_; // end of buff[] (ptr to last valid buff char)
00717     char *valbuffp_; // pointer to first char in buff of integer being parsed
00718     int vals_[maxvals]; // value array for parsing #'s in ESC[#;#;#..
00719     int vali_; // parsing index into vals[], 0 if none
00720     int save_row_, save_col_; // used by ESC[s/u for save/restore
00721
00722     int append_buff(char c);
00723     int append_val(void);
00724
00725 public:
00726     EscapeSeq(void);
00727     void reset(void);
00728     char esc_mode(void) const;
00729     void esc_mode(char val);
00730     int total_vals(void) const;
00731     int val(int i) const;
00732     int defvalmax(int dval, int max) const;
00733     bool parse_in_progress(void) const;
00734     bool is_csi(void) const;
00735     int parse(char c);
00736     void save_cursor(int row, int col);
00737     void restore_cursor(int &row, int &col);
00738 };
00739
00740 // Partial UTF-8 Buffer Class //////////////////////////////////////
00741 //
00742 // Class to manage buffering partial UTF-8 characters between write calls.
00743 //
00744 class FL_EXPORT PartialUtf8Buf {
00745     char buf_[10]; // buffer partial UTF-8 encoded char
00746     int buflen_; // length of buffered UTF-8 encoded char
00747     int clen_; // final byte length of a UTF-8 char
00748 public:
00749     void clear(void) { buflen_ = clen_ = 0; } // clear the buffer
00750     PartialUtf8Buf(void) { clear(); } // Ctor
00751     // Is byte 'c' in the middle of a UTF-8 encoded byte sequence?
00752     bool is_continuation(char c) {
00753         //      Byte 1      Byte 2      Byte 3      ..etc..
00754         // ASCII:  0xxxxxxx
00755         // UTF8 (2): 110xxxxx 10xxxxxx
00756         // UTF8 (3): 1110xxxx 10xxxxxx 10xxxxxx
00757         // UTF8 (4): 11110xxx 10xxxxxx 10xxxxxx 10xxxxxx
00758         // UTF8 (5): 111110xx 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx
00759         // UTF8 (6): 1111110x 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx
00760         //      \_____/ \_____/
00761         //      Start byte      Continuation bytes
00762         //      (c & 0xc0) == 0x80
00763         return ((c & 0xc0) == 0x80);
00764     }
00765     // Access buffer
00766     const char* buf(void) const { return buf_; }

```

```

00767 // Access buffer length
00768 int buflen(void) const { return buflen_; }
00769 // Append bytes of a partial UTF-8 string to the buffer.
00770 //
00771 // Returns:
00772 // - true if done OK. Use is_complete() to see if a complete char received.
00773 // - false if buffer overrun occurred, class is clear()ed.
00774 //
00775 // An appropriate response to 'false' would be to print the
00776 // "unknown character" and skip all subsequent UTF-8 continuation chars.
00777 //
00778 bool append(const char* p, int len) {
00779     if (len <= 0) return true; // ignore silly requests: say we did but dont
00780     if (buflen_ + len >= (int)sizeof(buf_)) // overrun check
00781         { clear(); return false; } // clear self, return false
00782     if (!buflen_) clen_ = fl_utf8len(*p); // first byte? save char len for later
00783     while (len>0) { buf_[buflen_++] = *p++; len--; } // append byte to buffer
00784     return true;
00785 }
00786 bool is_complete(void) const { return (buflen_ && (buflen_ == clen_)); }
00787 };
00788
00794 public:
00799 Fl_Scrollbar *scrollbar; // vertical scrollbar (value: rows above disp_chars[])
00800 private:
00801 bool fontsize_defer_; // flag defers font calcs until first draw() (issue 837)
00802 int scrollbar_size_; // local preference for scrollbar size
00803 CharStyle *current_style_; // current font, attrib, color..
00804 OutFlags oflags_; // output translation flags (CR_TO_LF, LF_TO_CR, LF_TO_CRLF)
00805
00806 // A ring buffer is used for the terminal's history (hist) and display (disp) buffer.
00807 // See README-Fl_Terminal.txt, section "RING BUFFER DESCRIPTION" for diagrams/info.
00808 //
00809 // Ring buffer
00810 RingBuffer ring_; // terminal history/display ring buffer
00811 Cursor cursor_; // terminal cursor (position, color, etc)
00812 Margin margin_; // terminal margins (top,left,bottom,right)
00813 Selection select_; // mouse selection
00814 EscapeSeq escseq; // Escape sequence parsing (ESC[ xterm/vt100)
00815 bool show_unknown_; // if true, show unknown chars as '?' (default off)
00816 bool ansi_; // if true, parse ansi codes (default on)
00817 char *tabstops_; // array of tab stops (0|1) \__ TODO: This should probably
00818 int tabstops_size_; // size of tabstops[] array / be a class "TabStops".
00819 Fl_Rect scrn_; // terminal screen xywh inside box(), margins, and scrollbar
00820 int autoscroll_dir_; // 0=autoscroll timer off, 3=scrolling up, 4=scrolling down
00821 int autoscroll_amt_; // #pixels above or below edge, used for autoscroll speed
00822 RedrawStyle redraw_style_; // NO_REDRAW, RATE_LIMITED, PER_WRITE
00823 float redraw_rate_; // maximum redraw rate in seconds, default=0.10
00824 bool redraw_modified_; // display modified; used by update_cb() to rate limit redraws
00825 bool redraw_timer_; // if true, redraw timer is running
00826 PartialUtf8Buf pub_; // handles Partial Utf8 Buffer (pub)
00827
00828 protected:
00829 // Ring buffer management
00830 const Utf8Char* u8c_ring_row(int grow) const;
00831 const Utf8Char* u8c_hist_row(int hrow) const;
00832 const Utf8Char* u8c_hist_use_row(int hrow) const;
00833 const Utf8Char* u8c_disp_row(int drow) const;
00834 // Non-const versions of the above.
00835 // "Effective C++" says: implement non-const method to cast away const
00836 //
00837 Utf8Char* u8c_ring_row(int grow);
00838 Utf8Char* u8c_hist_row(int hrow);
00839 Utf8Char* u8c_hist_use_row(int hurow);
00840 Utf8Char* u8c_disp_row(int drow);
00841 Utf8Char* u8c_cursor(void);
00842 private:
00843 void create_ring(int drows, int dcols, int hrows);
00844 void init_(int X,int Y,int W,int H,const char*L,int rows,int cols,int hist,bool fontsize_defer);
00845 protected:
00846 int scrollbar_width(void) const;
00847 private:
00848 // Tabstops
00849 void init_tabstops(int newsize);
00850 void default_tabstops(void);
00851 void clear_all_tabstops(void);
00852 void set_tabstop(void);
00853 void clear_tabstop(void);
00854 // Updates
00855 void update_screen_xywh(void);
00856 void update_screen(bool font_changed);
00857 void update_scrollbar(void);
00858 // Resize
00859 void resize_display_rows(int drows);
00860 void resize_display_columns(int dcols);
00861 void refit_disp_to_screen(void);
00862 // Callbacks

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```

00863 static void scrollbar_cb(Fl_Widget*, void*); // scrollbar manipulation
00864 static void autoscroll_timer_cb(void*); // mouse drag autoscroll
00865 void autoscroll_timer_cb2(void);
00866 static void redraw_timer_cb(void*); // redraw rate limiting timer
00867 void redraw_timer_cb2(void);
00868
00869 // Screen management
00870 protected:
00871 const CharStyle& current_style(void) const;
00872 void current_style(const CharStyle& sty);
00873 private:
00874 int x_to_glob_col(int X, int grow, int &gcol) const;
00875 int xy_to_glob_rowcol(int X, int Y, int &grow, int &gcol) const;
00876 protected:
00877 int w_to_col(int W) const;
00878 int h_to_row(int H) const;
00879 // API: Display clear operations
00880 void clear_sod(void);
00881 void clear_eod(void);
00882 void clear_eol(void);
00883 void clear_sol(void);
00884 void clear_line(int row);
00885 void clear_line(void);
00886 const Utf8Char* walk_selection(const Utf8Char *u8c, int &row, int &col) const;
00887 bool get_selection(int &row, int &scol, int &erow, int &ecol) const;
00888 bool is_selection(void) const;
00889 bool is_inside_selection(int row, int col) const;
00890 private:
00891 bool is_hist_ring_row(int grow) const;
00892 bool is_disp_ring_row(int grow) const;
00893 protected:
00894 int selection_text_len(void) const;
00895 const char* selection_text(void) const;
00896 void clear_mouse_selection(void);
00897 bool selection_extend(int X, int Y);
00898 void scroll(int rows);
00899 void insert_rows(int count);
00900 void delete_rows(int count);
00901 void insert_char_eol(char c, int drow, int dcol, int rep);
00902 void insert_char(char c, int rep);
00903 void delete_chars(int drow, int dcol, int rep);
00904 void delete_chars(int rep);
00905 public:
00906 // API: Terminal operations
00907 void clear(void);
00908 void clear(Fl_Color val);
00909 void clear_screen(bool scroll_to_hist=true); // ESC [ 2 J
00910 void clear_screen_home(bool scroll_to_hist=true); // ESC [ H ESC [ 2 J
00911 void clear_history(void); // ESC [ 3 J
00912 void reset_terminal(void); // ESC c
00913 void cursor_home(void); // ESC [ 0 H
00914 // API: Cursor
00915 void cursorfgcolor(Fl_Color val);
00916 void cursorbgcolor(Fl_Color val);
00917 Fl_Color cursorfgcolor(void) const;
00918 Fl_Color cursorbgcolor(void) const;
00919 protected:
00920 void cursor_row(int row);
00921 void cursor_col(int col);
00922 public:
00923 int cursor_row(void) const;
00924 int cursor_col(void) const;
00925 protected:
00926 void cursor_up(int count=1, bool do_scroll=false);
00927 void cursor_down(int count=1, bool do_scroll=false);
00928 void cursor_left(int count=1);
00929 void cursor_right(int count=1, bool do_scroll=false);
00930 void cursor_eol(void);
00931 void cursor_sol(void);
00932 void cursor_cr(void);
00933 void cursor_crlf(int count=1);
00934 void cursor_tab_right(int count=1);
00935 void cursor_tab_left(int count=1);
00936 void save_cursor(void);
00937 void restore_cursor(void);
00938 // Output translation
00939 public:
00940 void output_translate(Fl_Terminal::OutFlags val);
00941 Fl_Terminal::OutFlags output_translate(void) const;
00942 private:
00943 void handle_lf(void);
00944 void handle_cr(void);
00945 // Printing
00946 void handle_ctrl(char c);
00947 bool is_printable(char c);
00948 bool is_ctrl(char c);
00949 void handle_SGR(void);

```

```

00950 void handle_DECRARA(void);
00951 void handle_escseq(char c);
00952 // --
00953 void display_modified(void);
00954 void display_modified_clear(void);
00955 void clear_char_at_disp(int drow, int dcol);
00956 const Utf8Char* utf8_char_at_disp(int drow, int dcol) const;
00957 const Utf8Char* utf8_char_at_glob(int grow, int gcol) const;
00958 void repeat_char(char c, int rep);
00959 void utf8_cache_clear(void);
00960 void utf8_cache_flush(void);
00961 // API: Character display output
00962 public:
00963 void putchar(const char *text, int len, int drow, int dcol);
00964 void putchar(char c, int drow, int dcol);
00965 void print_char(const char *text, int len=-1);
00966 void print_char(char c);
00967 // API: String display output
00968 void append_utf8(const char *buf, int len=-1);
00969 void append_ascii(const char *s);
00970 void append(const char *s, int len=-1);
00971 protected:
00972 int handle_unknown_char(void);
00973 // Drawing
00974 void draw_row_bg(int grow, int X, int Y) const;
00975 void draw_row(int grow, int Y) const;
00976 void draw_buff(int Y) const;
00977 private:
00978 void handle_selection_autoscroll(void);
00979 int handle_selection(int e);
00980 public:
00981 // FLTK: draw(), resize(), handle()
00982 void draw(void) FL_OVERRIDE;
00983 void resize(int X,int Y,int W,int H) FL_OVERRIDE;
00984 int handle(int e) FL_OVERRIDE;
00985
00986 protected:
00987 // Internal short names
00988 // Don't make these public, but allow internals and
00989 // derived classes to maintain brevity.
00990 //
00992 inline int ring_rows(void) const { return ring_.ring_rows(); }
00994 inline int ring_cols(void) const { return ring_.ring_cols(); }
00996 inline int ring_srow(void) const { return ring_.ring_srow(); }
00998 inline int ring_erow(void) const { return ring_.ring_erow(); }
01000 inline int hist_rows(void) const { return ring_.hist_rows(); }
01002 inline int hist_cols(void) const { return ring_.hist_cols(); }
01004 inline int hist_srow(void) const { return ring_.hist_srow(); }
01006 inline int hist_erow(void) const { return ring_.hist_erow(); }
01008 inline int hist_use(void) const { return ring_.hist_use(); }
01010 inline int hist_use_srow(void) const { return ring_.hist_use_srow(); }
01012 inline int disp_rows(void) const { return ring_.disp_rows(); }
01014 inline int disp_cols(void) const { return ring_.disp_cols(); }
01016 inline int disp_srow(void) const { return ring_.disp_srow(); }
01018 inline int disp_erow(void) const { return ring_.disp_erow(); }
01020 inline int offset(void) const { return ring_.offset(); }
01021
01022 // TODO: CLEAN UP WHAT'S PUBLIC, AND WHAT SHOULD BE 'PROTECTED' AND 'PRIVATE'
01023 // Some of the public stuff should, quite simply, "not be".
01024
01025 // API: Terminal features
01026 public:
01027 // API: Scrollbar
01028 int scrollbar_size(void) const;
01029 void scrollbar_size(int val);
01030 int scrollbar_actual_size(void) const;
01031 // API: History
01032 int history_rows(void) const;
01033 void history_rows(int val);
01034 int history_use(void) const;
01035 // API: Display
01036 int display_rows(void) const;
01037 void display_rows(int val);
01038 int display_columns(void) const;
01039 void display_columns(int val);
01040 // API: Box
01048 void box(Fl_Boxtype val) { Fl_Group::box(val); update_screen(false); }
01050 Fl_Boxtype box(void) const { return Fl_Group::box(); }
01051 // API: Margins
01053 int margin_left(void) const { return margin_.left(); }
01055 int margin_right(void) const { return margin_.right(); }
01057 int margin_top(void) const { return margin_.top(); }
01059 int margin_bottom(void) const { return margin_.bottom(); }
01060 void margin_left(int val);
01061 void margin_right(int val);
01062 void margin_top(int val);
01063 void margin_bottom(int val);

```

```

01064 // API: Text font/size/color
01065 void textfont(Fl_Font val);
01066 void textsize(Fl_Fontsize val);
01067 void textcolor(Fl_Color val);
01068 void color(Fl_Color val);
01069 void textfgcolor(Fl_Color val);
01070 void textbgcolor(Fl_Color val);
01071 void textfgcolor_default(Fl_Color val);
01072 void textbgcolor_default(Fl_Color val);
01074 Fl_Font textfont(void) const { return current_style_>fontface(); }
01076 Fl_Fontsize textsize(void) const { return current_style_>fontsize(); }
01078 Fl_Color color(void) const { return Fl_Group::color(); }
01080 Fl_Color textcolor(void) const { return textfgcolor_default(); }
01082 Fl_Color textfgcolor(void) const { return current_style_>fgcolor(); }
01084 Fl_Color textbgcolor(void) const { return current_style_>bgcolor(); }
01086 Fl_Color textfgcolor_default(void) const { return current_style_>defaultfgcolor(); }
01088 Fl_Color textbgcolor_default(void) const { return current_style_>defaultbgcolor(); }
01089 void textfgcolor_xterm(uchar val);
01090 void textbgcolor_xterm(uchar val);
01092 void selectionfgcolor(Fl_Color val) { select_.selectionfgcolor(val); }
01094 void selectionbgcolor(Fl_Color val) { select_.selectionbgcolor(val); }
01096 Fl_Color selectionfgcolor(void) const { return select_.selectionfgcolor(); }
01098 Fl_Color selectionbgcolor(void) const { return select_.selectionbgcolor(); }
01099 // API: Text attrib
01100 void textattrib(uchar val);
01101 uchar textattrib() const;
01102 // API: Redraw style/rate
01103 RedrawStyle redraw_style(void) const;
01104 void redraw_style(RedrawStyle val);
01105 private:
01106 bool is_redraw_style(RedrawStyle val) { return redraw_style_ == val; }
01107 public:
01108 float redraw_rate(void) const;
01109 void redraw_rate(float val);
01110 // API: Show unknown/unprintable chars
01111 bool show_unknown(void) const;
01112 void show_unknown(bool val);
01113 // API: ANSI sequences
01114 bool ansi(void) const;
01115 void ansi(bool val);
01116 // Fl_Simple_Terminal API compatibility
01117 int history_lines(void) const;
01118 void history_lines(int val);
01119 // API: printf()
01120 void printf(const char *fmt, ...);
01121 void vprintf(const char *fmt, va_list ap);
01122 // Ctor
01123 Fl_Terminal(int X,int Y,int W,int H,const char*L=0);
01124 Fl_Terminal(int X,int Y,int W,int H,const char*L,int rows,int cols,int hist);
01125 // Dtor
01126 ~Fl_Terminal(void);
01127 // Debugging features
01128 //DEBUG void show_ring_info() const { ring_.show_ring_info(); }
01129 //DEBUG void write_row(FILE *fp, Utf8Char *u8c, int cols) const;
01130 //DEBUG void show_buffers(RingBuffer *a, RingBuffer *b=0) const;
01131 };
01132 #endif

```

13.150 Fl_Text_Buffer.H

```

00001 //
00002 // Header file for Fl_Text_Buffer class.
00003 //
00004 // Copyright 2001-2023 by Bill Spitzak and others.
00005 // Original code Copyright Mark Edel. Permission to distribute under
00006 // the LGPL for the FLTK library granted by Mark Edel.
00007 //
00008 // This library is free software. Distribution and use rights are outlined in
00009 // the file "COPYING" which should have been included with this file. If this
00010 // file is missing or damaged, see the license at:
00011 //
00012 // https://www.fltk.org/COPYING.php
00013 //
00014 // Please see the following page on how to report bugs and issues:
00015 //
00016 // https://www.fltk.org/bugs.php
00017 //
00018 //
00019 /* \file
00020 Fl_Text_Buffer, Fl_Text_Selection widget . */
00021
00022 #ifndef FL_TEXT_BUFFER_H
00023 #define FL_TEXT_BUFFER_H
00024
00025 #include <stdarg.h> /* va_list */

```

```

00026 #include "fl_attr.h" /* Doxygen can't find <FL/fl_attr.h> */
00027
00028 #undef ASSERT_UTF8
00029
00030 #ifdef ASSERT_UTF8
00031 # include <assert.h>
00032 # define IS_UTF8_ALIGNED(a) if (a && *a) assert(fl_utf8len(*a)>0);
00033 # define IS_UTF8_ALIGNED2(a, b) if (b>=0 && b<a->length()) assert(fl_utf8len(a->byte_at(b))>0);
00034 #else
00035 # define IS_UTF8_ALIGNED(a)
00036 # define IS_UTF8_ALIGNED2(a, b)
00037 #endif
00038
00039
00040 /*
00041 "character size" is the size of a UTF-8 character in bytes
00042 "character width" is the width of a Unicode character in pixels
00043 "column" was originally defined as a character offset from the left margin.
00044 It was identical to the byte offset. In UTF-8, we have neither a byte offset
00045 nor truly fixed width fonts (*). Column could be a pixel value multiplied with
00046 an average character width (which is a bearable approximation).
00047
00048 * in Unicode, there are no fixed width fonts! Even if the ASCII characters may
00049 happen to be all the same width in pixels, Chinese characters surely are not.
00050 There are plenty of exceptions, like ligatures, that make special handling of
00051 "fixed" character widths a nightmare. I decided to remove all references to
00052 fixed fonts and see "columns" as a multiple of the average width of a
00053 character in the main font.
00054 - Matthias
00055 */
00056
00057
00058 /* Maximum length in characters of a tab or control character expansion
00059 of a single buffer character */
00060 #define FL_TEXT_MAX_EXP_CHAR_LEN 20
00061
00062 #include "Fl_Export.H"
00063
00064 class Fl_Text_Undo_Action_List;
00065 class Fl_Text_Undo_Action;
00066
00100 class FL_EXPORT Fl_Text_Selection {
00101     friend class Fl_Text_Buffer;
00102
00103 public:
00104
00105     // Sets the selection range and selected().
00106     void set(int startpos, int endpos);
00107
00108     // Updates a selection after text was modified.
00109     void update(int pos, int nDeleted, int nInserted);
00110
00122     int start() const { return mSelected ? mStart : 0; }
00123
00135     int end() const { return mSelected ? mEnd : 0; }
00136
00142     bool selected() const { return mSelected; }
00143
00148     void selected(bool b) { mSelected = b; }
00149
00163     int length() const { return mSelected ? mEnd - mStart : 0; }
00164
00165     // Returns true if position \p pos is in this Fl_Text_Selection.
00166     int includes(int pos) const;
00167
00168     // Returns true if selected() and the positions of this selection.
00169     int selected(int *startpos, int *endpos) const;
00170     FL_DEPRECATED("in 1.4.0 - use selected(startpos, endpos) instead",
00171     int position(int *startpos, int *endpos) const) { return selected(startpos, endpos); }
00172
00173 protected:
00174
00175     int mStart;
00176     int mEnd;
00177     bool mSelected;
00178 };
00179
00180
00181 typedef void (*Fl_Text_Modify_Cb)(int pos, int nInserted, int nDeleted,
00182     int nRestyled, const char* deletedText,
00183     void* cbArg);
00184
00185
00186 typedef void (*Fl_Text_Predelete_Cb)(int pos, int nDeleted, void* cbArg);
00187
00188
00201 class FL_EXPORT Fl_Text_Buffer {

```

```
00202 public:
00203
00212 Fl_Text_Buffer(int requestedSize = 0, int preferredGapSize = 1024);
00213
00217 ~Fl_Text_Buffer();
00218
00223 int length() const { return mLength; }
00224
00231 char* text() const;
00232
00237 void text(const char* text);
00238
00249 char* text_range(int start, int end) const;
00250
00257 unsigned int char_at(int pos) const;
00258
00265 char byte_at(int pos) const;
00266
00272 const char *address(int pos) const
00273 { return (pos < mGapStart) ? mBuf+pos : mBuf+pos+mGapEnd-mGapStart; }
00274
00280 char *address(int pos)
00281 { return (pos < mGapStart) ? mBuf+pos : mBuf+pos+mGapEnd-mGapStart; }
00282
00289 void insert(int pos, const char* text, int insertedLength = -1);
00290
00296 void append(const char* t, int addedLength = -1) { insert(length(), t, addedLength); }
00297
00298 void vprintf(const char *fmt, va_list ap);
00299 void printf(const char* fmt, ...);
00300
00306 void remove(int start, int end);
00307
00316 void replace(int start, int end, const char *text, int insertedLength = -1);
00317
00325 void copy(Fl_Text_Buffer* fromBuf, int fromStart, int fromEnd, int toPos);
00326
00331 int undo(int *cp=0);
00332
00337 bool can_undo() const;
00338
00342 int redo(int *cp=0);
00343
00348 bool can_redo() const;
00349
00357 void canUndo(char flag=1);
00358
00374 int insertfile(const char *file, int pos, int buflen = 128*1024);
00375
00379 int appendfile(const char *file, int buflen = 128*1024)
00380 { return insertfile(file, length(), buflen); }
00381
00385 int loadfile(const char *file, int buflen = 128*1024)
00386 { select(0, length()); remove_selection(); return appendfile(file, buflen); }
00387
00398 int outputfile(const char *file, int start, int end, int buflen = 128*1024);
00399
00410 int savefile(const char *file, int buflen = 128*1024)
00411 { return outputfile(file, 0, length(), buflen); }
00412
00419 int tab_distance() const { return mTabDist; }
00420
00425 void tab_distance(int tabDist);
00426
00430 void select(int start, int end);
00431
00435 int selected() const { return mPrimary.selected(); }
00436
00440 void unselect();
00441
00445 int selection_position(int* start, int* end);
00446
00452 char* selection_text();
00453
00457 void remove_selection();
00458
00462 void replace_selection(const char* text);
00463
00467 void secondary_select(int start, int end);
00468
00473 int secondary_selected() { return mSecondary.selected(); }
00474
00478 void secondary_unselect();
00479
00483 int secondary_selection_position(int* start, int* end);
00484
00490 char* secondary_selection_text();
```

```
00491
00496 void remove_secondary_selection();
00497
00502 void replace_secondary_selection(const char* text);
00503
00507 void highlight(int start, int end);
00508
00512 int highlight() { return mHighlight.selected(); }
00513
00517 void unhighlight();
00518
00522 int highlight_position(int* start, int* end);
00523
00529 char* highlight_text();
00530
00542 void add_modify_callback(Fl_Text_Modify_Cb bufModifiedCB, void* cbArg);
00543
00547 void remove_modify_callback(Fl_Text_Modify_Cb bufModifiedCB, void* cbArg);
00548
00553 void call_modify_callbacks() { call_modify_callbacks(0, 0, 0, 0, 0); }
00554
00558 void add_predelete_callback(Fl_Text_Predelete_Cb bufPredeleCB, void* cbArg);
00559
00564 void remove_predelete_callback(Fl_Text_Predelete_Cb predeleCB, void* cbArg);
00565
00570 void call_predelete_callbacks() { call_predelete_callbacks(0, 0); }
00571
00580 char* line_text(int pos) const;
00581
00587 int line_start(int pos) const;
00588
00596 int line_end(int pos) const;
00597
00603 int word_start(int pos) const;
00604
00610 int word_end(int pos) const;
00611
00619 int count_displayed_characters(int lineStartPos, int targetPos) const;
00620
00630 int skip_displayed_characters(int lineStartPos, int nChars);
00631
00636 int count_lines(int startPos, int endPos) const;
00637
00642 int skip_lines(int startPos, int nLines);
00643
00650 int rewind_lines(int startPos, int nLines);
00651
00666 int findchar_forward(int startPos, unsigned searchChar, int* foundPos) const;
00667
00681 int findchar_backward(int startPos, unsigned int searchChar, int* foundPos) const;
00682
00694 int search_forward(int startPos, const char* searchString, int* foundPos,
00695                    int matchCase = 0) const;
00696
00708 int search_backward(int startPos, const char* searchString, int* foundPos,
00709                    int matchCase = 0) const;
00710
00714 const Fl_Text_Selection* primary_selection() const { return &mPrimary; }
00715
00719 Fl_Text_Selection* primary_selection() { return &mPrimary; }
00720
00724 const Fl_Text_Selection* secondary_selection() const { return &mSecondary; }
00725
00729 const Fl_Text_Selection* highlight_selection() const { return &mHighlight; }
00730
00735 int prev_char(int ix) const;
00736 int prev_char_clipped(int ix) const;
00737
00742 int next_char(int ix) const;
00743 int next_char_clipped(int ix) const;
00744
00748 int utf8_align(int) const;
00749
00753 int input_file_was_transcoded;
00754
00758 static const char* file_encoding_warning_message;
00759
00769 void (*transcoding_warning_action)(Fl_Text_Buffer*);
00770 bool is_word_separator(int pos) const;
00771
00772 protected:
00773
00778 void call_modify_callbacks(int pos, int nDeleted, int nInserted,
00779                            int nRestyled, const char* deletedText) const;
00780
00785 void call_predelete_callbacks(int pos, int nDeleted) const;
00786
```



```

00797 int insert_(int pos, const char* text, int insertedLength = -1);
00798
00805 void remove_(int start, int end);
00806
00811 void redisplay_selection(Fl_Text_Selection* oldSelection,
00812                        Fl_Text_Selection* newSelection) const;
00813
00817 void move_gap(int pos);
00818
00823 void reallocate_with_gap(int newGapStart, int newGapLen);
00824
00825 char* selection_text_(Fl_Text_Selection* sel) const;
00826
00830 void remove_selection_(Fl_Text_Selection* sel);
00831
00835 void replace_selection_(Fl_Text_Selection* sel, const char* text);
00836
00840 void update_selections(int pos, int nDeleted, int nInserted);
00841
00845 int apply_undo(Fl_Text_Undo_Action* action, int* cursorPos);
00846
00847 Fl_Text_Selection mPrimary;
00848 Fl_Text_Selection mSecondary;
00849 Fl_Text_Selection mHighlight;
00850 int mLength;
00853 char* mBuf;
00854 int mGapStart;
00855 int mGapEnd;
00856 // The hardware tab distance used by all displays for this buffer,
00857 // and used in computing offsets for rectangular selection operations.
00858 int mTabDist;
00859 int mNModifyProcs;
00860 Fl_Text_Modify_Cb *mModifyProcs;
00862 void** mCbArgs;
00863 int mNPredeleteProcs;
00864 Fl_Text_Predelete_Cb *mPredeleteProcs;
00866 void **mPredeleteCbArgs;
00867 int mCursorPosHint;
00869 char mCanUndo;
00871 int mPreferredGapSize;
00874 Fl_Text_Undo_Action* mUndo;
00875 Fl_Text_Undo_Action_List* mUndoList;
00876 Fl_Text_Undo_Action_List* mRedoList;
00877 };
00878
00879 #endif

```

13.151 Fl_Text_Display.H

```

00001 //
00002 // Header file for Fl_Text_Display class.
00003 //
00004 // Copyright 2001-2023 by Bill Spitzak and others.
00005 // Original code Copyright Mark Edel. Permission to distribute under
00006 // the LGPL for the FLTK library granted by Mark Edel.
00007 //
00008 // This library is free software. Distribution and use rights are outlined in
00009 // the file "COPYING" which should have been included with this file. If this
00010 // file is missing or damaged, see the license at:
00011 //
00012 //     https://www.fltk.org/COPYING.php
00013 //
00014 // Please see the following page on how to report bugs and issues:
00015 //
00016 //     https://www.fltk.org/bugs.php
00017 //
00018
00019 /* \file
00020 Fl_Text_Display widget . */
00021
00022 #ifndef FL_TEXT_DISPLAY_H
00023 #define FL_TEXT_DISPLAY_H
00024
00025 #include <FL/Fl.H> // Fl::scrollbar_size()
00026 #include "fl_draw.H"
00027 #include "Fl_Group.H"
00028 #include "Fl_Widget.H"
00029 #include "Fl_Scrollbar.H"
00030 #include "Fl_Text_Buffer.H"
00031
00078 class FL_EXPORT Fl_Text_Display: public Fl_Group {
00079
00080 public:
00081
00085 enum {

```

```

00086     NORMAL_CURSOR,
00087     CARET_CURSOR,
00088     DIM_CURSOR,
00089     BLOCK_CURSOR,
00090     HEAVY_CURSOR,
00091     SIMPLE_CURSOR
00092 };
00093
00099     enum {
00100         CURSOR_POS,
00101         CHARACTER_POS
00102     };
00103
00109     enum {
00110         DRAG_NONE = -2,
00111         DRAG_START_DND = -1,
00112         DRAG_CHAR = 0,
00113         DRAG_WORD = 1,
00114         DRAG_LINE = 2
00115     };
00116
00120     enum {
00121         WRAP_NONE,
00122         WRAP_AT_COLUMN,
00123         WRAP_AT_PIXEL,
00124         WRAP_AT_BOUNDS
00125     };
00126
00127     friend int fl_text_drag_prepare(int pos, int key, Fl_Text_Display* d);
00128     friend void fl_text_drag_me(int pos, Fl_Text_Display* d);
00129
00130     typedef void (*Unfinished_Style_Cb)(int, void *);
00131
00145     struct Style_Table_Entry {
00146         Fl_Color    color;
00147         Fl_Font     font;
00148         Fl_Fontsize size;
00149         unsigned    attr;
00150         Fl_Color    bgcolor;
00151     };
00152
00156     enum {
00157         ATTR_BGCOLOR          = 0x0001,
00158         ATTR_BGCOLOR_EXT_    = 0x0002,
00159         ATTR_BGCOLOR_EXT     = 0x0003,
00160         ATTR_UNDERLINE       = 0x0004,
00161         ATTR_GRAMMAR         = 0x0008,
00162         ATTR_SPELLING        = 0x000C,
00163         ATTR_STRIKE_THROUGH = 0x0010,
00164         ATTR_LINES_MASK     = 0x001C
00165     };
00166
00167     Fl_Text_Display(int X, int Y, int W, int H, const char *l = 0);
00168     ~Fl_Text_Display();
00169
00170     int handle(int e) FL_OVERRIDE;
00171
00172     void buffer(Fl_Text_Buffer* buf);
00173
00180     void buffer(Fl_Text_Buffer& buf) { buffer(&buf); }
00181
00189     Fl_Text_Buffer* buffer() const { return mBuffer; }
00196     Fl_Text_Buffer* style_buffer() const { return mStyleBuffer; }
00197
00198     void redisplay_range(int start, int end);
00199     void scroll(int topLineNum, int horizOffset);
00200     void insert(const char* text);
00201     void overstrike(const char* text);
00202     void insert_position(int newPos);
00203
00215     int insert_position() const { return mCursorPos; }
00216     int position_to_xy(int pos, int* x, int* y) const;
00217
00218     int in_selection(int x, int y) const;
00219     void show_insert_position();
00220
00221     int move_right();
00222     int move_left();
00223     int move_up();
00224     int move_down();
00225     int count_lines(int start, int end, bool start_pos_is_line_start) const;
00226     int line_start(int pos) const;
00227     int line_end(int startPos, bool startPosIsLineStart) const;
00228     int skip_lines(int startPos, int nLines, bool startPosIsLineStart);
00229     int rewind_lines(int startPos, int nLines);
00230     void next_word(void);
00231     void previous_word(void);

```

```
00232
00233 void show_cursor(int b = 1);
00234
00238 void hide_cursor() { show_cursor(0); }
00239
00240 void cursor_style(int style);
00241 int cursor_style() const { return mCursorStyle; }
00242
00247 Fl_Color cursor_color() const {return mCursor_color;}
00248
00253 void cursor_color(Fl_Color n) {mCursor_color = n;}
00254
00260 int scrollbar_width() const {
00261     return scrollbar_width_ ? scrollbar_width_ : Fl::scrollbar_size();
00262 }
00263
00269 void scrollbar_width(int width) {
00270     Fl::scrollbar_size(width);
00271     scrollbar_width_ = 0;
00272 }
00273
00283 int scrollbar_size() const {
00284     return(scrollbar_width_);
00285 }
00286
00306 void scrollbar_size(int newSize) {
00307     scrollbar_width_ = newSize;
00308 }
00309
00314 Fl_Align scrollbar_align() const { return scrollbar_align_; }
00315
00320 void scrollbar_align(Fl_Align a) { scrollbar_align_ = a; }
00321
00327 int word_start(int pos) const { return buffer()->word_start(pos); }
00328
00334 int word_end(int pos) const { return buffer()->word_end(pos); }
00335
00336
00337 void highlight_data(Fl_Text_Buffer *styleBuffer,
00338                    const Style_Table_Entry *styleTable,
00339                    int nStyles, char unfinishedStyle,
00340                    Unfinished_Style_Cb unfinishedHighlightCB,
00341                    void *cbArg);
00342
00343 int position_style(int lineStartPos, int lineLen, int lineIndex) const;
00344
00350 int shortcut() const {return shortcut_;}
00351
00357 void shortcut(int s) {shortcut_ = s;}
00358
00363 Fl_Font textfont() const {return textfont_;}
00364
00369 void textfont(Fl_Font s) {textfont_ = s; mColumnScale = 0; }
00370
00375 Fl_Fontsize textsize() const {return textsize_;}
00376
00381 void textsize(Fl_Fontsize s) {textsize_ = s; mColumnScale = 0; }
00382
00387 Fl_Color textcolor() const {return textcolor_;}
00388
00393 void textcolor(Fl_Color n) {textcolor_ = n;}
00394
00399 void grammar_underline_color(Fl_Color color) { grammar_underline_color_ = color; }
00400
00405 Fl_Color grammar_underline_color() const { return grammar_underline_color_;}
00406
00411 void spelling_underline_color(Fl_Color color) { spelling_underline_color_ = color; }
00412
00417 Fl_Color spelling_underline_color() const { return spelling_underline_color_;}
00418
00423 void secondary_selection_color(Fl_Color color) { secondary_selection_color_ = color; }
00424
00429 Fl_Color secondary_selection_color() const { return secondary_selection_color_;}
00430
00431 int wrapped_column(int row, int column) const;
00432 int wrapped_row(int row) const;
00433 void wrap_mode(int wrap, int wrap_margin);
00434
00435 virtual void recalcd_display();
00436 void resize(int X, int Y, int W, int H) FL_OVERRIDE;
00437
00443 double x_to_col(double x) const;
00444
00451 double col_to_x(double col) const;
00452
00453 void linenumber_width(int width);
00454 int linenumber_width() const;
```

```

00455 void linenumber_font(Fl_Font val);
00456 Fl_Font linenumber_font() const;
00457 void linenumber_size(Fl_Fontsize val);
00458 Fl_Fontsize linenumber_size() const;
00459 void linenumber_fgcolor(Fl_Color val);
00460 Fl_Color linenumber_fgcolor() const;
00461 void linenumber_bgcolor(Fl_Color val);
00462 Fl_Color linenumber_bgcolor() const;
00463 void linenumber_align(Fl_Align val);
00464 Fl_Align linenumber_align() const;
00465 void linenumber_format(const char* val);
00466 const char* linenumber_format() const;
00467
00468 protected:
00469 // Most (all?) of this stuff should only be called from resize() or
00470 // draw().
00471 // Anything with "vline" indicates that it deals with currently
00472 // visible lines.
00473
00474 void draw() FL_OVERRIDE;
00475 void draw_text(int X, int Y, int W, int H);
00476 void draw_range(int start, int end);
00477 void draw_cursor(int, int);
00478
00479 void draw_string(int style, int x, int y, int toX, const char *string,
00480                 int nChars) const;
00481
00482 void draw_vline(int visLineNum, int leftClip, int rightClip,
00483               int leftCharIndex, int rightCharIndex);
00484
00485 int find_x(const char *s, int len, int style, int x) const;
00486
00487 enum {
00488     DRAW_LINE,
00489     FIND_INDEX,
00490     FIND_INDEX_FROM_ZERO,
00491     GET_WIDTH,
00492     FIND_CURSOR_INDEX // STR #2788
00493 };
00494
00495 int handle_vline(int mode,
00496                 int lineStart, int lineLen, int leftChar, int rightChar,
00497                 int topClip, int bottomClip,
00498                 int leftClip, int rightClip) const;
00499
00500 int handle_rmb(int readonly);
00501
00502 void draw_line_numbers(bool clearAll);
00503
00504 void clear_rect(int style, int x, int y, int width, int height) const;
00505 void display_insert();
00506
00507 void offset_line_starts(int newTopLineNum);
00508
00509 void calc_line_starts(int startLine, int endLine);
00510
00511 void update_line_starts(int pos, int charsInserted, int charsDeleted,
00512                       int linesInserted, int linesDeleted, int *scrolled);
00513
00514 void calc_last_char();
00515
00516 int position_to_line( int pos, int* lineNum ) const;
00517 double string_width(const char* string, int length, int style) const;
00518
00519 static void scroll_timer_cb(void*);
00520
00521 static void buffer_predelete_cb(int pos, int nDeleted, void* cbArg);
00522 static void buffer_modified_cb(int pos, int nInserted, int nDeleted,
00523                               int nRestyled, const char* deletedText,
00524                               void* cbArg);
00525
00526 static void h_scrollbar_cb(Fl_Scrollbar* w, Fl_Text_Display* d);
00527 static void v_scrollbar_cb( Fl_Scrollbar* w, Fl_Text_Display* d);
00528 void update_v_scrollbar();
00529 void update_h_scrollbar();
00530 int measure_vline(int visLineNum) const;
00531 int longest_vline() const;
00532 int empty_vlines() const;
00533 int vline_length(int visLineNum) const;
00534 int xy_to_position(int x, int y, int PosType = CHARACTER_POS) const;
00535
00536 void xy_to_rowcol(int x, int y, int* row, int* column,
00537                  int PosType = CHARACTER_POS) const;
00538 void maintain_absolute_top_line_number(int state);
00539 int get_absolute_top_line_number() const;
00540 void absolute_top_line_number(int oldFirstChar);
00541 int maintaining_absolute_top_line_number() const;

```

```

00542 void reset_absolute_top_line_number();
00543 int position_to_linecol(int pos, int* lineNum, int* column) const;
00544 int scroll_(int topLineNum, int horizOffset);
00545
00546 void extend_range_for_styles(int* start, int* end);
00547
00548 void find_wrap_range(const char *deletedText, int pos, int nInserted,
00549                    int nDeleted, int *modRangeStart, int *modRangeEnd,
00550                    int *linesInserted, int *linesDeleted);
00551 void measure_deleted_lines(int pos, int nDeleted);
00552 void wrapped_line_counter(Fl_Text_Buffer *buf, int startPos, int maxPos,
00553                          int maxLines, bool startPosIsLineStart,
00554                          int styleBufOffset, int *retPos, int *retLines,
00555                          int *retLineStart, int *retLineEnd,
00556                          bool countLastLineMissingNewLine = true) const;
00557 void find_line_end(int pos, bool start_pos_is_line_start, int *lineEnd,
00558                  int *nextLineStart) const;
00559 double measure_proportional_character(const char *s, int colNum, int pos) const;
00560 int wrap_uses_character(int lineEndPos) const;
00561
00562 int damage_range1_start, damage_range1_end;
00563 int damage_range2_start, damage_range2_end;
00564 int mCursorPos;
00565 int mCursorOn;
00566 int mCursorOldY;           /* Y pos. of cursor for blanking */
00567 int mCursorToHint;        /* Tells the buffer modified callback
00568                          where to move the cursor, to reduce
00569                          the number of redraw calls */
00570 int mCursorStyle;         /* One of enum cursorStyles above */
00571 int mCursorPreferredXPos; /* Pixel position for vert. cursor movement */
00572 int mNVisibleLines;      /* # of visible (displayed) lines. This is
00573                          also the size of the mLineStarts[] array. */
00574 int mNBufferLines;       /* # of newlines in the buffer */
00575 Fl_Text_Buffer* mBuffer;  /* Contains text to be displayed */
00576 Fl_Text_Buffer* mStyleBuffer; /* Optional parallel buffer containing
00577                          color and font information */
00578 int mFirstChar, mLastChar; /* Buffer positions of first and last
00579                          displayed character (lastChar points
00580                          either to a newline or one character
00581                          beyond the end of the buffer) */
00582 int mContinuousWrap;     /* Wrap long lines when displaying */
00583 int mWrapMarginPix;      /* Margin in # of pixels for
00584                          wrapping in continuousWrap mode */
00585 int* mLineStarts;        /* Array of the size mNVisibleLines.
00586                          This array only keeps track of lines
00587                          within the display area. Each entry
00588                          contains the starting character offset
00589                          (from the beginning of the text buffer)
00590                          for each /visible/ line.
00591                          If wrap enabled, points to the beginning
00592                          of each wrap. So a long line wrapping
00593                          into 3 separate lines in the display
00594                          will take up 3 separate array entries. */
00595 int mTopLineNum;         /* Line number of top displayed line
00596                          of file (first line of file is 1) */
00597 int mAbsTopLineNum;      /* In continuous wrap mode, the line
00598                          number of the top line if the text
00599                          were not wrapped (note that this is
00600                          only maintained as needed). */
00601 int mNeedAbsTopLineNum;  /* Externally settable flag to continue
00602                          maintaining absTopLineNum even if
00603                          it isn't needed for line # display */
00604 int mHorizOffset;        /* Horizontal scroll pos. in pixels */
00605 int mTopLineNumHint;     /* Line number of top displayed line
00606                          of file (first line of file is 1) */
00607 int mHorizOffsetHint;    /* Horizontal scroll pos. in pixels */
00608 int mNStyles;            /* Number of entries in styleTable */
00609 const Style_Table_Entry *mStyleTable; /* Table of fonts and colors for
00610                          coloring/syntax-highlighting */
00611 char mUnfinishedStyle;   /* Style buffer entry which triggers
00612                          on-the-fly reparsing of region */
00613 Unfinished_Style_Cb mUnfinishedHighlightCB; /* Callback to parse "unfinished" */
00614 /* regions */
00615 void* mHighlightCBArg;    /* Arg to unfinishedHighlightCB */
00616
00617 int mMaxsize;
00618
00619 int mSuppressResync;     /* Suppress resynchronization of line
00620                          starts during buffer updates */
00621 int mNLinesDeleted;     /* Number of lines deleted during
00622                          buffer modification (only used
00623                          when resynchronization is suppressed) */
00624 int mModifyingTabDistance; /* Whether tab distance is being modified XXX: UNUSED */
00625
00626 mutable double mColumnScale; /* Width in pixels of an average character. This
00627                          value is calculated as needed (lazy eval); it
00628                          needs to be mutable so that it can be calculated

```

```

00629                                     within a method marked as "const" */
00630
00631     Fl_Color mCursor_color;
00632
00633     Fl_Scrollbar* mHScrollBar;
00634     Fl_Scrollbar* mVScrollBar;
00635     int scrollbar_width_;           // size of scrollbar trough (behavior changed in 1.4)
00636     Fl_Align scrollbar_align_;
00637     int dragPos, dragType, dragging;
00638     int display_insert_position_hint;
00639     struct { int x, y, w, h; } text_area;
00640
00641     int shortcut_;
00642
00643     Fl_Font textfont_;
00644     Fl_Fontsize textsize_;
00645     Fl_Color textcolor_;
00646     Fl_Color grammar_underline_color_;
00647     Fl_Color spelling_underline_color_;
00648     Fl_Color secondary_selection_color_;
00649
00650     // Line number margin and width
00651     int mLineNumLeft, mLineNumWidth;
00652
00653     // Line number font/colors
00654     Fl_Font    linenum_font_;
00655     Fl_Fontsize linenum_size_;
00656     Fl_Color    linenum_fgcolor_;
00657     Fl_Color    linenum_bgcolor_;
00658     Fl_Align    linenum_align_;
00659     const char* linenum_format_;
00660 };
00661
00662 #endif

```

13.152 Fl_Text_Editor.H

```

00001 //
00002 // Header file for Fl_Text_Editor class.
00003 //
00004 // Copyright 2001-2023 by Bill Spitzak and others.
00005 // Original code Copyright Mark Edel. Permission to distribute under
00006 // the LGPL for the FLTK library granted by Mark Edel.
00007 //
00008 // This library is free software. Distribution and use rights are outlined in
00009 // the file "COPYING" which should have been included with this file. If this
00010 // file is missing or damaged, see the license at:
00011 //
00012 //     https://www.fltk.org/COPYING.php
00013 //
00014 // Please see the following page on how to report bugs and issues:
00015 //
00016 //     https://www.fltk.org/bugs.php
00017 //
00018
00019 /* \file
00020    Fl_Text_Editor widget . */
00021
00022
00023 #ifndef FL_TEXT_EDITOR_H
00024 #define FL_TEXT_EDITOR_H
00025
00026 #include "Fl_Text_Display.H"
00027
00028 // key will match in any state
00029 #define FL_TEXT_EDITOR_ANY_STATE (-1L)
00030
00031 class FL_EXPORT Fl_Text_Editor : public Fl_Text_Display {
00032 public:
00033     typedef int (*Key_Func)(int key, Fl_Text_Editor* editor);
00034
00035     struct Key_Binding {
00036         int key;
00037         int state;
00038         Key_Func function;
00039         Key_Binding* next;
00040     };
00041
00042     Fl_Text_Editor(int X, int Y, int W, int H, const char* l = 0);
00043     ~Fl_Text_Editor() { remove_all_key_bindings(); }
00044     int handle(int e) FL_OVERRIDE;
00045     void insert_mode(int b) { insert_mode_ = b; }
00046     int insert_mode() { return insert_mode_; }
00047     void tab_nav(int val);
00048     int tab_nav() const;

```

```

00068 void add_key_binding(int key, int state, Key_Func f, Key_Binding** list);
00070 void add_key_binding(int key, int state, Key_Func f)
00071 { add_key_binding(key, state, f, &key_bindings); }
00072 void remove_key_binding(int key, int state, Key_Binding** list);
00074 void remove_key_binding(int key, int state)
00075 { remove_key_binding(key, state, &key_bindings); }
00076 void remove_all_key_bindings(Key_Binding** list);
00078 void remove_all_key_bindings() { remove_all_key_bindings(&key_bindings); }
00079 void add_default_key_bindings(Key_Binding** list);
00080 Key_Func bound_key_function(int key, int state, Key_Binding* list) const;
00082 Key_Func bound_key_function(int key, int state) const
00083 { return bound_key_function(key, state, key_bindings); }
00085 void default_key_function(Key_Func f) { default_key_function_ = f; }
00086
00087 // functions for the built in default bindings
00088 static int kf_default(int c, Fl_Text_Editor* e);
00089 static int kf_ignore(int c, Fl_Text_Editor* e);
00090 static int kf_backspace(int c, Fl_Text_Editor* e);
00091 static int kf_enter(int c, Fl_Text_Editor* e);
00092 static int kf_move(int c, Fl_Text_Editor* e);
00093 static int kf_shift_move(int c, Fl_Text_Editor* e);
00094 static int kf_ctrl_move(int c, Fl_Text_Editor* e);
00095 static int kf_c_s_move(int c, Fl_Text_Editor* e);
00096 static int kf_meta_move(int c, Fl_Text_Editor* e);
00097 static int kf_m_s_move(int c, Fl_Text_Editor* e);
00098 static int kf_home(int, Fl_Text_Editor* e);
00099 static int kf_end(int c, Fl_Text_Editor* e);
00100 static int kf_left(int c, Fl_Text_Editor* e);
00101 static int kf_up(int c, Fl_Text_Editor* e);
00102 static int kf_right(int c, Fl_Text_Editor* e);
00103 static int kf_down(int c, Fl_Text_Editor* e);
00104 static int kf_page_up(int c, Fl_Text_Editor* e);
00105 static int kf_page_down(int c, Fl_Text_Editor* e);
00106 static int kf_insert(int c, Fl_Text_Editor* e);
00107 static int kf_delete(int c, Fl_Text_Editor* e);
00108 static int kf_copy(int c, Fl_Text_Editor* e);
00109 static int kf_cut(int c, Fl_Text_Editor* e);
00110 static int kf_paste(int c, Fl_Text_Editor* e);
00111 static int kf_select_all(int c, Fl_Text_Editor* e);
00112 static int kf_undo(int c, Fl_Text_Editor* e);
00113 static int kf_redo(int c, Fl_Text_Editor* e);
00114
00115 protected:
00116 int handle_key();
00117 void maybe_do_callback(Fl_Callback_Reason reason = FL_REASON_CHANGED);
00118
00119 #ifndef FL_DOXYGEN
00120 int insert_mode_;
00121 Key_Binding* key_bindings;
00122 #endif
00123
00131 static Key_Binding* global_key_bindings;
00132
00133 #ifndef FL_DOXYGEN
00134 Key_Func default_key_function_;
00135 #endif
00136 };
00137
00138 #endif
00139

```

13.153 Fl_Tile.H

```

00001 //
00002 // Tile header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Tile_H
00018 #define Fl_Tile_H
00019
00020 #include "Fl_Group.H"
00021
00022 /*

```

```

00023 The Fl_Tile class lets you resize its children by dragging
00024 the border between them.
00025 */
00026
00027 class FL_EXPORT Fl_Tile : public Fl_Group {
00028 public:
00029     int handle(int event) FL_OVERRIDE;
00030     Fl_Tile(int X, int Y, int W, int H, const char *L=0);
00031     ~Fl_Tile() FL_OVERRIDE;
00032     void resize(int X, int Y, int W, int H) FL_OVERRIDE;
00033     virtual void move_intersection(int oldx, int oldy, int newx, int newy);
00034     virtual void drag_intersection(int oldx, int oldy, int newx, int newy);
00035     FL_DEPRECATED("in 1.4.0 - use move_intersection(p) instead",
00036     void position(int oldx, int oldy, int newx, int newy)) { move_intersection(oldx, oldy, newx, newy);
    }
00037     void position(int x, int y) { Fl_Group::position(x, y); }
00038     void size_range(int index, int minw, int minh, int maxw=0x7FFFFFFF, int maxh=0x7FFFFFFF);
00039     void size_range(Fl_Widget *w, int minw, int minh, int maxw=0x7FFFFFFF, int maxh=0x7FFFFFFF);
00040     void init_size_range(int default_min_w = -1, int default_min_h = -1);
00041
00042 protected:
00043     int cursor_;
00044     Fl_Cursor *cursors_;
00045
00050     Fl_Cursor cursor(int n) {
00051         return cursors_[n];
00052     }
00053
00054     void set_cursor(int n); // set one of n (0..3) cursors
00055
00056     typedef struct { int minw, minh, maxw, maxh; } Size_Range;
00057
00058     Size_Range *size_range_;
00059     int size_range_size_, size_range_capacity_;
00060     int default_min_w_, default_min_h_;
00061     void request_shrink_l(int old_l, int &new_l, Fl_Rect *final_size);
00062     void request_shrink_r(int old_r, int &new_r, Fl_Rect *final_size);
00063     void request_shrink_t(int old_t, int &new_t, Fl_Rect *final_size);
00064     void request_shrink_b(int old_b, int &new_b, Fl_Rect *final_size);
00065     void request_grow_l(int old_l, int &new_l, Fl_Rect *final_size);
00066     void request_grow_r(int old_r, int &new_r, Fl_Rect *final_size);
00067     void request_grow_t(int old_t, int &new_t, Fl_Rect *final_size);
00068     void request_grow_b(int old_b, int &new_b, Fl_Rect *final_size);
00069
00070     int on_insert(Fl_Widget*, int) FL_OVERRIDE;
00071     int on_move(int, int) FL_OVERRIDE;
00072     void on_remove(int) FL_OVERRIDE;
00073 };
00074
00075 #endif

```

13.154 Fl_Tiled_Image.H

```

00001 //
00002 // Tiled image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2015 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Tiled_Image widget . */
00019
00020 #ifndef Fl_Tiled_Image_H
00021 # define Fl_Tiled_Image_H
00022
00023 # include "Fl_Image.H"
00024
00025
00032 class FL_EXPORT Fl_Tiled_Image : public Fl_Image {
00033 protected:
00034
00035     Fl_Image     *image_; // The image that is tiled
00036     int         alloc_image_; // Did we allocate this image?
00037
00038 public:

```



```

00039 Fl_Tiled_Image(Fl_Image *i, int W = 0, int H = 0);
00040 virtual ~Fl_Tiled_Image();
00041
00042 Fl_Image *copy(int W, int H) const FL_OVERRIDE;
00043 Fl_Image *copy() const {
00044     return Fl_Image::copy();
00045 }
00046 void color_average(Fl_Color c, float i) FL_OVERRIDE;
00047 void desaturate() FL_OVERRIDE;
00048 void draw(int X, int Y, int W, int H, int cx = 0, int cy = 0) FL_OVERRIDE;
00049 void draw(int X, int Y) { draw(X, Y, w(), h(), 0, 0); }
00051 Fl_Image *image() { return image_; }
00052 };
00053
00054 #endif // !Fl_Tiled_Image_H

```

13.155 Fl_Timer.H

```

00001 //
00002 // Timer header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
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00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018    Fl_Timer widget . */
00019
00020 #ifndef Fl_Timer_H
00021 #define Fl_Timer_H
00022
00023 #ifndef Fl_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026
00027 // values for type():
00028 #define FL_NORMAL_TIMER          0
00029 #define FL_VALUE_TIMER          1
00030 #define FL_HIDDEN_TIMER         2
00031
00032 class FL_EXPORT Fl_Timer : public Fl_Widget {
00033     static void stepcb(void *);
00034     void step();
00035     char on, direction_;
00036     double delay, total;
00037     long lastsec, lastusec;
00038 protected:
00039     void draw() FL_OVERRIDE;
00040 public:
00041     int handle(int) FL_OVERRIDE;
00042     Fl_Timer(uchar t, int x, int y, int w, int h, const char *l);
00043     ~Fl_Timer();
00044     void value(double);
00045     double value() const {return delay>0.0?delay:0.0;}
00046     char direction() const {return direction_;}
00047     void direction(char d) {direction_ = d;}
00048     char suspended() const {return !on;}
00049     void suspended(char d);
00050 };
00051
00052 #endif
00053
00054

```

13.156 Fl_Toggle_Button.H

```

00001 //
00002 // Toggle button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:

```

```

00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 /* \file
00018     Fl_Toggle_Button widget . */
00019 //
00020 #ifndef Fl_Toggle_Button_H
00021 #define Fl_Toggle_Button_H
00022 //
00023 #include "Fl_Button.H"
00024 //
00034 class FL_EXPORT Fl_Toggle_Button : public Fl_Button {
00035 public:
00041     Fl_Toggle_Button(int X,int Y,int W,int H,const char *l=0);
00042 };
00043 //
00044 #endif

```

13.157 Fl_Toggle_Light_Button.H

```

00001 //
00002 // Toggle light button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 // provided for back-compatibility only
00018 //
00019 #ifndef Fl_Toggle_Light_Button
00020 #include "Fl_Light_Button.H"
00021 #define Fl_Toggle_Light_Button Fl_Light_Button
00022 #endif

```

13.158 Fl_Toggle_Round_Button.H

```

00001 //
00002 // Toggle round button header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 // provided for back-compatibility only
00018 //
00019 #ifndef Fl_Toggle_Round_Button
00020 #include "Fl_Round_Button.H"
00021 #define Fl_Toggle_Round_Button Fl_Round_Button
00022 #endif

```

13.159 Fl_Tooltip.H

```

00001 //
00002 // Tooltip header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2011 by Bill Spitzak and others.

```

```

00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Tooltip widget . */
00019
00020 #ifndef Fl_Tooltip_H
00021 #define Fl_Tooltip_H
00022
00023 #include <FL/Fl.H>
00024 #include <FL/Fl_Widget.H>
00025
00034 class FL_EXPORT Fl_Tooltip {
00035     friend class Fl_TooltipBox;
00036 public:
00037     static float delay() { return delay_; }
00038     static void delay(float f) { delay_ = f; }
00042     static float hidedelay() { return hidedelay_; }
00044     static void hidedelay(float f) { hidedelay_ = f; }
00049     static float hoverdelay() { return hoverdelay_; }
00054     static void hoverdelay(float f) { hoverdelay_ = f; }
00056     static int enabled() { return Fl::option(Fl::OPTION_SHOW_TOOLTIPS); }
00058     static void enable(int b = 1) { Fl::option(Fl::OPTION_SHOW_TOOLTIPS, (b!=0)); }
00060     static void disable() { enable(0); }
00061     static void (*enter)(Fl_Widget* w);
00062     static void enter_area(Fl_Widget* w, int X, int Y, int W, int H, const char* tip);
00063     static void (*exit)(Fl_Widget *w);
00065     static Fl_Widget* current() {return widget_;}
00066     static void current(Fl_Widget*);
00067
00069     static Fl_Font font() { return font_; }
00071     static void font(Fl_Font i) { font_ = i; }
00073     static Fl_Fontsize size() { return (size_ == -1 ? FL_NORMAL_SIZE : size_); }
00075     static void size(Fl_Fontsize s) { size_ = s; }
00077     static Fl_Color color() { return color_; }
00079     static void color(Fl_Color c) { color_ = c; }
00081     static Fl_Color textcolor() { return textcolor_; }
00083     static void textcolor(Fl_Color c) { textcolor_ = c; }
00085     static int margin_width() { return margin_width_; }
00087     static void margin_width(int v) { margin_width_ = v; }
00089     static int margin_height() { return margin_height_; }
00091     static void margin_height(int v) { margin_height_ = v; }
00093     static int wrap_width() { return wrap_width_; }
00095     static void wrap_width(int v) { wrap_width_ = v; }
00097     static Fl_Window* current_window(void);
00098
00099     // These should not be public, but Fl_Widget::tooltip() needs them...
00100     // fabien: made it private with only a friend function access
00101 private:
00102     friend void Fl_Widget::tooltip(const char *);
00103     friend void Fl_Widget::copy_tooltip(const char *);
00104     static void enter_(Fl_Widget* w);
00105     static void exit_(Fl_Widget *w);
00106     static void set_enter_exit_once_();
00107
00108 private:
00109     static float delay_;
00110     static float hidedelay_;
00111     static float hoverdelay_;
00112     static Fl_Color color_;
00113     static Fl_Color textcolor_;
00114     static Fl_Font font_;
00115     static Fl_Fontsize size_;
00116     static Fl_Widget* widget_;
00117     static int margin_width_;
00118     static int margin_height_;
00119     static int wrap_width_;
00120     static const int draw_symbols_; // 1 = draw @-symbols in tooltips, 0 = no
00121 };
00122
00123 #endif

```

13.160 Fl_Tree.H File Reference

This file contains the definitions of the [Fl_Tree](#) class.

```
#include <FL/Fl.H>
#include <FL/Fl_Group.H>
#include <FL/Fl_Scrollbar.H>
#include <FL/fl_draw.H>
#include <FL/Fl_Tree_Item.H>
#include <FL/Fl_Tree_Prefs.H>
```

Classes

- class [Fl_Tree](#)
Tree widget.

Enumerations

- enum [Fl_Tree_Reason](#) {
[FL_TREE_REASON_NONE](#) = FL_REASON_UNKNOWN , [FL_TREE_REASON_SELECTED](#) = FL_REASON_SELECTED , [FL_TREE_REASON_DESELECTED](#) = FL_REASON_DESELECTED , [FL_TREE_REASON_RESELECTED](#) = FL_REASON_RESELECTED ,
[FL_TREE_REASON_OPENED](#) = FL_REASON_OPENED , [FL_TREE_REASON_CLOSED](#) = FL_REASON_CLOSED , [FL_TREE_REASON_DRAGGED](#) = FL_REASON_DRAGGED }

The reason the callback was invoked.

13.160.1 Detailed Description

This file contains the definitions of the [Fl_Tree](#) class.

13.160.2 Enumeration Type Documentation

13.160.2.1 Fl_Tree_Reason

enum [Fl_Tree_Reason](#)

The reason the callback was invoked.

Enumerator

FL_TREE_REASON_NONE	unknown reason
FL_TREE_REASON_SELECTED	an item was selected
FL_TREE_REASON_DESELECTED	an item was de-selected
FL_TREE_REASON_RESELECTED	an item was re-selected (double-clicked). See Fl_Tree_Item_Reselect_Mode to enable this.
FL_TREE_REASON_OPENED	an item was opened
FL_TREE_REASON_CLOSED	an item was closed
FL_TREE_REASON_DRAGGED	an item was dragged into a new place

13.161 Fl_Tree.H

[Go to the documentation of this file.](#)

```
00001 //
00002
00003 #ifndef FL_TREE_H
00004 #define FL_TREE_H
00005
00006 #include <FL/Fl.H>
00007 #include <FL/Fl_Group.H>
00008 #include <FL/Fl_Scrollbar.H>
00009 #include <FL/fl_draw.H>
00010
00011 #include <FL/Fl_Tree_Item.H>
00012 #include <FL/Fl_Tree_Prefs.H>
```

```

00013
00015 // FL/Fl_Tree.H
00017 //
00018 // Fl_Tree -- This file is part of the Fl_Tree widget for FLTK
00019 // Copyright (C) 2009-2010 by Greg Ercolano.
00020 //
00021 // This library is free software. Distribution and use rights are outlined in
00022 // the file "COPYING" which should have been included with this file. If this
00023 // file is missing or damaged, see the license at:
00024 //
00025 //     https://www.fltk.org/COPYING.php
00026 //
00027 // Please see the following page on how to report bugs and issues:
00028 //
00029 //     https://www.fltk.org/bugs.php
00030 //
00031
00036
00275 enum Fl_Tree_Reason {
00276     FL_TREE_REASON_NONE           = FL_REASON_UNKNOWN,
00277     FL_TREE_REASON_SELECTED      = FL_REASON_SELECTED,
00278     FL_TREE_REASON_DESELECTED   = FL_REASON_DESELECTED,
00279     FL_TREE_REASON_RESELECTED   = FL_REASON_RESELECTED,
00281     FL_TREE_REASON_OPENED       = FL_REASON_OPENED,
00282     FL_TREE_REASON_CLOSED       = FL_REASON_CLOSED,
00283     FL_TREE_REASON_DRAGGED      = FL_REASON_DRAGGED
00284 };
00285
00286 class FL_EXPORT Fl_Tree : public Fl_Group {
00287     friend class Fl_Tree_Item;
00288     Fl_Tree_Item *_root; // can be null!
00289     Fl_Tree_Item *_item_focus; // item that has focus box
00290     Fl_Tree_Item *_callback_item; // item invoked during callback (can be NULL)
00291     Fl_Tree_Reason _callback_reason; // reason for the callback
00292     Fl_Tree_Prefs _prefs; // all the tree's settings
00293     int _scrollbar_size; // size of scrollbar trough
00294     Fl_Tree_Item *_lastselect; // last selected item
00295     char _lastpushed; // FL_PUSH occurred on: 0=nothing, 1=open/close,
00296     2=usericon, 3=label
00297     void fix_scrollbar_order();
00298 protected:
00299     Fl_Scrollbar *_vscroll;
00300     Fl_Scrollbar *_hscroll;
00301     int _tox, _toy, _tow, _toh;
00302     int _tix, _tiy, _tiw, _tih;
00303
00305     int _tree_w;
00307     int _tree_h;
00308     void item_clicked(Fl_Tree_Item* val);
00309     void do_callback_for_item(Fl_Tree_Item* item, Fl_Tree_Reason reason);
00310
00311     // next_visible_item() and extend_selection() moved to 'public' in ABI 1.3.3
00312     // undocumented draw_tree() dropped -- draw() does all the work now
00313
00314     // draw() has to be protected per FLTK convention (was public in 1.3.x)
00315     void draw() FL_OVERRIDE;
00316
00317 public:
00318     Fl_Tree(int X, int Y, int W, int H, const char *L=0);
00319     ~Fl_Tree();
00320     int handle(int e) FL_OVERRIDE;
00321     void show_self();
00322     void resize(int,int,int,int) FL_OVERRIDE;
00323
00325     // root methods
00327     void root_label(const char *new_label);
00328     Fl_Tree_Item* root();
00329     void root(Fl_Tree_Item *newitem);
00330     const Fl_Tree_Prefs& prefs() const { return _prefs; }
00331
00333     // Item creation/removal methods
00335     Fl_Tree_Item *add(const char *path, Fl_Tree_Item *newitem=0);
00336     Fl_Tree_Item *add(Fl_Tree_Item *parent_item, const char *name);
00337     Fl_Tree_Item *insert_above(Fl_Tree_Item *above, const char *name);
00338     Fl_Tree_Item *insert(Fl_Tree_Item *item, const char *name, int pos);
00339     int remove(Fl_Tree_Item *item);
00340     void clear();
00341     void clear_children(Fl_Tree_Item *item);
00342
00344     // Item lookup methods
00346     Fl_Tree_Item *find_item(const char *path);
00347     const Fl_Tree_Item *find_item(const char *path) const;
00348     int item_pathname(char *pathname, int pathnamelen, const Fl_Tree_Item *item) const;
00349     const Fl_Tree_Item* find_clicked(int yonly=0) const;
00350     Fl_Tree_Item* find_clicked(int yonly=0);
00351     Fl_Tree_Item *item_clicked();

```

```

00352 Fl_Tree_Item *first();
00353 Fl_Tree_Item *first_visible(); // deprecated in ABI 10303
00354 Fl_Tree_Item *first_visible_item();
00355 Fl_Tree_Item *next(Fl_Tree_Item *item=0);
00356 Fl_Tree_Item *prev(Fl_Tree_Item *item=0);
00357 Fl_Tree_Item *last();
00358 Fl_Tree_Item *last_visible(); // deprecated in ABI 10303
00359 Fl_Tree_Item *last_visible_item();
00360 Fl_Tree_Item *next_visible_item(Fl_Tree_Item *start, int dir); // made public in 1.3.3 ABI
00361 Fl_Tree_Item *first_selected_item();
00362 Fl_Tree_Item *last_selected_item();
00363 Fl_Tree_Item *next_item(Fl_Tree_Item *item, int dir=FL_Down, bool visible=false);
00364 Fl_Tree_Item *next_selected_item(Fl_Tree_Item *item=0, int dir=FL_Down);
00365 int get_selected_items(Fl_Tree_Item_Array &items);
00366
00368 // Item open/close methods
00370 int open(Fl_Tree_Item *item, int docallback=1);
00371 int open(const char *path, int docallback=1);
00372 void open_toggle(Fl_Tree_Item *item, int docallback=1);
00373 int close(Fl_Tree_Item *item, int docallback=1);
00374 int close(const char *path, int docallback=1);
00375 int is_open(Fl_Tree_Item *item) const;
00376 int is_open(const char *path) const;
00377 int is_close(Fl_Tree_Item *item) const;
00378 int is_close(const char *path) const;
00379
00381 // Item selection methods
00383 int select(Fl_Tree_Item *item, int docallback=1);
00384 int select(const char *path, int docallback=1);
00385 void select_toggle(Fl_Tree_Item *item, int docallback=1);
00386 int deselect(Fl_Tree_Item *item, int docallback=1);
00387 int deselect(const char *path, int docallback=1);
00388 int deselect_all(Fl_Tree_Item *item=0, int docallback=1);
00389 int select_only(Fl_Tree_Item *selitem, int docallback=1);
00390 int select_all(Fl_Tree_Item *item=0, int docallback=1);
00391 int extend_selection_dir(Fl_Tree_Item *from,
00392                         Fl_Tree_Item *to,
00393                         int dir,
00394                         int val,
00395                         bool visible);
00396 int extend_selection(Fl_Tree_Item *from,
00397                    Fl_Tree_Item *to,
00398                    int val=1,
00399                    bool visible=false);
00400 void set_item_focus(Fl_Tree_Item *item);
00401 Fl_Tree_Item *get_item_focus() const;
00402 int is_selected(Fl_Tree_Item *item) const;
00403 int is_selected(const char *path);
00404
00406 // Item attribute related methods
00408 Fl_Font item_labelfont() const;
00409 void item_labelfont(Fl_Font val);
00410 Fl_Fontsize item_labelsize() const;
00411 void item_labelsize(Fl_Fontsize val);
00412 Fl_Color item_labelfgcolor(void) const;
00413 void item_labelfgcolor(Fl_Color val);
00414 Fl_Color item_labelbgcolor(void) const;
00415 void item_labelbgcolor(Fl_Color val);
00416 Fl_Color connectorcolor() const;
00417 void connectorcolor(Fl_Color val);
00418 int marginleft() const;
00419 void marginleft(int val);
00420 int margintop() const;
00421 void margintop(int val);
00422 int marginbottom() const;
00423 void marginbottom(int val);
00424 int linespacing() const;
00425 void linespacing(int val);
00426 int openchild_marginbottom() const;
00427 void openchild_marginbottom(int val);
00428 int usericonmarginleft() const;
00429 void usericonmarginleft(int val);
00430 int labelmarginleft() const;
00431 void labelmarginleft(int val);
00432 int widgetmarginleft() const;
00433 void widgetmarginleft(int val);
00434 int connectorwidth() const;
00435 void connectorwidth(int val);
00436 Fl_Image* usericon() const;
00437 void usericon(Fl_Image *val);
00438 Fl_Image* openicon() const;
00439 void openicon(Fl_Image *val);
00440 Fl_Image* closeicon() const;
00441 void closeicon(Fl_Image *val);
00442 int showcollapse() const;
00443 void showcollapse(int val);
00444 int showroot() const;

```

```

00445 void showroot(int val);
00446 Fl_Tree_Connector connectorstyle() const;
00447 void connectorstyle(Fl_Tree_Connector val);
00448 Fl_Tree_Sort sortorder() const;
00449 void sortorder(Fl_Tree_Sort val);
00450 Fl_Boxtype selectbox() const;
00451 void selectbox(Fl_Boxtype val);
00452 Fl_Tree_Select selectmode() const;
00453 void selectmode(Fl_Tree_Select val);
00454 Fl_Tree_Item_Reselect_Mode item_reselect_mode() const;
00455 void item_reselect_mode(Fl_Tree_Item_Reselect_Mode mode);
00456 Fl_Tree_Item_Draw_Mode item_draw_mode() const;
00457 void item_draw_mode(Fl_Tree_Item_Draw_Mode mode);
00458 void item_draw_mode(int mode);
00459 void calc_dimensions();
00460 void calc_tree();
00461 void recalc_tree();
00462 int displayed(Fl_Tree_Item *item);
00463 void show_item(Fl_Tree_Item *item, int yoff);
00464 void show_item(Fl_Tree_Item *item);
00465 void show_item_top(Fl_Tree_Item *item);
00466 void show_item_middle(Fl_Tree_Item *item);
00467 void show_item_bottom(Fl_Tree_Item *item);
00468 void display(Fl_Tree_Item *item);
00469 int vposition() const;
00470 void vposition(int pos);
00471 int hposition() const;
00472 void hposition(int pos);
00473
00474 int is_scrollbar(Fl_Widget *w);
00475 int scrollbar_size() const;
00476 void scrollbar_size(int size);
00477 int is_vscroll_visible() const;
00478 int is_hscroll_visible() const;
00479
00481 // callback related
00483 void callback_item(Fl_Tree_Item* item);
00484 Fl_Tree_Item* callback_item();
00485 void callback_reason(Fl_Tree_Reason reason);
00486 Fl_Tree_Reason callback_reason() const;
00487
00489 void load(class Fl_Preferences&);
00490 };
00491
00492 #endif /*FL_TREE_H*/

```

13.162 Fl_Tree_Item.H File Reference

This file contains the definitions for [Fl_Tree_Item](#).

```

#include <FL/Fl.H>
#include <FL/Fl_Widget.H>
#include <FL/Fl_Image.H>
#include <FL/fl_draw.H>
#include <FL/Fl_Tree_Item_Array.H>
#include <FL/Fl_Tree_Prefs.H>

```

Classes

- class [Fl_Tree_Item](#)
Tree widget item.

13.162.1 Detailed Description

This file contains the definitions for [Fl_Tree_Item](#).

13.163 Fl_Tree_Item.H

[Go to the documentation of this file.](#)

```

00001 //
00002
00003 #ifndef FL_TREE_ITEM_H
00004 #define FL_TREE_ITEM_H

```

```

00005
00006 #include <FL/Fl.H>
00007 #include <FL/Fl_Widget.H>
00008 #include <FL/Fl_Image.H>
00009 #include <FL/fl_draw.H>
00010
00011 #include <FL/Fl_Tree_Item_Array.H>
00012 #include <FL/Fl_Tree_Prefs.H>
00013
00015 // FL/Fl_Tree_Item.H
00017 //
00018 // Fl_Tree -- This file is part of the Fl_Tree widget for FLTK
00019 // Copyright (C) 2009-2010 by Greg Ercolano.
00020 //
00021 // This library is free software. Distribution and use rights are outlined in
00022 // the file "COPYING" which should have been included with this file. If this
00023 // file is missing or damaged, see the license at:
00024 //
00025 //     https://www.fltk.org/COPYING.php
00026 //
00027 // Please see the following page on how to report bugs and issues:
00028 //
00029 //     https://www.fltk.org/bugs.php
00030 //
00031
00036
00064 class Fl_Tree;
00065 class FL_EXPORT Fl_Tree_Item {
00066     Fl_Tree          *_tree;                // parent tree
00067     const char      *_label;               // label (memory managed)
00068     Fl_Font         _labelfont;            // label's font face
00069     Fl_Fontsize     _labelsize;           // label's font size
00070     Fl_Color        _labelfgcolor;        // label's fg color
00071     Fl_Color        _labelbgcolor;        // label's bg color (0xffffffff is 'transparent')
00073     enum Fl_Tree_Item_Flags {
00074         OPEN          = 1<<0,
00075         VISIBLE       = 1<<1,
00076         ACTIVE        = 1<<2,
00077         SELECTED      = 1<<3
00078     };
00079     unsigned short  _flags;                // misc flags
00080     int             _xywh[4];              // xywh of this widget (if visible)
00081     int             _collapse_xywh[4];    // xywh of collapse icon (if visible)
00082     int             _label_xywh[4];       // xywh of label
00083     Fl_Widget       *_widget;              // item's label widget (optional)
00084     Fl_Image        *_usericon;           // item's user-specific icon (optional)
00085     Fl_Image        *_userdeicon;         // deactivated usericon
00086     Fl_Tree_Item_Array _children;          // array of child items
00087     Fl_Tree_Item    *_parent;             // parent item (=0 if root)
00088     void            *_userdata;           // user data that can be associated with an item
00089     Fl_Tree_Item    *_prev_sibling;       // previous sibling (same level)
00090     Fl_Tree_Item    *_next_sibling;       // next sibling (same level)
00091     // Protected methods
00092 protected:
00093     void _init(const Fl_Tree_Prefs &prefs, Fl_Tree *tree);
00094     void show_widgets();
00095     void hide_widgets();
00096     void draw_vertical_connector(int x, int y1, int y2, const Fl_Tree_Prefs &prefs);
00097     void draw_horizontal_connector(int x1, int x2, int y, const Fl_Tree_Prefs &prefs);
00098     void recalc_tree();
00099     int calc_item_height(const Fl_Tree_Prefs &prefs) const;
00100     Fl_Color drawfgcolor() const;
00101     Fl_Color drawbgcolor() const;
00102
00103 public:
00104     Fl_Tree_Item(const Fl_Tree_Prefs &prefs); // CTOR -- backwards compatible
00105     Fl_Tree_Item(Fl_Tree *tree);             // CTOR -- ABI 1.3.3+
00106     virtual ~Fl_Tree_Item();                // DTOR -- ABI 1.3.3+
00107     Fl_Tree_Item(const Fl_Tree_Item *o);     // COPY CTOR
00109     int x() const { return(_xywh[0]); }
00111     int y() const { return(_xywh[1]); }
00114     int w() const { return(_xywh[2]); }
00116     int h() const { return(_xywh[3]); }
00119     int label_x() const { return(_label_xywh[0]); }
00122     int label_y() const { return(_label_xywh[1]); }
00126     int label_w() const { return(_label_xywh[2]); }
00129     int label_h() const { return(_label_xywh[3]); }
00130     virtual int draw_item_content(int render);
00131     void draw(int X, int &Y, int W, Fl_Tree_Item *itemfocus,
00132             int &tree_item_xmax, int lastchild=1, int render=1);
00133     void show_self(const char *indent = "") const;
00134     void label(const char *val);
00135     const char *label() const;
00136
00138     inline void user_data( void* data ) { _userdata = data; }
00139
00141     inline void* user_data() const { return _userdata; }

```



```

00142
00144 void labelfont(Fl_Font val) {
00145     _labelfont = val;
00146     recalc_tree();           // may change tree geometry
00147 }
00149 Fl_Font labelfont() const {
00150     return(_labelfont);
00151 }
00153 void labelszize(Fl_Fontsize val) {
00154     _labelsize = val;
00155     recalc_tree();           // may change tree geometry
00156 }
00158 Fl_Fontsize labelszize() const {
00159     return(_labelsize);
00160 }
00162 void labelfgcolor(Fl_Color val) {
00163     _labelfgcolor = val;
00164 }
00166 Fl_Color labelfgcolor() const {
00167     return(_labelfgcolor);
00168 }
00170 void labelcolor(Fl_Color val) {
00171     labelfgcolor(val);
00172 }
00174 Fl_Color labelcolor() const {
00175     return labelfgcolor();
00176 }
00179 void labelbgcolor(Fl_Color val) {
00180     _labelbgcolor = val;
00181 }
00186 Fl_Color labelbgcolor() const {
00187     return(_labelbgcolor);
00188 }
00190 void widget(Fl_Widget *val) {
00191     _widget = val;
00192     recalc_tree();           // may change tree geometry
00193 }
00195 Fl_Widget *widget() const {
00196     return(_widget);
00197 }
00199 int children() const {
00200     return(_children.total());
00201 }
00203 Fl_Tree_Item *child(int index) {
00204     return(_children[index]);
00205 }
00207 const Fl_Tree_Item *child(int t) const;
00209 int has_children() const {
00210     return(children());
00211 }
00212 int find_child(const char *name);
00213 int find_child(Fl_Tree_Item *item);
00214 int remove_child(Fl_Tree_Item *item);
00215 int remove_child(const char *new_label);
00216 void clear_children();
00217 void swap_children(int ax, int bx);
00218 int swap_children(Fl_Tree_Item *a, Fl_Tree_Item *b);
00219 const Fl_Tree_Item *find_child_item(const char *name) const;
00220 Fl_Tree_Item *find_child_item(const char *name);
00221 const Fl_Tree_Item *find_child_item(char **arr) const;
00222 Fl_Tree_Item *find_child_item(char **arr);
00223 const Fl_Tree_Item *find_item(char **arr) const;
00224 Fl_Tree_Item *find_item(char **arr);
00226 // Adding items
00228 Fl_Tree_Item *add(const Fl_Tree_Prefs &prefs,
00229                 const char *new_label,
00230                 Fl_Tree_Item *newitem);
00231 Fl_Tree_Item *add(const Fl_Tree_Prefs &prefs,
00232                 const char *new_label);
00233 Fl_Tree_Item *add(const Fl_Tree_Prefs &prefs,
00234                 char **arr,
00235                 Fl_Tree_Item *newitem);
00236 Fl_Tree_Item *add(const Fl_Tree_Prefs &prefs,
00237                 char **arr);
00238 Fl_Tree_Item *replace(Fl_Tree_Item *new_item);
00239 Fl_Tree_Item *replace_child(Fl_Tree_Item *olditem, Fl_Tree_Item *newitem);
00240 Fl_Tree_Item *insert(const Fl_Tree_Prefs &prefs, const char *new_label, int pos=0);
00241 Fl_Tree_Item *insert_above(const Fl_Tree_Prefs &prefs, const char *new_label);
00242 Fl_Tree_Item *deparent(int index);
00243 int reparent(Fl_Tree_Item *newchild, int index);
00244 int move(int to, int from);
00245 int move(Fl_Tree_Item *item, int op=0, int pos=0);
00246 int move_above(Fl_Tree_Item *item);
00247 int move_below(Fl_Tree_Item *item);
00248 int move_into(Fl_Tree_Item *item, int pos=0);
00249 int depth() const;
00250 Fl_Tree_Item *prev();

```

```

00251 Fl_Tree_Item *next();
00252 Fl_Tree_Item *next_sibling();
00253 Fl_Tree_Item *prev_sibling();
00254 void update_prev_next(int index);
00255 Fl_Tree_Item *next_displayed(Fl_Tree_Prefs &prefs); // deprecated
00256 Fl_Tree_Item *prev_displayed(Fl_Tree_Prefs &prefs); // deprecated
00257 Fl_Tree_Item *next_visible(Fl_Tree_Prefs &prefs);
00258 Fl_Tree_Item *prev_visible(Fl_Tree_Prefs &prefs);
00259
00261 Fl_Tree_Item *parent() {
00262     return(_parent);
00263 }
00265 const Fl_Tree_Item *parent() const {
00266     return(_parent);
00267 }
00271 void parent(Fl_Tree_Item *val) {
00272     _parent = val;
00273 }
00274 const Fl_Tree_Prefs& prefs() const;
00277 const Fl_Tree *tree() const {
00278     return(_tree);
00279 }
00282 Fl_Tree *tree() {
00283     return(_tree);
00284 }
00286 // State
00288 void open();
00289 void close();
00291 int is_open() const {
00292     return(is_flag(OPEN));
00293 }
00295 int is_close() const {
00296     return(is_flag(OPEN)?0:1);
00297 }
00299 void open_toggle() {
00300     is_open()?close():open(); // handles calling recalc_tree()
00301 }
00305 void select(int val=1) {
00306     set_flag(SELECTED, val);
00307 }
00309 void select_toggle() {
00310     if ( is_selected() ) {
00311         deselect(); // deselect if selected
00312     } else {
00313         select(); // select if deselected
00314     }
00315 }
00320 int select_all() {
00321     int count = 0;
00322     if ( ! is_selected() ) {
00323         select();
00324         ++count;
00325     }
00326     for ( int t=0; t<children(); t++ ) {
00327         count += child(t)->select_all();
00328     }
00329     return(count);
00330 }
00332 void deselect() {
00333     set_flag(SELECTED, 0);
00334 }
00339 int deselect_all() {
00340     int count = 0;
00341     if ( is_selected() ) {
00342         deselect();
00343         ++count;
00344     }
00345     for ( int t=0; t<children(); t++ ) {
00346         count += child(t)->deselect_all();
00347     }
00348     return(count);
00349 }
00351 char is_selected() const {
00352     return(is_flag(SELECTED));
00353 }
00362 void activate(int val=1) {
00363     set_flag(ACTIVE, val);
00364     if ( !_widget && val != (int)_widget->active() ) {
00365         if ( val ) {
00366             _widget->activate();
00367         } else {
00368             _widget->deactivate();
00369         }
00370     }
00371     _widget->redraw();
00372 }
00376 void deactivate() {

```

```

00377     activate(0);
00378 }
00380 char is_activated() const {
00381     return(is_flag(ACTIVE));
00382 }
00384 char is_active() const {
00385     return(is_activated());
00386 }
00388 int visible() const {
00389     return(is_visible());
00390 }
00392 int is_visible() const {
00393     return(is_flag(VISIBLE));
00394 }
00395 int visible_r() const;
00396
00406 void usericon(Fl_Image *val) {
00407     _usericon = val;
00408     recalc_tree();           // may change tree geometry
00409 }
00411 Fl_Image *usericon() const {
00412     return(_usericon);
00413 }
00440 void userdeicon(Fl_Image* val) {
00441     _userdeicon = val;
00442 }
00445 Fl_Image* userdeicon() const {
00446     return _userdeicon;
00447 }
00449 // Events
00451 const Fl_Tree_Item* find_clicked(const Fl_Tree_Prefs &prefs, int yonly=0) const;
00452 Fl_Tree_Item* find_clicked(const Fl_Tree_Prefs &prefs, int yonly=0);
00453 int event_on_item(const Fl_Tree_Prefs &prefs) const;
00454 int event_on_collapse_icon(const Fl_Tree_Prefs &prefs) const;
00455 int event_on_user_icon(const Fl_Tree_Prefs &prefs) const;
00456 int event_on_label(const Fl_Tree_Prefs &prefs) const;
00458 int is_root() const {
00459     return(_parent==0?1:0);
00460 }
00461
00462 // Protected methods
00463 // TODO: move these to top 'protected:' section
00464 protected:
00466 inline void set_flag(unsigned short flag,int val) {
00467     if ( flag==OPEN || flag==VISIBLE ) {
00468         recalc_tree();           // may change tree geometry
00469     }
00470     if ( val ) _flags |= flag; else _flags &= ~flag;
00471 }
00473 inline int is_flag(unsigned short val) const {
00474     return(_flags & val ? 1 : 0);
00475 }
00476
00477 };
00478
00479 #endif /*FL_TREE_ITEM_H*/

```

13.164 Fl_Tree_Item_Array.H File Reference

This file defines a class that manages an array of [Fl_Tree_Item](#) pointers.

```

#include <FL/Fl.H>
#include "Fl_Export.H"

```

Classes

- class [Fl_Tree_Item_Array](#)
Manages an array of [Fl_Tree_Item](#) pointers.

13.164.1 Detailed Description

This file defines a class that manages an array of [Fl_Tree_Item](#) pointers.

13.165 Fl_Tree_Item_Array.H

[Go to the documentation of this file.](#)

```

00001 //
00002
00003 #ifndef _FL_TREE_ITEM_ARRAY_H
00004 #define _FL_TREE_ITEM_ARRAY_H
00005
00006 #include <FL/Fl.H>
00007 #include "Fl_Export.H"
00008
00009 class FL_EXPORT Fl_Tree_Item; // forward decl must *precede* first doxygen comment block
00010                               // or doxygen will not document our class..
00011
00013 // FL/Fl_Tree_Item_Array.H
00015 //
00016 // Fl_Tree -- This file is part of the Fl_Tree widget for FLTK
00017 // Copyright (C) 2009-2010 by Greg Ercolano.
00018 //
00019 // This library is free software. Distribution and use rights are outlined in
00020 // the file "COPYING" which should have been included with this file. If this
00021 // file is missing or damaged, see the license at:
00022 //
00023 //     https://www.fltk.org/COPYING.php
00024 //
00025 // Please see the following page on how to report bugs and issues:
00026 //
00027 //     https://www.fltk.org/bugs.php
00028 //
00029
00034
00044
00045 class FL_EXPORT Fl_Tree_Item_Array {
00046     Fl_Tree_Item **_items; // items array
00047     int _total; // #items in array
00048     int _size; // #items *allocated* for array
00049     int _chunksize; // #items to enlarge mem allocation
00050     enum {
00051         MANAGE_ITEM = 1
00052     };
00053     char _flags; // flags to control behavior
00054     void enlarge(int count);
00055 public:
00056     Fl_Tree_Item_Array(int new_chunksize = 10); // CTOR
00057     ~Fl_Tree_Item_Array(); // DTOR
00058     Fl_Tree_Item_Array(const Fl_Tree_Item_Array *o); // COPY CTOR
00060     Fl_Tree_Item *operator[](int i) {
00061         return(_items[i]);
00062     }
00064     const Fl_Tree_Item *operator[](int i) const {
00065         return(_items[i]);
00066     }
00068     int total() const {
00069         return(_total);
00070     }
00072     void swap(int ax, int bx);
00073     int move(int to, int from);
00074     int deparent(int pos);
00075     int reparent(Fl_Tree_Item *item, Fl_Tree_Item *newparent, int pos);
00076     void clear();
00077     void add(Fl_Tree_Item *val);
00078     void insert(int pos, Fl_Tree_Item *new_item);
00079     void replace(int pos, Fl_Tree_Item *new_item);
00080     void remove(int index);
00081     int remove(Fl_Tree_Item *item);
00085     void manage_item_destroy(int val) {
00086         if ( val ) _flags |= MANAGE_ITEM; else _flags &= ~MANAGE_ITEM;
00087     }
00088     int manage_item_destroy() const {
00089         return _flags & MANAGE_ITEM ? 1 : 0;
00090     }
00091 };
00092
00093 #endif /*_FL_TREE_ITEM_ARRAY_H*/

```

13.166 Fl_Tree_Prefs.H File Reference

This file contains the definitions for `Fl_Tree`'s preferences.

```
#include <FL/Fl.H>
```

Classes

- class [Fl_Tree_Prefs](#)
Tree widget's preferences.

Typedefs

- typedef void() [Fl_Tree_Item_Draw_Callback](#)([Fl_Tree_Item](#) *, void *)

Enumerations

- enum [Fl_Tree_Connector](#) { [FL_TREE_CONNECTOR_NONE](#) =0 , [FL_TREE_CONNECTOR_DOTTED](#) =1 , [FL_TREE_CONNECTOR_SOLID](#) =2 }
- Defines the style of connection lines between items.*
- enum [Fl_Tree_Item_Draw_Mode](#) { [FL_TREE_ITEM_DRAW_DEFAULT](#) =0 , [FL_TREE_ITEM_DRAW_LABEL_AND_WIDGET](#) =1 , [FL_TREE_ITEM_HEIGHT_FROM_WIDGET](#) =2 }
- Bit flags that control how item's labels and widget(s) are drawn in the tree via `item_draw_mode()`.*
- enum [Fl_Tree_Item_Reselect_Mode](#) { [FL_TREE_SELECTABLE_ONCE](#) =0 , [FL_TREE_SELECTABLE_ALWAYS](#) }
- Defines the ways an item can be (re) selected via `item_reselect_mode()`.*
- enum [Fl_Tree_Select](#) { [FL_TREE_SELECT_NONE](#) =0 , [FL_TREE_SELECT_SINGLE](#) =1 , [FL_TREE_SELECT_MULTI](#) =2 , [FL_TREE_SELECT_SINGLE_DRAGGABLE](#) =3 }
- Tree selection style.*
- enum [Fl_Tree_Sort](#) { [FL_TREE_SORT_NONE](#) =0 , [FL_TREE_SORT_ASCENDING](#) =1 , [FL_TREE_SORT_DESCENDING](#) =2 }
- Sort order options for items added to the tree.*

13.166.1 Detailed Description

This file contains the definitions for [Fl_Tree](#)'s preferences.

```

Fl_Tree_Prefs
:
:
:
:
Fl_Tree
:
|_____ Fl_Tree_Item

```

13.166.2 Enumeration Type Documentation

13.166.2.1 Fl_Tree_Connector

enum [Fl_Tree_Connector](#)

Defines the style of connection lines between items.

Enumerator

FL_TREE_CONNECTOR_NONE	Use no lines connecting items.
FL_TREE_CONNECTOR_DOTTED	Use dotted lines connecting items (default)
FL_TREE_CONNECTOR_SOLID	Use solid lines connecting items.

13.166.2.2 Fl_Tree_Item_Draw_Mode

enum [Fl_Tree_Item_Draw_Mode](#)

Bit flags that control how item's labels and widget(s) are drawn in the tree via `item_draw_mode()`.

Enumerator

FL_TREE_ITEM_DRAW_DEFAULT	If <code>widget()</code> defined, draw in place of label, and <code>widget()</code> tracks item height (default)
---	--

Enumerator

FL_TREE_ITEM_DRAW_LABEL_AND_WIDGET	If widget() defined, include label to the left of the widget.
FL_TREE_ITEM_HEIGHT_FROM_WIDGET	If widget() defined, widget()'s height controls item's height.

13.166.2.3 Fl_Tree_Item_Reselect_Mode

enum [Fl_Tree_Item_Reselect_Mode](#)

Defines the ways an item can be (re) selected via `item_reselect_mode()`.

Enumerator

FL_TREE_SELECTABLE_ONCE	Item can only be selected once (default)
FL_TREE_SELECTABLE_ALWAYS	Enables FL_TREE_REASON_RESELECTED events for callbacks.

13.166.2.4 Fl_Tree_Select

enum [Fl_Tree_Select](#)

Tree selection style.

Enumerator

FL_TREE_SELECT_NONE	Nothing selected when items are clicked.
FL_TREE_SELECT_SINGLE	Single item selected when item is clicked (default)
FL_TREE_SELECT_MULTI	Multiple items can be selected by clicking with SHIFT, CTRL or mouse drags.
FL_TREE_SELECT_SINGLE_DRAGGABLE	Single items may be selected, and they may be reordered by mouse drag.

13.166.2.5 Fl_Tree_Sort

enum [Fl_Tree_Sort](#)

Sort order options for items added to the tree.

Enumerator

FL_TREE_SORT_NONE	No sorting; items are added in the order defined (default).
FL_TREE_SORT_ASCENDING	Add items in ascending sort order.
FL_TREE_SORT_DESCENDING	Add items in descending sort order.

13.167 Fl_Tree_Prefs.H

[Go to the documentation of this file.](#)

```

00001 //
00002
00003 #ifndef FL_TREE_PREFS_H
00004 #define FL_TREE_PREFS_H
00005
00006 #include <FL/Fl.H>          // needed for ABI version features (via Enumerations.H)
00007
00009 // FL/Fl_Tree_Prefs.H
00011 //
00012 // Fl_Tree_Prefs -- This file is part of the Fl_Tree widget for FLTK
00013 // Copyright (C) 2009-2010 by Greg Ercolano.
00014 //

```

```

00015 // This library is free software. Distribution and use rights are outlined in
00016 // the file "COPYING" which should have been included with this file. If this
00017 // file is missing or damaged, see the license at:
00018 //
00019 //     https://www.fltk.org/COPYING.php
00020 //
00021 // Please see the following page on how to report bugs and issues:
00022 //
00023 //     https://www.fltk.org/bugs.php
00024 //
00025
00040
00043
00047 enum Fl_Tree_Sort {
00048     FL_TREE_SORT_NONE=0,
00049     FL_TREE_SORT_ASCENDING=1,
00050     FL_TREE_SORT_DESCENDING=2
00051 };
00052
00056 enum Fl_Tree_Connector {
00057     FL_TREE_CONNECTOR_NONE=0,
00058     FL_TREE_CONNECTOR_DOTTED=1,
00059     FL_TREE_CONNECTOR_SOLID=2
00060 };
00061
00065 enum Fl_Tree_Select {
00066     FL_TREE_SELECT_NONE=0,
00067     FL_TREE_SELECT_SINGLE=1,
00068     FL_TREE_SELECT_MULTI=2,
00070     FL_TREE_SELECT_SINGLE_DRAGGABLE=3
00072 };
00073
00078 enum Fl_Tree_Item_Reselect_Mode {
00079     FL_TREE_SELECTABLE_ONCE=0,
00080     FL_TREE_SELECTABLE_ALWAYS
00081 };
00082
00087 enum Fl_Tree_Item_Draw_Mode {
00088     FL_TREE_ITEM_DRAW_DEFAULT=0,
00090     FL_TREE_ITEM_DRAW_LABEL_AND_WIDGET=1,
00091     FL_TREE_ITEM_HEIGHT_FROM_WIDGET=2
00092 };
00093
00094 class Fl_Tree_Item;
00095 typedef void (Fl_Tree_Item_Draw_Callback)(Fl_Tree_Item*, void*);
00096
00105 class FL_EXPORT Fl_Tree_Prefs {
00106     Fl_Font _labelfont; // label's font face
00107     Fl_Fontsize _labelsize; // label's font size
00108     int _margintop; // --
00109     int _marginleft; // |- tree's controllable margins
00110     int _marginbottom; // --
00111     int _openchild_marginbottom; // extra space below an open child tree
00112     int _usericonmarginleft; // space to left of user icon (if any)
00113     int _labelmarginleft; // space to left of label
00114     int _widgetmarginleft; // space to left of widget
00115     int _connectorwidth; // connector width (right of open/close icon)
00116     int _linespacing; // vertical space between lines
00117     // Colors
00118     Fl_Color _labelfgcolor; // label's foreground color
00119     Fl_Color _labelbgcolor; // label's background color
00120     Fl_Color _connectorcolor; // connector dotted line color
00121     Fl_Tree_Connector _connectorstyle; // connector line style
00122     Fl_Image *_openimage; // the 'open' icon [+]
00123     Fl_Image *_closeimage; // the 'close' icon [-]
00124     Fl_Image *_userimage; // user's own icon
00125     Fl_Image *_opendeimage; // deactivated 'open' icon
00126     Fl_Image *_closedeimage; // deactivated 'close' icon
00127     Fl_Image *_userdeimage; // deactivated user icon
00128     char _showcollapse; // 1=show collapse icons, 0=don't
00129     char _showroot; // show the root item as part of the tree
00130     Fl_Tree_Sort _sortorder; // none, ascending, descending, etc.
00131     Fl_Boxtype _selectbox; // selection box type
00132     Fl_Tree_Select _selectmode; // selection mode
00133     Fl_Tree_Item_Reselect_Mode _itemreselectmode; // controls item selection callback() behavior
00134     Fl_Tree_Item_Draw_Mode _itemdrawmode; // controls how items draw label + widget()
00135     Fl_Tree_Item_Draw_Callback *_itemdrawcallback; // callback to handle drawing items (0=none)
00136     void *_itemdrawuserdata; // data for drawing items (0=none)
00137 public:
00138     Fl_Tree_Prefs();
00139     ~Fl_Tree_Prefs();
00140
00142     // Labels
00145     inline Fl_Font item_labelfont() const { return(_labelfont); }
00147     inline void item_labelfont(Fl_Font val) { _labelfont = val; }
00149     inline Fl_Fontsize item_labelsize() const { return(_labelsize); }
00151     inline void item_labelsize(Fl_Fontsize val) { _labelsize = val; }

```

```

00153 inline Fl_Color item_labelbgcolor() const { return(_labelbgcolor); }
00155 inline void item_labelbgcolor(Fl_Color val) { _labelbgcolor = val; }
00160 inline Fl_Color item_labelbgcolor() const {
00161     return _labelbgcolor;
00162 }
00166 inline void item_labelbgcolor(Fl_Color val) {
00167     _labelbgcolor = val;
00168 }
00169
00171 // Obsolete names - for 1.3.0 backwards compat
00174 inline Fl_Font labelfont() const { return(_labelfont); }
00176 inline void labelfont(Fl_Font val) { _labelfont = val; }
00178 inline Fl_Fontsize labelsz() const { return(_labelsize); }
00180 inline void labelsz(Fl_Fontsize val) { _labelsize = val; }
00182 inline Fl_Color labelfgcolor() const { return(_labelfgcolor); }
00184 inline void labelfgcolor(Fl_Color val) { _labelfgcolor = val; }
00186 inline Fl_Color labelbgcolor() const { return(item_labelbgcolor()); }
00188 inline void labelbgcolor(Fl_Color val) { item_labelbgcolor(val); }
00189
00191 // Margins
00194 inline int marginleft() const {
00195     return(_marginleft);
00196 }
00198 inline void marginleft(int val) {
00199     _marginleft = val;
00200 }
00202 inline int margintop() const {
00203     return(_margintop);
00204 }
00206 inline void margintop(int val) {
00207     _margintop = val;
00208 }
00211 inline int marginbottom() const {
00212     return(_marginbottom);
00213 }
00216 inline void marginbottom(int val) {
00217     _marginbottom = val;
00218 }
00220 inline int openchild_marginbottom() const {
00221     return(_openchild_marginbottom);
00222 }
00224 inline void openchild_marginbottom(int val) {
00225     _openchild_marginbottom = val;
00226 }
00228 inline int usericonmarginleft() const {
00229     return(_usericonmarginleft);
00230 }
00232 inline void usericonmarginleft(int val) {
00233     _usericonmarginleft = val;
00234 }
00236 inline int labelmarginleft() const {
00237     return(_labelmarginleft);
00238 }
00240 inline void labelmarginleft(int val) {
00241     _labelmarginleft = val;
00242 }
00244 inline int widgetmarginleft() const {
00245     return(_widgetmarginleft);
00246 }
00248 inline void widgetmarginleft(int val) {
00249     _widgetmarginleft = val;
00250 }
00252 inline int linespacing() const {
00253     return(_linespacing);
00254 }
00256 inline void linespacing(int val) {
00257     _linespacing = val;
00258 }
00259
00261 // Colors and Styles
00264 inline Fl_Color connectorcolor() const {
00265     return(_connectorcolor);
00266 }
00268 inline void connectorcolor(Fl_Color val) {
00269     _connectorcolor = val;
00270 }
00272 inline Fl_Tree_Connector connectorstyle() const {
00273     return(_connectorstyle);
00274 }
00276 inline void connectorstyle(Fl_Tree_Connector val) {
00277     _connectorstyle = val;
00278 }
00280 inline void connectorstyle(int val) {
00281     _connectorstyle = Fl_Tree_Connector(val);
00282 }
00284 inline int connectorwidth() const {
00285     return(_connectorwidth);

```



```

00286     }
00288     inline void connectorwidth(int val) {
00289         _connectorwidth = val;
00290     }
00291
00293     // Icons
00298     inline Fl_Image *openicon() const {
00299         return(_openimage);
00300     }
00301     void openicon(Fl_Image *val);
00305     inline Fl_Image *closeicon() const {
00306         return(_closeimage);
00307     }
00308     void closeicon(Fl_Image *val);
00310     inline Fl_Image *usericon() const {
00311         return(_userimage);
00312     }
00316     inline void usericon(Fl_Image *val) {
00317         _userimage = val;
00318         // Update deactivated version of icon..
00319         if ( _userdeimage ) delete _userdeimage;
00320         if ( _userimage ) {
00321             _userdeimage = _userimage->copy();
00322             _userdeimage->inactive();
00323         } else {
00324             _userdeimage = 0;
00325         }
00326     }
00327
00330     inline Fl_Image *opendeicon() const {
00331         return _opendeimage;
00332     }
00335     inline Fl_Image *closedeicon() const {
00336         return _closedeimage;
00337     }
00340     inline Fl_Image *userdeicon() const {
00341         return _userdeimage;
00342     }
00343
00345     // Options
00348     inline char showcollapse() const {
00349         return(_showcollapse);
00350     }
00359     inline void showcollapse(int val) {
00360         _showcollapse = val;
00361     }
00363     inline Fl_Tree_Sort sortorder() const {
00364         return(_sortorder);
00365     }
00370     inline void sortorder(Fl_Tree_Sort val) {
00371         _sortorder = val;
00372     }
00374     inline Fl_Boxtype selectbox() const {
00375         return(_selectbox);
00376     }
00378     inline void selectbox(Fl_Boxtype val) {
00379         _selectbox = val;
00380     }
00382     inline int showroot() const {
00383         return(int(_showroot));
00384     }
00389     inline void showroot(int val) {
00390         _showroot = char(val);
00391     }
00393     inline Fl_Tree_Select selectmode() const {
00394         return(_selectmode);
00395     }
00401     inline void selectmode(Fl_Tree_Select val) {
00402         _selectmode = val;
00403     }
00405     Fl_Tree_Item_Reselect_Mode item_reselect_mode() const {
00406         return _itemreselectmode;
00407     }
00409     void item_reselect_mode(Fl_Tree_Item_Reselect_Mode mode) {
00410         _itemreselectmode = mode;
00411     }
00413     inline Fl_Tree_Item_Draw_Mode item_draw_mode() const {
00414         return(_itemdrawmode);
00415     }
00421     inline void item_draw_mode(Fl_Tree_Item_Draw_Mode val) {
00422         _itemdrawmode = val;
00423     }
00424     void item_draw_callback(Fl_Tree_Item_Draw_Callback *cb, void *data=0) {
00425         _itemdrawcallback = cb;
00426         _itemdrawuserdata = data;
00427     }
00428     Fl_Tree_Item_Draw_Callback* item_draw_callback() const {

```

```

00429     return(_itemdrawcallback);
00430 }
00431 void* item_draw_user_data() const {
00432     return(_itemdrawuserdata);
00433 }
00434 void do_item_draw_callback(Fl_Tree_Item *o) const {
00435     _itemdrawcallback(o, _itemdrawuserdata);
00436 }
00437 };
00438
00439 #endif /*FL_TREE_PREFS_H*/

```

13.168 fl_types.h File Reference

This file contains simple "C"-style type definitions.

```
#include "fl_attr.h"
```

Typedefs

Miscellaneous

- typedef unsigned int [Fl_Shortcut](#)
16-bit Unicode character + 8-bit indicator for keyboard flags.
- typedef unsigned char **uchar**
unsigned char
- typedef unsigned long **ulong**
unsigned long

13.168.1 Detailed Description

This file contains simple "C"-style type definitions.

13.168.2 Typedef Documentation

13.168.2.1 Fl_Shortcut

```
typedef unsigned int Fl\_Shortcut
16-bit Unicode character + 8-bit indicator for keyboard flags.
```

Note

This **should** be 24-bit Unicode character + 8-bit indicator for keyboard flags. The upper 8 bits are currently unused but reserved.

Due to compatibility issues this type and all FLTK **shortcuts** can only be used with 16-bit Unicode characters (U+0000 .. U+FFFF) and not with the full range of unicode characters (U+0000 .. U+10FFFF).

This is caused by the bit flags FL_SHIFT, FL_CTRL, FL_ALT, and FL_META being all in the range 0x010000 .. 0x400000.

Todo Discuss and decide whether we can "shift" these special keyboard flags to the upper byte to enable full 21-bit Unicode characters (U+0000 .. U+10FFFF) plus the keyboard indicator bits as this was originally intended. This would be possible if we could rely on **all** programs being coded with symbolic names and not hard coded bit values.

13.169 fl_types.h

[Go to the documentation of this file.](#)

```

00001 /*
00002  * Simple "C"-style types for the Fast Light Tool Kit (FLTK).
00003  *
00004  * Copyright 1998-2020 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file.  If this

```

```

00008 * file is missing or damaged, see the license at:
00009 *
00010 *     https://www.fltk.org/COPYING.php
00011 *
00012 * Please see the following page on how to report bugs and issues:
00013 *
00014 *     https://www.fltk.org/bugs.php
00015 */
00016
00021 #ifndef FL_TYPES_H
00022 #define FL_TYPES_H
00023
00024 #include "fl_attr.h"
00025
00026 /* group: Miscellaneous */ 00028
00030 typedef unsigned char uchar;
00032 typedef unsigned long ulong;
00033
00055 typedef unsigned int Fl_Shortcut;
00056
00057 /* group: Miscellaneous */ 00058
00059 #endif

```

13.170 fl_utf8.h File Reference

header for Unicode and UTF-8 character handling

```

#include "Fl_Export.H"
#include "fl_types.h"
#include <stdio.h>
#include <sys/stat.h>

```

Functions

- `int fl_access` (const char *f, int mode)
Cross-platform function to test a files access() with a UTF-8 encoded name or value.
- `int fl_chdir` (const char *path)
Cross-platform function to change the current working directory, given as a UTF-8 encoded string.
- `int fl_chmod` (const char *f, int mode)
Cross-platform function to set a files mode() with a UTF-8 encoded name or value.
- `int fl_close_fd` (int fd)
Cross-platform function to close a file descriptor.
- `int fl_execvp` (const char *file, char *const *argv)
- `FILE * fl_fopen` (const char *f, const char *mode)
Cross-platform function to open files with a UTF-8 encoded name.
- `char * fl_getcwd` (char *buf, int len)
Cross-platform function to get the current working directory as a UTF-8 encoded value.
- `char * fl_getenv` (const char *v)
Cross-platform function to get environment variables with a UTF-8 encoded name or value.
- `char fl_make_path` (const char *path)
Cross-platform function to recursively create a path in the file system.
- `void fl_make_path_for_file` (const char *path)
Cross-platform function to create a path for the file in the file system.
- `int fl_mkdir` (const char *f, int mode)
Cross-platform function to create a directory with a UTF-8 encoded name.
- `unsigned int fl_nonspacing` (unsigned int ucs)
Returns true if the Unicode character ucs is non-spacing.
- `int fl_open` (const char *fname, int oflags,...)
Cross-platform function to open files with a UTF-8 encoded name.
- `int fl_open_ext` (const char *fname, int binary, int oflags,...)
Cross-platform function to open files with a UTF-8 encoded name.

- `int fl_putenv` (const char *var)
Cross-platform function to write environment variables with a UTF-8 encoded name or value.
- `int fl_rename` (const char *f, const char *n)
Cross-platform function to rename a filesystem object using UTF-8 encoded names.
- `int fl_rmdir` (const char *f)
Cross-platform function to remove a directory with a UTF-8 encoded name.
- `int fl_stat` (const char *f, struct stat *b)
Cross-platform function to stat() a file using a UTF-8 encoded name or value.
- `int fl_system` (const char *cmd)
Cross-platform function to run a system command with a UTF-8 encoded string.
- `int fl_tolower` (unsigned int ucs)
Returns the Unicode lower case value of ucs.
- `int fl_toupper` (unsigned int ucs)
Returns the Unicode upper case value of ucs.
- `unsigned fl_ucs_to_Utf16` (const unsigned ucs, unsigned short *dst, const unsigned dstlen)
Convert a single 32-bit Unicode codepoint into an array of 16-bit characters.
- `int fl_unlink` (const char *fname)
Cross-platform function to unlink() (that is, delete) a file using a UTF-8 encoded filename.
- `char * fl_utf2mbcs` (const char *s)
Converts UTF-8 string s to a local multi-byte character string.
- `const char * fl_utf8back` (const char *p, const char *start, const char *end)
Move p backward until it points to the start of a UTF-8 character.
- `int fl_utf8bytes` (unsigned ucs)
Return the number of bytes needed to encode the given UCS4 character in UTF-8.
- `unsigned fl_utf8decode` (const char *p, const char *end, int *len)
Decode a single UTF-8 encoded character starting at p.
- `int fl_utf8encode` (unsigned ucs, char *buf)
Write the UTF-8 encoding of ucs into buf and return the number of bytes written.
- `unsigned fl_utf8from_mb` (char *dst, unsigned dstlen, const char *src, unsigned srclen)
Convert a filename from the locale-specific multibyte encoding used by Windows to UTF-8 as used by FLTK.
- `unsigned fl_utf8froma` (char *dst, unsigned dstlen, const char *src, unsigned srclen)
Convert an ISO-8859-1 (ie normal c-string) byte stream to UTF-8.
- `unsigned fl_utf8fromwc` (char *dst, unsigned dstlen, const wchar_t *src, unsigned srclen)
Turn "wide characters" as returned by some system calls (especially on Windows) into UTF-8.
- `const char * fl_utf8fwd` (const char *p, const char *start, const char *end)
Move p forward until it points to the start of a UTF-8 character.
- `int fl_utf8len` (char c)
Returns the byte length of the UTF-8 sequence with first byte c, or -1 if c is not valid.
- `int fl_utf8len1` (char c)
Returns the byte length of the UTF-8 sequence with first byte c, or 1 if c is not valid.
- `int fl_utf8locale` ()
Return true if the "locale" seems to indicate that UTF-8 encoding is used.
- `int fl_utf8strlen` (const char *text, int len)
Return the length in bytes of a UTF-8 string.
- `int fl_utf8test` (const char *src, unsigned srclen)
Examines the first srclen bytes in src and returns a verdict on whether it is UTF-8 or not.
- `unsigned fl_utf8to_mb` (const char *src, unsigned srclen, char *dst, unsigned dstlen)
Convert the UTF-8 used by FLTK to the locale-specific encoding used for filenames (and sometimes used for data in files).
- `unsigned fl_utf8toa` (const char *src, unsigned srclen, char *dst, unsigned dstlen)
Convert a UTF-8 sequence into an array of 1-byte characters.

- unsigned [fl_utf8toUtf16](#) (const char *src, unsigned srclen, unsigned short *dst, unsigned dstlen)
Convert a UTF-8 sequence into an array of 16-bit characters.
- unsigned [fl_utf8towc](#) (const char *src, unsigned srclen, wchar_t *dst, unsigned dstlen)
Converts a UTF-8 string into a wide character string.
- int [fl_utf_nb_char](#) (const unsigned char *buf, int len)
Returns the number of Unicode chars in the UTF-8 string.
- int [fl_utf_strcasecmp](#) (const char *s1, const char *s2)
UTF-8 aware strcasecmp - converts to Unicode and tests.
- int [fl_utf_strncasecmp](#) (const char *s1, const char *s2, int n)
UTF-8 aware strncasecmp - converts to lower case Unicode and tests.
- int [fl_utf_tolower](#) (const unsigned char *str, int len, char *buf)
Converts the string str to its lower case equivalent into buf.
- int [fl_utf_toupper](#) (const unsigned char *str, int len, char *buf)
Converts the string str to its upper case equivalent into buf.
- int [fl_wcwidth](#) (const char *src)
extended wrapper around [fl_wcwidth_\(unsigned int ucs\)](#) function.
- int [fl_wcwidth_](#) (unsigned int ucs)
Wrapper to adapt Markus Kuhn's implementation of wcwidth() for FLTK.

13.170.1 Detailed Description

header for Unicode and UTF-8 character handling

13.171 fl_utf8.h

[Go to the documentation of this file.](#)

```

00001 /*
00002  * Author: Jean-Marc Lienher ( http://oksid.ch )
00003  * Copyright 2000-2010 by O'ksi'D.
00004  * Copyright 2016-2021 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  * https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *
00014  * https://www.fltk.org/bugs.php
00015  */
00016
00017 /* Merged in some functionality from the fltk-2 version. IMM.
00018  * The following code is an attempt to merge the functions incorporated in FLTK2
00019  * with the functions provided in OksiD's fltk-1.1.6-utf8 port
00020  */
00021
00022 #ifndef _HAVE_FL_UTF8_HDR_
00023 #define _HAVE_FL_UTF8_HDR_
00024
00025 #include "Fl_Export.H"
00026 #include "fl_types.h"
00027 #include <stdio.h> // FILE *fl_fopen()
00028 #include <sys/stat.h> // struct stat
00029
00030 #ifdef __cplusplus
00031 extern "C" {
00032 #endif
00033
00034 /* F2: comes from FLTK2 */
00035 /* OD: comes from OksiD */
00036
00037 FL_EXPORT int fl_utf8bytes(unsigned ucs);
00038
00039 /* OD: returns the byte length of the first UTF-8 char sequence (returns -1 if not valid) */
00040 FL_EXPORT int fl_utf8len(char c);
00041
00042 /* OD: returns the byte length of the first UTF-8 char sequence (returns +1 if not valid) */
00043 FL_EXPORT int fl_utf8len1(char c);

```

```

00058
00059 /* OD: returns the byte length of a UTF-8 text */
00060 FL_EXPORT int fl_utf8strlen(const char *text, int len);
00061
00062 /* OD: returns the number of Unicode chars in the UTF-8 string */
00063 FL_EXPORT int fl_utf_nb_char(const unsigned char *buf, int len);
00064
00065 /* F2: Convert the next UTF-8 char-sequence into a Unicode value (and say how many bytes were used) */
00066 FL_EXPORT unsigned fl_utf8decode(const char* p, const char* end, int* len);
00067
00068 /* F2: Encode a Unicode value into a UTF-8 sequence, return the number of bytes used */
00069 FL_EXPORT int fl_utf8encode(unsigned ucs, char* buf);
00070
00071 /* F2: Move forward to the next valid UTF-8 sequence start between start and end */
00072 FL_EXPORT const char* fl_utf8fwd(const char* p, const char* start, const char* end);
00073
00074 /* F2: Move backward to the previous valid UTF-8 sequence start */
00075 FL_EXPORT const char* fl_utf8back(const char* p, const char* start, const char* end);
00076
00077 /* XX: Convert a single 32-bit Unicode value into UTF16 */
00078 FL_EXPORT unsigned fl_ucs_to_Utf16(const unsigned ucs, unsigned short *dst, const unsigned dstlen);
00079
00080 /* F2: Convert a UTF-8 string into UTF16 */
00081 FL_EXPORT unsigned fl_utf8toUtf16(const char* src, unsigned srclen, unsigned short* dst, unsigned
dstlen);
00082
00083 /* F2: Convert a UTF-8 string into a wide character string - makes UTF16 on win32, "UCS4" elsewhere */
00084 FL_EXPORT unsigned fl_utf8towc(const char *src, unsigned srclen, wchar_t *dst, unsigned dstlen);
00085
00086 /* F2: Convert a wide character string to UTF-8 - takes in UTF16 on win32, "UCS4" elsewhere */
00087 FL_EXPORT unsigned fl_utf8fromwc(char *dst, unsigned dstlen, const wchar_t *src, unsigned srclen);
00088
00089 /* F2: Convert a UTF-8 string into ASCII, eliding untranslatable glyphs */
00090 FL_EXPORT unsigned fl_utf8toa (const char *src, unsigned srclen, char *dst, unsigned dstlen);
00091
00092 /* F2: Convert 8859-1 string to UTF-8 */
00093 FL_EXPORT unsigned fl_utf8froma (char *dst, unsigned dstlen, const char *src, unsigned srclen);
00094
00095 /* F2: Returns true if the current O/S locale is UTF-8 */
00096 FL_EXPORT int fl_utf8locale(void);
00097
00098 /* F2: Examine the first len characters of src, to determine if the input text is UTF-8 or not
* NOTE: The value returned is not simply boolean - it contains information about the probable
* type of the src text. */
00100 FL_EXPORT int fl_utf8test(const char *src, unsigned len);
00101
00102
00103 /* XX: return width of "raw" ucs character in columns.
* for internal use only */
00105 FL_EXPORT int fl_wcwidth_(unsigned int ucs);
00106
00107 /* XX: return width of UTF-8 character string in columns.
* NOTE: this may also do C1 control character (0x80 to 0x9f) to CP1252 mapping,
* depending on original build options */
00110 FL_EXPORT int fl_wcwidth(const char *src);
00111
00112 /* OD: Return true if the character is non-spacing */
00113 FL_EXPORT unsigned int fl_nonspacing(unsigned int ucs);
00114
00115 /* F2: Convert UTF-8 to a local multi-byte encoding - mainly for win32? */
00116 FL_EXPORT unsigned fl_utf8to_mb(const char *src, unsigned srclen, char *dst, unsigned dstlen);
00117 /* OD: Convert UTF-8 to a local multi-byte encoding */
00118 FL_EXPORT char* fl_utf2mbcs(const char *src);
00119
00120 /* F2: Convert a local multi-byte encoding to UTF-8 - mainly for win32? */
00121 FL_EXPORT unsigned fl_utf8from_mb(char *dst, unsigned dstlen, const char *src, unsigned srclen);
00122
00123 /*****
00124 #ifdef _WIN32
00125 /* these two Windows-only functions are kept for API compatibility */
00126 /* OD: Attempt to convert the UTF-8 string to the current locale */
00127 FL_EXPORT char *fl_utf8_to_locale(const char *s, int len, unsigned int codepage);
00128
00129 /* OD: Attempt to convert a string in the current locale to UTF-8 */
00130 FL_EXPORT char *fl_locale_to_utf8(const char *s, int len, unsigned int codepage);
00131 #endif /* _WIN32 */
00132
00133 /*****
00134 * The following functions are intended to provide portable, UTF-8 aware
00135 * versions of standard functions
00136 */
00137
00138 /* OD: UTF-8 aware strncasecmp - converts to lower case Unicode and tests */
00139 FL_EXPORT int fl_utf_strncasecmp(const char *s1, const char *s2, int n);
00140
00141 /* OD: UTF-8 aware strcasecmp - converts to Unicode and tests */
00142 FL_EXPORT int fl_utf_strcasecmp(const char *s1, const char *s2);
00143

```

```

00144 /* OD: return the Unicode lower case value of ucs */
00145 FL_EXPORT int fl_tolower(unsigned int ucs);
00146
00147 /* OD: return the Unicode upper case value of ucs */
00148 FL_EXPORT int fl_toupper(unsigned int ucs);
00149
00150 /* OD: converts the UTF-8 string to the lower case equivalent */
00151 FL_EXPORT int fl_utf_tolower(const unsigned char *str, int len, char *buf);
00152
00153 /* OD: converts the UTF-8 string to the upper case equivalent */
00154 FL_EXPORT int fl_utf_toupper(const unsigned char *str, int len, char *buf);
00155
00156 /* OD: Portable UTF-8 aware chmod wrapper */
00157 FL_EXPORT int fl_chmod(const char* f, int mode);
00158
00159 /* OD: Portable UTF-8 aware access wrapper */
00160 FL_EXPORT int fl_access(const char* f, int mode);
00161
00162 /* OD: Portable UTF-8 aware stat wrapper */
00163 FL_EXPORT int fl_stat(const char *path, struct stat *buffer);
00164
00165 /* OD: Portable UTF-8 aware getcwd wrapper */
00166 FL_EXPORT char *fl_getcwd(char *buf, int len);
00167
00168 /* Portable UTF-8 aware chdir wrapper */
00169 FL_EXPORT int fl_chdir(const char *path);
00170
00171 /* OD: Portable UTF-8 aware fopen wrapper */
00172 FL_EXPORT FILE *fl_fopen(const char *f, const char *mode);
00173
00174 /* OD: Portable UTF-8 aware system wrapper */
00175 FL_EXPORT int fl_system(const char* f);
00176
00177 /* OD: Portable UTF-8 aware execvp wrapper */
00178 FL_EXPORT int fl_execvp(const char *file, char *const *argv);
00179
00180 /* OD: Portable UTF-8 aware open wrapper */
00181 FL_EXPORT int fl_open(const char *fname, int oflags, ...);
00182
00183 FL_EXPORT int fl_open_ext(const char *fname, int binary, int oflags, ...);
00184
00185 /* Portable wrapper around unix-style close() function */
00186 FL_EXPORT int fl_close_fd(int fd);
00187
00188 /* OD: Portable UTF-8 aware unlink wrapper */
00189 FL_EXPORT int fl_unlink(const char *fname);
00190
00191 /* OD: Portable UTF-8 aware rmdir wrapper */
00192 FL_EXPORT int fl_rmdir(const char *f);
00193
00194 /* OD: Portable UTF-8 aware getenv wrapper */
00195 FL_EXPORT char* fl_getenv(const char *name);
00196
00197 /* Portable UTF-8 aware putenv wrapper */
00198 FL_EXPORT int fl_putenv(const char *var);
00199
00200 /* OD: Portable UTF-8 aware mkdir wrapper */
00201 FL_EXPORT int fl_mkdir(const char* f, int mode);
00202
00203 /* OD: Portable UTF-8 aware rename wrapper */
00204 FL_EXPORT int fl_rename(const char* f, const char *t);
00205
00206
00207 /* OD: Given a full pathname, this will create the directory path needed to hold the file named */
00208 FL_EXPORT void fl_make_path_for_file( const char *path );
00209
00210 /* OD: recursively create a path in the file system */
00211 FL_EXPORT char fl_make_path( const char *path );
00212
00213
00216 /*****
00217
00218 #ifdef __cplusplus
00219 }
00220 #endif /* __cplusplus */
00221
00222
00223 #endif /* _HAVE_FL_UTF8_HDR_ */

```

13.172 Fl_Valuator.H

```

00001 //
00002 // Valuator header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.

```

```

00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Valuator widget . */
00019
00020 #ifndef FL_Valuator_H
00021 #define FL_Valuator_H
00022
00023 #ifndef FL_Widget_H
00024 #include "Fl_Widget.H"
00025 #endif
00026
00027 // shared type() values for classes that work in both directions:
00028 #define FL_VERTICAL      0
00029 #define FL_HORIZONTAL    1
00030
00047 class FL_EXPORT Fl_Valuator : public Fl_Widget {
00048
00049     double value_;
00050     double previous_value_;
00051     double min, max; // truncates to this range *after* rounding
00052     double A; int B; // rounds to multiples of A/B, or no rounding if A is zero
00053
00054 protected:
00056     int horizontal() const {return type() & FL_HORIZONTAL;}
00057     Fl_Valuator(int X, int Y, int W, int H, const char* L);
00058
00060     double previous_value() const {return previous_value_;}
00062     void handle_push() {previous_value_ = value_;}
00063     double softclamp(double);
00064     void handle_drag(double newvalue);
00065     void handle_release(); // use drag() value
00066     virtual void value_damage(); // cause damage() due to value() changing
00068     void set_value(double v) {value_ = v;}
00069
00070 public:
00071
00073     void bounds(double a, double b) {min=a; max=b;}
00075     double minimum() const {return min;}
00077     void minimum(double a) {min = a;}
00079     double maximum() const {return max;}
00081     void maximum(double a) {max = a;}
00102     void range(double a, double b) {min = a; max = b;}
00104     void step(int a) {A = a; B = 1;}
00106     void step(double a, int b) {A = a; B = b;}
00107     void step(double s);
00119     double step() const {return A/B;}
00120     void precision(int digits);
00121
00123     double value() const {return value_;}
00124     int value(double);
00125
00126     virtual int format(char*);
00127     double round(double); // round to nearest multiple of step
00128     double clamp(double); // keep in range
00129     double increment(double, int); // add n*step to value
00130 };
00131
00132 #endif

```

13.173 Fl_Value_Input.H

```

00001 //
00002 // Value input header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //

```



```

00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Value_Input widget . */
00019
00020 #ifndef Fl_Value_Input_H
00021 #define Fl_Value_Input_H
00022
00023 #include "Fl_Valuator.H"
00024 #include "Fl_Input.H"
00025
00056 class FL_EXPORT Fl_Value_Input : public Fl_Valuator {
00057 public:
00058     /* This is the encapsulated Fl_input attribute to which
00059     this class delegates the value font, color and shortcut */
00060     Fl_Input input;
00061 private:
00062     char soft_;
00063     static void input_cb(Fl_Widget*,void*);
00064     void value_damage() FL_OVERRIDE; // cause damage() due to value() changing
00065 public:
00066     int handle(int) FL_OVERRIDE;
00067 protected:
00068     void draw() FL_OVERRIDE;
00069 public:
00070     void resize(int,int,int,int) FL_OVERRIDE;
00071     Fl_Value_Input(int x,int y,int w,int h,const char *l=0);
00072     ~Fl_Value_Input ();
00073
00075     void soft(char s) {soft_ = s;}
00082     char soft() const {return soft_;}
00087     int shortcut() const {return input.shortcut();}
00105     void shortcut(int s) {input.shortcut(s);}
00106
00108     Fl_Font textfont() const {return input.textfont();}
00110     void textfont(Fl_Font s) {input.textfont(s);}
00112     Fl_Fontsize textsize() const {return input.textsize();}
00114     void textsize(Fl_Fontsize s) {input.textsize(s);}
00116     Fl_Color textcolor() const {return input.textcolor();}
00118     void textcolor(Fl_Color n) {input.textcolor(n);}
00120     Fl_Color cursor_color() const {return input.cursor_color();}
00122     void cursor_color(Fl_Color n) {input.cursor_color(n);}
00123
00124 };
00125
00126 #endif

```

13.174 Fl_Value_Output.H

```

00001 //
00002 // Value output header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Value_Output widget . */
00019
00020 #ifndef Fl_Value_Output_H
00021 #define Fl_Value_Output_H
00022
00023 #ifndef Fl_Valuator_H
00024 #include "Fl_Valuator.H"
00025 #endif
00026
00039 class FL_EXPORT Fl_Value_Output : public Fl_Valuator {
00040     Fl_Font textfont_;
00041     Fl_Fontsize textsize_;
00042     uchar soft_;
00043     Fl_Color textcolor_;
00044
00045 protected:
00046     void draw() FL_OVERRIDE;
00047

```

```

00048 public:
00049     int handle(int) FL_OVERRIDE;
00050     Fl_Value_Output(int x,int y,int w,int h,const char *l=0);
00051
00058     void soft(uchar s) {soft_ = s;}
00065     uchar soft() const {return soft_;}
00066
00068     Fl_Font textfont() const {return textfont_;}
00070     void textfont(Fl_Font s) {textfont_ = s;}
00072     Fl_Fontsize textsize() const {return textsize_;}
00073     void textsize(Fl_Fontsize s) {textsize_ = s;}
00075     Fl_Color textcolor() const {return textcolor_;}
00077     void textcolor(Fl_Color s) {textcolor_ = s;}
00078 };
00079
00080 #endif

```

13.175 Fl_Value_Slider.H

```

00001 //
00002 // Value Slider header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_Value_Slider widget . */
00019
00020 #ifndef Fl_Value_Slider_H
00021 #define Fl_Value_Slider_H
00022
00023 #include "Fl_Slider.H"
00024
00031 class FL_EXPORT Fl_Value_Slider : public Fl_Slider {
00032     Fl_Font textfont_;
00033     Fl_Fontsize textsize_;
00034     Fl_Color textcolor_;
00035     short value_width_;
00036     short value_height_;
00037
00038 protected:
00039     void draw() FL_OVERRIDE;
00040
00041 public:
00042     int handle(int) FL_OVERRIDE;
00043     Fl_Value_Slider(int x, int y, int w, int h, const char *l = 0);
00044
00046     Fl_Font textfont() const { return textfont_; }
00047
00049     void textfont(Fl_Font s) { textfont_ = s; }
00050
00052     Fl_Fontsize textsize() const { return textsize_; }
00053
00055     void textsize(Fl_Fontsize s) { textsize_ = s; }
00056
00058     Fl_Color textcolor() const { return textcolor_; }
00059
00061     void textcolor(Fl_Color s) { textcolor_ = s; }
00062
00078     void value_width(int s) {
00079         if (s > w() - 10)
00080             s = w() - 10;
00081         if (s < 10)
00082             s = 10;
00083         value_width_ = (short)s;
00084     }
00085
00090     int value_width() const { return (value_width_); }
00091
00107     void value_height(int s) {
00108         if (s > h() - 10)
00109             s = h() - 10;
00110         if (s < 10)
00111             s = 10;
00112         value_height_ = (short)s;

```

```

00113     }
00118     int value_height() const { return (value_height_); }
00119 };
00120
00121 #endif

```

13.176 FI_Widget.H File Reference

[FI_Widget](#) and [FI_Label](#) classes.

```
#include "Fl.H"
```

Classes

- class [FI_Callback_User_Data](#)
A class prototype that allows for additional data in callbacks.
- struct [FI_Label](#)
This struct stores all information for a text or mixed graphics label.
- class [FI_Widget](#)
FI_Widget is the base class for all widgets in FLTK.

Macros

- #define [FL_RESERVED_TYPE](#) 100
Reserved type numbers (necessary for my cheapo RTTI) start here.

Typedefs

- typedef void() [FI_Callback](#)([FI_Widget](#) *, void *)
Default callback type definition for all fltk widgets (by far the most used)
- typedef void() [FI_Callback0](#)([FI_Widget](#) *)
One parameter callback type definition passing only the widget.
- typedef void() [FI_Callback1](#)([FI_Widget](#) *, long)
Callback type definition passing the widget and a long data value.
- typedef [FI_Callback](#) * [FI_Callback_p](#)
Default callback type pointer definition for all fltk widgets.

13.176.1 Detailed Description

[FI_Widget](#) and [FI_Label](#) classes.

13.176.2 Macro Definition Documentation

13.176.2.1 FL_RESERVED_TYPE

```
#define FL_RESERVED_TYPE 100
```

Reserved type numbers (necessary for my cheapo RTTI) start here.

Grep the header files for "RESERVED_TYPE" to find the next available number.

13.177 FI_Widget.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Widget header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2024 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this

```

```

00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00022 #ifndef FL_Widget_H
00023 #define FL_Widget_H
00024
00025 #include "Fl.H"
00026
00027 class Fl_Widget;
00028 class Fl_Window;
00029 class Fl_Group;
00030 class Fl_Image;
00031
00033 typedef void (Fl_Callback ) (Fl_Widget*, void*);
00035 typedef Fl_Callback* Fl_Callback_p; // needed for BORLAND
00037 typedef void (Fl_Callback0) (Fl_Widget*);
00039 typedef void (Fl_Callback1) (Fl_Widget*, long);
00040
00049 struct FL_EXPORT Fl_Label {
00051     const char* value;
00053     Fl_Image* image;
00055     Fl_Image* deimage;
00057     Fl_Font font;
00059     Fl_Fontsize size;
00061     Fl_Color color;
00063     Fl_Align align_;
00065     uchar type;
00066
00068     void draw(int,int,int,int, Fl_Align) const ;
00069     void measure(int &w, int &h) const ;
00070 };
00071
00072
00086 class Fl_Callback_User_Data {
00087 public:
00088     virtual ~Fl_Callback_User_Data() { }
00089 };
00090
00091
00104 class FL_EXPORT Fl_Widget {
00105     friend class Fl_Group;
00106
00107     Fl_Group* parent_;
00108     Fl_Callback* callback_;
00109     void* user_data_;
00110     int x_, y_, w_, h_;
00111     Fl_Label label_;
00112     unsigned int flags_;
00113     Fl_Color color_;
00114     Fl_Color color2_;
00115     uchar type_;
00116     uchar damage_;
00117     uchar box_;
00118     uchar when_;
00119
00120     const char *tooltip_;
00121
00123     Fl_Widget(const Fl_Widget &);
00125     Fl_Widget& operator=(const Fl_Widget &);
00126
00127 protected:
00128
00139     Fl_Widget(int x, int y, int w, int h, const char *label=0L);
00140
00142     void x(int v) {x_ = v;}
00144     void y(int v) {y_ = v;}
00146     void w(int v) {w_ = v;}
00148     void h(int v) {h_ = v;}
00150     unsigned int flags() const {return flags_;}
00152     void set_flag(unsigned int c) {flags_ |= c;}
00154     void clear_flag(unsigned int c) {flags_ &= ~c;}
00158     enum {
00159         INACTIVE           = 1<<0,
00160         INVISIBLE          = 1<<1,
00161         OUTPUT             = 1<<2,
00162         NOBORDER           = 1<<3,
00163         FORCE_POSITION      = 1<<4,
00164         NON_MODAL          = 1<<5,
00165         SHORTCUT_LABEL     = 1<<6,
00166         CHANGED            = 1<<7,
00167         OVERRIDE           = 1<<8,

```

```

00168     VISIBLE_FOCUS      = 1<<9,
00169     COPIED_LABEL       = 1<<10,
00170     CLIP_CHILDREN      = 1<<11,
00171     MENU_WINDOW        = 1<<12,
00172     TOOLTIP_WINDOW     = 1<<13,
00173     MODAL               = 1<<14,
00174     NO_OVERLAY         = 1<<15,
00175     GROUP_RELATIVE     = 1<<16,
00176     COPIED_TOOLTIP     = 1<<17,
00177     FULLSCREEN         = 1<<18,
00178     MAC_USE_ACCENTS_MENU = 1<<19,
00179     NEEDS_KEYBOARD     = 1<<20,
00180     IMAGE_BOUND        = 1<<21,
00181     DEIMAGE_BOUND      = 1<<22,
00182     AUTO_DELETE_USER_DATA = 1<<23,
00183     MAXIMIZED          = 1<<24,
00184     POPUP              = 1<<25,
00185     // Note to devs: add new FLTK core flags above this line (up to 1<<28).
00186
00187     // Three more flags, reserved for user code
00188
00189     USERFLAG3          = 1<<29,
00190     USERFLAG2          = 1<<30,
00191     USERFLAG1          = 1<<31
00192 };
00193 void draw_box() const;
00194 void draw_box(Fl_Boxtype t, Fl_Color c) const;
00195 void draw_box(Fl_Boxtype t, int x,int y,int w,int h, Fl_Color c) const;
00196 void draw_backdrop() const;
00197
00203 void draw_focus() const {
00204     draw_focus(box(), x(), y(), w(), h(), color());
00205 }
00206
00212 void draw_focus(Fl_Boxtype t, int X, int Y, int W, int H) const {
00213     draw_focus(t, X, Y, W, H, color());
00214 }
00215
00216 // See documentation in Fl_Widget.cxx
00217 void draw_focus(Fl_Boxtype t, int x, int y, int w, int h, Fl_Color bg) const;
00218
00219 void draw_label() const;
00220 void draw_label(int, int, int, int) const;
00221
00222 public:
00223
00232 virtual ~Fl_Widget();
00233
00250 virtual void draw() = 0;
00251
00281 virtual int handle(int event);
00282
00291 int is_label_copied() const {return ((flags_ & COPIED_LABEL) ? 1 : 0);}
00292
00307 void needs_keyboard(bool needs) {
00308     if (needs) set_flag(NEEDS_KEYBOARD);
00309     else clear_flag(NEEDS_KEYBOARD);
00310 }
00311
00317 bool needs_keyboard() const {
00318     return (flags_ & NEEDS_KEYBOARD);
00319 }
00320
00326 Fl_Group* parent() const {return parent_;}
00327
00336 void parent(Fl_Group* p) {parent_ = p;} // for hacks only, use Fl_Group::add()
00337
00343 uchar type() const {return type_;}
00344
00348 void type(uchar t) {type_ = t;}
00349
00353 int x() const {return x_;}
00354
00358 int y() const {return y_;}
00359
00363 int w() const {return w_;}
00364
00368 int h() const {return h_;}
00369
00389 virtual void resize(int x, int y, int w, int h);
00390
00392 int damage_resize(int,int,int,int);
00393
00401 void position(int X,int Y) {resize(X,Y,w_,h_);}
00402
00410 void size(int W,int H) {resize(x_,y_,W,H);}
00411

```

```

00417 Fl_Align align() const {return label_.align_;}
00418
00426 void align(Fl_Align alignment) {label_.align_ = alignment;}
00427
00432 Fl_Boxtype box() const {return (Fl_Boxtype)box_;}
00433
00441 void box(Fl_Boxtype new_box) {box_ = new_box;}
00442
00447 Fl_Color color() const {return color_;}
00448
00459 void color(Fl_Color bg) {color_ = bg;}
00460
00465 Fl_Color selection_color() const {return color2_;}
00466
00475 void selection_color(Fl_Color a) {color2_ = a;}
00476
00484 void color(Fl_Color bg, Fl_Color sel) {color_=bg; color2_=sel;}
00485
00490 const char* label() const {return label_.value;}
00491
00503 void label(const char* text);
00504
00515 void copy_label(const char *new_label);
00516
00520 void label(Fl_Labeltype a, const char* b) {label_.type = a; label_.value = b;}
00521
00526 Fl_Labeltype labeltype() const {return (Fl_Labeltype)label_.type;}
00527
00536 void labeltype(Fl_Labeltype a) {label_.type = a;}
00537
00542 Fl_Color labelcolor() const {return label_.color;}
00543
00548 void labelcolor(Fl_Color c) {label_.color=c;}
00549
00557 Fl_Font labelfont() const {return label_.font;}
00558
00566 void labelfont(Fl_Font f) {label_.font=f;}
00567
00572 Fl_Fontsize labelsize() const {return label_.size;}
00573
00578 void labelsize(Fl_Fontsize pix) {label_.size=pix;}
00579
00583 Fl_Image* image() {return label_.image;}
00584
00588 const Fl_Image* image() const {return label_.image;}
00589
00605 void image(Fl_Image* img);
00606
00611 void image(Fl_Image& img);
00612
00628 void bind_image(Fl_Image* img);
00629
00634 void bind_image(int f) { if (f) set_flag(IMAGE_BOUND); else clear_flag(IMAGE_BOUND); }
00635
00641 int image_bound() const {return ((flags_ & IMAGE_BOUND) ? 1 : 0);}
00642
00646 Fl_Image* deimage() {return label_.deimage;}
00647
00651 const Fl_Image* deimage() const {return label_.deimage;}
00652
00659 void deimage(Fl_Image* img);
00660
00665 void deimage(Fl_Image& img);
00666
00673 void bind_deimage(Fl_Image* img);
00674
00680 int deimage_bound() const {return ((flags_ & DEIMAGE_BOUND) ? 1 : 0);}
00681
00686 void bind_deimage(int f) { if (f) set_flag(DEIMAGE_BOUND); else clear_flag(DEIMAGE_BOUND); }
00687
00692 const char *tooltip() const {return tooltip_;}
00693
00694 void tooltip(const char *text); // see Fl_Tooltip
00695 void copy_tooltip(const char *text); // see Fl_Tooltip
00696
00701 Fl_Callback_p callback() const {return callback_;}
00702
00708 void callback(Fl_Callback* cb, void* p) {
00709     callback_ = cb;
00710     user_data(p);
00711 }
00712
00720 void callback(Fl_Callback* cb, Fl_Callback_User_Data* p, bool auto_free) {
00721     callback_ = cb;
00722     user_data(p, auto_free);
00723 }
00724

```

```

00729 void callback(Fl_Callback* cb) {callback_ = cb;}
00730
00735 void callback(Fl_Callback0* cb) {
00736     callback_ = (Fl_Callback*)(fl_intptr_t) (cb);
00737 }
00738
00744 void callback(Fl_Callback1* cb, long p = 0) {
00745     callback_ = (Fl_Callback*)(fl_intptr_t) (cb);
00746     user_data((void*)(fl_intptr_t)p);
00747 }
00748
00753 void* user_data() const {return user_data_;}
00754
00756 void user_data(void* v);
00757
00759 void user_data(Fl_Callback_User_Data* v, bool auto_free);
00760
00772 long argument() const {return (long)(fl_intptr_t)user_data_;}
00773
00778 void argument(long v) {user_data((void*)(fl_intptr_t)v);}
00779
00788 Fl_When when() const {return (Fl_When)when_;}
00789
00827 void when(uchar i) {when_ = i;}
00828
00833 unsigned int visible() const {return !(flags_&INVISIBLE);}
00834
00839 int visible_r() const;
00840
00858 virtual void show();
00859
00863 virtual void hide();
00864
00869 void set_visible() {flags_ &= ~INVISIBLE;}
00870
00875 void clear_visible() {flags_ |= INVISIBLE;}
00876
00881 unsigned int active() const {return !(flags_&INACTIVE);}
00882
00887 int active_r() const;
00888
00894 void activate();
00895
00910 void deactivate();
00911
00920 unsigned int output() const {return (flags_&OUTPUT);}
00921
00925 void set_output() {flags_ |= OUTPUT;}
00926
00930 void clear_output() {flags_ &= ~OUTPUT;}
00931
00937 unsigned int takeevents() const {return !(flags_&(INACTIVE|INVISIBLE|OUTPUT));}
00938
00957 unsigned int changed() const {return flags_ & CHANGED;}
00958
00962 void set_changed() {flags_ |= CHANGED;}
00963
00967 void clear_changed() {flags_ &= ~CHANGED;}
00968
00973 void clear_active() {flags_ |= INACTIVE;}
00974
00979 void set_active() {flags_ &= ~INACTIVE;}
00980
00988 int take_focus();
00989
00996 void set_visible_focus() { flags_ |= VISIBLE_FOCUS; }
00997
01002 void clear_visible_focus() { flags_ &= ~VISIBLE_FOCUS; }
01003
01008 void visible_focus(int v) { if (v) set_visible_focus(); else clear_visible_focus(); }
01009
01014 unsigned int visible_focus() const { return flags_ & VISIBLE_FOCUS; }
01015
01036 static void default_callback(Fl_Widget *widget, void *data);
01037
01050 void do_callback(Fl_Callback_Reason reason=FL_REASON_UNKNOWN) {do_callback(this, user_data_,
reason);}
01051
01059 void do_callback(Fl_Widget *widget, long arg, Fl_Callback_Reason reason=FL_REASON_UNKNOWN) {
01060     do_callback(widget, (void*)(fl_intptr_t)arg, reason);
01061 }
01062
01063 void do_callback(Fl_Widget *widget, void *arg = 0, Fl_Callback_Reason reason=FL_REASON_UNKNOWN);
01064
01065 /* Internal use only. */
01066 int test_shortcut();
01067 /* Internal use only. */

```

```

01068     static unsigned int label_shortcut(const char *t);
01069     /* Internal use only. */
01070     static int test_shortcut(const char*, const bool require_alt = false);
01071     /* Internal use only. */
01072     void _set_fullscreen() {flags_ |= FULLSCREEN;}
01073     void _clear_fullscreen() {flags_ &= ~FULLSCREEN;}
01074
01080     int contains(const Fl_Widget *w) const ;
01081
01088     int inside(const Fl_Widget *wgt) const {return wgt ? wgt->contains(this) : 0;}
01089
01093     void redraw();
01094
01099     void redraw_label();
01100
01107     uchar damage() const {return damage_;}
01108
01121     void clear_damage(uchar c = 0) {damage_ = c;}
01122
01128     void damage(uchar c);
01129
01136     void damage(uchar c, int x, int y, int w, int h);
01137
01138     void draw_label(int, int, int, int, Fl_Align) const;
01139
01147     void measure_label(int& ww, int& hh) const {label_.measure(ww, hh);}
01148
01149     Fl_Window* window() const ;
01150     Fl_Window* top_window() const;
01151     Fl_Window* top_window_offset(int& xoff, int& yoff) const;
01152
01176     virtual Fl_Group* as_group() { return NULL; }
01177     virtual Fl_Group const* as_group() const { return NULL; }
01178
01191     virtual Fl_Window* as_window() { return 0; }
01192     virtual Fl_Window const* as_window() const { return NULL; }
01193
01204     virtual class Fl_Gl_Window* as_gl_window() { return NULL; }
01205     virtual class Fl_Gl_Window const* as_gl_window() const { return NULL; }
01206
01209     int use_accents_menu() { return flags() & MAC_USE_ACCENTS_MENU; }
01210
01214     Fl_Color color2() const {return (Fl_Color)color2_;}
01215
01219     void color2(unsigned a) {color2_ = a;}
01220
01232     void shortcut_label(int value) {
01233         if (value)
01234             set_flag(SHORTCUT_LABEL);
01235         else
01236             clear_flag(SHORTCUT_LABEL);
01237     }
01238
01241     int shortcut_label() const { return flags_ & SHORTCUT_LABEL; }
01242 };
01243
01249 #define FL_RESERVED_TYPE 100
01250
01251 #endif

```

13.178 Fl_Widget_Surface.H

```

00001 //
00002 // Drivers code for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2016 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Widget_Surface_h
00018 #define Fl_Widget_Surface_h
00019
00020 #include <FL/Fl_Device.H>
00021 #include <FL/Fl_Window.H>
00022
00025 class FL_EXPORT Fl_Widget_Surface : public Fl_Surface_Device {

```



```

00026 private:
00027     void traverse(Fl_Widget *widget); // finds subwindows of widget and prints them
00028 protected:
00030     int x_offset;
00032     int y_offset;
00033     Fl_Widget_Surface(Fl_Graphics_Driver *d);
00034 public:
00035     virtual void translate(int x, int y);
00036     virtual void untranslate();
00037     void draw(Fl_Widget* widget, int delta_x = 0, int delta_y = 0);
00038     void draw_decorated_window(Fl_Window *win, int x_offset = 0, int y_offset = 0);
00039     void print_window_part(Fl_Window *win, int x, int y, int w, int h, int delta_x = 0, int delta_y =
0);
00040     virtual int printable_rect(int *w, int *h);
00041     virtual void origin(int x, int y);
00042     virtual void origin(int *x, int *y);
00043 };
00044
00045 #endif /* Fl_Widget_Surface_h */

```

13.179 Fl_Window.H File Reference

[Fl_Window](#) widget .

```

#include <FL/Fl.H>
#include <FL/Fl_Group.H>
#include <FL/Fl_Bitmap.H>

```

Classes

- class [Fl_Window](#)
This widget produces an actual window.

Macros

- #define `FL_DOUBLE_WINDOW` 0xF1
double window type id
- #define `FL_WINDOW` 0xF0
window type id: all subclasses have type() >= this

13.179.1 Detailed Description

[Fl_Window](#) widget .

13.180 Fl_Window.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Window header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00020 #ifndef Fl_Window_H
00021 #define Fl_Window_H
00022
00023 #include <FL/Fl.H>
00024 #include <FL/Fl_Group.H>
00025 #include <FL/Fl_Bitmap.H>
00026

```

```

00027 #define FL_WINDOW 0xF0
00028 #define FL_DOUBLE_WINDOW 0xF1
00029
00030 class Fl_X;
00031 class Fl_Window_Driver;
00032 class Fl_RGB_Image;
00033 class Fl_Double_Window;
00034
00055 class FL_EXPORT Fl_Window : public Fl_Group {
00056     friend class Fl_X;
00057     friend class Fl_Window_Driver;
00058 private:
00059     static char *default_xclass_;
00060     static char show_next_window_ionic_; // 1 means create next window in ionic form
00061
00062     int no_fullscreen_x;
00063     int no_fullscreen_y;
00064     int no_fullscreen_w;
00065     int no_fullscreen_h;
00066     int fullscreen_screen_top;
00067     int fullscreen_screen_bottom;
00068     int fullscreen_screen_left;
00069     int fullscreen_screen_right;
00070
00071     // TODO: it would make sense to merge the use of Fl_X and Fl_Window_Driver, maybe simply by
00072     // TODO: deriving Fl_Window_Driver from Fl_X. However, there are a lot of historic kludges
00073     // TODO: for some platforms around Fl_X.
00074     Fl_X *flx_; // points at the system-specific stuff, but exists only after the window is mapped
00075     Fl_Window_Driver *pWindowDriver; // points at the system-specific stuff at window creation time
00076
00077     const char* iconlabel_;
00078     char* xclass_;
00079
00080     // private size_range stuff:
00081     int minw_, minh_, maxw_, maxh_;
00082     int dw_, dh_, aspect_;
00083     uchar size_range_set_; // true (1) if size_range() has been set or calculated
00084
00085     // cursor stuff
00086     Fl_Cursor cursor_default;
00087
00088     void _Fl_Window(); // constructor innards
00089
00090     // unimplemented copy ctor and assignment operator
00091     Fl_Window(const Fl_Window&);
00092     Fl_Window& operator=(const Fl_Window&);
00093
00094     void is_maximized_(bool b);
00095
00096 protected:
00097
00099     static Fl_Window *current_;
00100     void draw() FL_OVERRIDE;
00102     virtual void flush();
00103
00112     void force_position(int force) {
00113         if (force) set_flag(FORCE_POSITION);
00114         else clear_flag(FORCE_POSITION);
00115     }
00124     int force_position() const { return ((flags() & FORCE_POSITION)?1:0); }
00125
00126     void free_icons();
00127
00128     void default_size_range(); // calculate size_range() if not set explicitly
00129     int is_resizable(); // calculate size_range() and return whether this is resizable
00130
00131 public:
00132
00161     Fl_Window(int w, int h, const char *title = 0);
00180     Fl_Window(int x, int y, int w, int h, const char *title = 0);
00189     virtual ~Fl_Window();
00190
00191     int handle(int) FL_OVERRIDE;
00192
00209     void resize(int X,int Y,int W,int H) FL_OVERRIDE;
00214     void border(int b);
00219     void clear_border() {set_flag(NO BORDER);}
00221     unsigned int border() const {return !(flags() & NO BORDER);}
00223     void set_override() {set_flag(NO BORDER|OVERRIDE);}
00225     unsigned int override() const { return flags()&OVERRIDE; }
00234     void set_modal() {set_flag(MODAL);}
00236     unsigned int modal() const {return flags() & MODAL;}
00243     void set_non_modal() {set_flag(NON_MODAL);}
00245     unsigned int non_modal() const {return flags() & (NON_MODAL|MODAL);}
00246
00284     void clear_modal_states() {clear_flag(NON_MODAL | MODAL);}
00285

```

```

00299 void set_menu_window()          {set_flag(MENU_WINDOW);}
00300
00302 unsigned int menu_window() const {return flags() & MENU_WINDOW;}
00303
00320 void set_tooltip_window()        { set_flag(TOOLTIP_WINDOW);
00321                                   clear_flag(MENU_WINDOW); }
00323 unsigned int tooltip_window() const {return flags() & TOOLTIP_WINDOW;}
00324
00332 void hotspot(int x, int y, int offscreen = 0);
00334 void hotspot(const Fl_Widget*, int offscreen = 0);
00336 void hotspot(const Fl_Widget& p, int offscreen = 0) {hotspot(&p,offscreen);}
00337
00346 void free_position() {clear_flag(FORCE_POSITION);}
00347
00348 void size_range(int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0);
00349
00351 const char* label() const        {return Fl_Widget::label();}
00353 const char* iconlabel() const    {return iconlabel_;}
00355 void label(const char*);
00357 void iconlabel(const char*);
00359 void label(const char* label, const char* iconlabel); // platform dependent
00360 void copy_label(const char* a);
00361
00362 static void default_xclass(const char*);
00363 static const char *default_xclass();
00364 const char* xclass() const;
00365 void xclass(const char* c);
00366
00367 static void default_icon(const Fl_RGB_Image*);
00368 static void default_icons(const Fl_RGB_Image*[], int);
00369 void icon(const Fl_RGB_Image*);
00370 void icons(const Fl_RGB_Image*[], int);
00371
00372 #if defined(_WIN32) || defined(FL_DOXYGEN)
00373 typedef struct HICON__* HICON;
00374 // These 2 member functions break the driver model but are kept for back compatibility.
00375 // They are implemented in Fl_win32.cxx
00376
00396 static void default_icons(HICON big_icon, HICON small_icon);
00397
00406 void icons(HICON big_icon, HICON small_icon);
00407 #endif // defined(_WIN32) || defined(FL_DOXYGEN)
00408
00409 /* for legacy compatibility */
00410 const void* icon() const;
00411 void icon(const void * ic);
00412
00418 int shown() {return flx_ != 0;}
00445 void show() FL_OVERRIDE;
00450 void hide() FL_OVERRIDE;
00471 void show(int argc, char **argv);
00472
00473 // Enables synchronous show(), docs in Fl_Window.cxx
00474 void wait_for_expose();
00475
00487 void fullscreen();
00491 void fullscreen_off();
00496 void fullscreen_off(int X,int Y,int W,int H);
00500 unsigned int fullscreen_active() const { return flags() & FULLSCREEN; }
00511 void fullscreen_screens(int top, int bottom, int left, int right);
00512
00513 void maximize();
00514 void un_maximize();
00516 unsigned int maximize_active() const { return flags() & MAXIMIZED; }
00517 public:
00533 void iconize();
00534
00535 int x_root() const ;
00536 int y_root() const ;
00537
00538 static Fl_Window *current();
00548 void make_current();
00549
00550 void cursor(Fl_Cursor);
00551 void cursor(const Fl_RGB_Image*, int, int);
00552 void default_cursor(Fl_Cursor);
00553
00554 /* for legacy compatibility */
00555 void cursor(Fl_Cursor c, Fl_Color, Fl_Color=FL_WHITE);
00556 void default_cursor(Fl_Cursor c, Fl_Color, Fl_Color=FL_WHITE);
00557
00558 static void default_callback(Fl_Window*, void* v);
00559
00565 int decorated_w() const;
00566
00580 int decorated_h() const;
00581

```

```

00582 // Note: Doxygen docs in Fl_Widget.H to avoid redundancy.
00583 Fl_Window* as_window() FL_OVERRIDE { return this; }
00584 Fl_Window const* as_window() const FL_OVERRIDE { return this; }
00585
00589 virtual class Fl_Overlay_Window *as_overlay_window() {return 0L; }
00590
00594 virtual class Fl_Double_Window *as_double_window() {return 0L;}
00595
00596 void shape(const Fl_Image* img);
00597 void shape(const Fl_Image& b);
00598 const Fl_Image *shape();
00599 void draw_backdrop();
00600 int screen_num();
00601 void screen_num(int screen_num);
00602 static bool is_a_rescale();
00603 fl_uintptr_t os_id();
00604
00612 static void show_next_window_ionic(char stat) {
00613     show_next_window_ionic_ = stat ? 1 : 0;
00614 }
00615
00623 static char show_next_window_ionic() {
00624     return show_next_window_ionic_;
00625 }
00626 };
00627
00628 #endif

```

13.181 Fl_Wizard.H

```

00001 //
00002 // Fl_Wizard widget definitions.
00003 //
00004 // Copyright 1999-2010 by Easy Software Products.
00005 // Copyright 2011-2020 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00018 /* \file
00019    Fl_Wizard widget . */
00020
00021 //
00022 // Include necessary header files...
00023 //
00024
00025 #ifndef _Fl_Wizard_H_
00026 #define _Fl_Wizard_H_
00027
00028 #include <FL/Fl_Group.H>
00029
00040 class FL_EXPORT Fl_Wizard : public Fl_Group {
00041
00042     Fl_Widget *value_;
00043
00044 protected:
00045
00046     void draw() FL_OVERRIDE;
00047
00048 public:
00049
00050     Fl_Wizard(int, int, int, int, const char * = 0);
00051
00052     void next();
00053     void prev();
00054     Fl_Widget *value();
00055     void value(Fl_Widget *);
00056 };
00057
00058 #endif // !_Fl_Wizard_H_

```

13.182 Fl_XBM_Image.H

```

00001 //

```

```

00002 // XBM image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_XBM_Image class . */
00019
00020 #ifndef Fl_XBM_Image_H
00021 #define Fl_XBM_Image_H
00022 # include "Fl_Bitmap.H"
00023
00028 class FL_EXPORT Fl_XBM_Image : public Fl_Bitmap {
00029
00030     public:
00031
00032     Fl_XBM_Image(const char* filename);
00033 };
00034
00035 #endif // !Fl_XBM_Image_H

```

13.183 Fl_XPM_Image.H

```

00001 //
00002 // XPM image header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /* \file
00018     Fl_XPM_Image class . */
00019
00020 #ifndef Fl_XPM_Image_H
00021 #define Fl_XPM_Image_H
00022 # include "Fl_Pixmap.H"
00023
00029 class FL_EXPORT Fl_XPM_Image : public Fl_Pixmap {
00030
00031     public:
00032
00033     Fl_XPM_Image(const char* filename);
00034 };
00035
00036 #endif // !Fl_XPM_Image

```

13.184 forms.H

```

00001 //
00002 // Forms emulation header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php

```

```

00015 //
00016
00017 #ifndef __FORMS_H__
00018 #define __FORMS_H__
00019
00020 #include "Fl.H"
00021 #include "Fl_Group.H"
00022 #include "Fl_Window.H"
00023 #include "fl_draw.H"
00024
00025 typedef Fl_Widget FL_OBJECT;
00026 typedef Fl_Window FL_FORM;
00027
00028 // Random constants & symbols defined by forms.h file:
00030
00031 #ifndef NULL
00032 #define NULL 0
00033 #endif
00034 #ifndef FALSE
00035 #define FALSE 0
00036 #define TRUE 1
00037 #endif
00038
00039 #define FL_ON 1
00040 #define FL_OK 1
00041 #define FL_VALID 1
00042 #define FL_PREEMPT 1
00043 #define FL_AUTO 2
00044 #define FL_WHEN_NEEDED FL_AUTO
00045 #define FL_OFF 0
00046 #define FL_NONE 0
00047 #define FL_CANCEL 0
00048 #define FL_INVALID 0
00049 #define FL_IGNORE -1
00050 // #define FL_CLOSE -2 // this variable is never used in FLTK Forms. It is removed
00051 // because it conflicts with the window FL_CLOSE event
00052
00053 #define FL_LCOL FL_BLACK
00054 #define FL_COL1 FL_GRAY
00055 #define FL_MCOL FL_LIGHT1
00056 #define FL_LEFT_BCOL FL_LIGHT3 // 53 is better match
00057 #define FL_TOP_BCOL FL_LIGHT2 // 51
00058 #define FL_BOTTOM_BCOL FL_DARK2 // 40
00059 #define FL_RIGHT_BCOL FL_DARK3 // 36
00060 #define FL_INACTIVE FL_INACTIVE_COLOR
00061 #define FL_INACTIVE_COL FL_INACTIVE_COLOR
00062 #define FL_FREE_COL1 FL_FREE_COLOR
00063 #define FL_FREE_COL2 ((Fl_Color)(FL_FREE_COLOR+1))
00064 #define FL_FREE_COL3 ((Fl_Color)(FL_FREE_COLOR+2))
00065 #define FL_FREE_COL4 ((Fl_Color)(FL_FREE_COLOR+3))
00066 #define FL_FREE_COL5 ((Fl_Color)(FL_FREE_COLOR+4))
00067 #define FL_FREE_COL6 ((Fl_Color)(FL_FREE_COLOR+5))
00068 #define FL_FREE_COL7 ((Fl_Color)(FL_FREE_COLOR+6))
00069 #define FL_FREE_COL8 ((Fl_Color)(FL_FREE_COLOR+7))
00070 #define FL_FREE_COL9 ((Fl_Color)(FL_FREE_COLOR+8))
00071 #define FL_FREE_COL10 ((Fl_Color)(FL_FREE_COLOR+9))
00072 #define FL_FREE_COL11 ((Fl_Color)(FL_FREE_COLOR+10))
00073 #define FL_FREE_COL12 ((Fl_Color)(FL_FREE_COLOR+11))
00074 #define FL_FREE_COL13 ((Fl_Color)(FL_FREE_COLOR+12))
00075 #define FL_FREE_COL14 ((Fl_Color)(FL_FREE_COLOR+13))
00076 #define FL_FREE_COL15 ((Fl_Color)(FL_FREE_COLOR+14))
00077 #define FL_FREE_COL16 ((Fl_Color)(FL_FREE_COLOR+15))
00078 #define FL_TOMATO ((Fl_Color)(131))
00079 #define FL_INDIANRED ((Fl_Color)(164))
00080 #define FL_SLATEBLUE ((Fl_Color)(195))
00081 #define FL_DARKGOLD ((Fl_Color)(84))
00082 #define FL_PALEGREEN ((Fl_Color)(157))
00083 #define FL_ORCHID ((Fl_Color)(203))
00084 #define FL_DARKCYAN ((Fl_Color)(189))
00085 #define FL_DARKTOMATO ((Fl_Color)(113))
00086 #define FL_WHEAT ((Fl_Color)(174))
00087
00088 #define FL_ALIGN_BESIDE FL_ALIGN_INSIDE
00089
00090 #define FL_PUP_TOGGLE 2 // FL_MENU_TOGGLE
00091 #define FL_PUP_INACTIVE 1 // FL_MENU_INACTIVE
00092 #define FL_NO_FRAME FL_NO_BOX
00093 #define FL_ROUNDED3D_UPBOX FL_ROUND_UP_BOX
00094 #define FL_ROUNDED3D_DOWNBOX FL_ROUND_DOWN_BOX
00095 #define FL_OVAL3D_UPBOX FL_ROUND_UP_BOX
00096 #define FL_OVAL3D_DOWNBOX FL_ROUND_DOWN_BOX
00097
00098 #define FL_MBUTTON1 1
00099 #define FL_LEFTMOUSE 1
00100 #define FL_MBUTTON2 2
00101 #define FL_MIDDLEMOUSE 2
00102 #define FL_MBUTTON3 3

```

```

00103 #define FL_RIGHTMOUSE 3
00104 #define FL_MBUTTON4 4
00105 #define FL_MBUTTON5 5
00106
00107 #define FL_INVALID_STYLE 255
00108 #define FL_NORMAL_STYLE FL_HELVETICA
00109 #define FL_BOLD_STYLE FL_HELVETICA_BOLD
00110 #define FL_ITALIC_STYLE FL_HELVETICA_ITALIC
00111 #define FL_BOLDITALIC_STYLE FL_HELVETICA_BOLD_ITALIC
00112 #define FL_FIXED_STYLE FL_COURIER
00113 #define FL_FIXEDBOLD_STYLE FL_COURIER_BOLD
00114 #define FL_FIXEDITALIC_STYLE FL_COURIER_ITALIC
00115 #define FL_FIXEDBOLDITALIC_STYLE FL_COURIER_BOLD_ITALIC
00116 #define FL_TIMES_STYLE FL_TIMES
00117 #define FL_TIMESBOLD_STYLE FL_TIMES_BOLD
00118 #define FL_TIMESITALIC_STYLE FL_TIMES_ITALIC
00119 #define FL_TIMESBOLDITALIC_STYLE FL_TIMES_BOLD_ITALIC
00120
00121 // hacks to change the labeltype() when passed to fl_set_object_lstyle():
00122 #define FL_SHADOW_STYLE (FL_SHADOW_LABEL<<8)
00123 #define FL_ENGRAVED_STYLE (FL_ENGRAVED_LABEL<<8)
00124 #define FL_EMBOSSSED_STYLE (FL_EMBOSSSED_LABEL<<0)
00125
00126 // size values are different from XForms, match older Forms:
00127 #define FL_TINY_SIZE 8
00128 #define FL_SMALL_SIZE 11 // 10
00129 // #define FL_NORMAL_SIZE 14 // 12
00130 #define FL_MEDIUM_SIZE 18 // 14
00131 #define FL_LARGE_SIZE 24 // 18
00132 #define FL_HUGE_SIZE 32 // 24
00133 #define FL_DEFAULT_SIZE FL_SMALL_SIZE
00134 #define FL_TINY_FONT FL_TINY_SIZE
00135 #define FL_SMALL_FONT FL_SMALL_SIZE
00136 #define FL_NORMAL_FONT FL_NORMAL_SIZE
00137 #define FL_MEDIUM_FONT FL_MEDIUM_SIZE
00138 #define FL_LARGE_FONT FL_LARGE_SIZE
00139 #define FL_HUGE_FONT FL_HUGE_SIZE
00140 #define FL_NORMAL_FONT1 FL_SMALL_FONT
00141 #define FL_NORMAL_FONT2 FL_NORMAL_FONT
00142 #define FL_DEFAULT_FONT FL_SMALL_FONT
00143
00144 #define FL_RETURN_END_CHANGED FL_WHEN_RELEASE
00145 #define FL_RETURN_CHANGED FL_WHEN_CHANGED
00146 #define FL_RETURN_END FL_WHEN_RELEASE_ALWAYS
00147 #define FL_RETURN_ALWAYS (FL_WHEN_CHANGED|FL_WHEN_NOT_CHANGED)
00148
00149 #define FL_BOUND_WIDTH 3
00150
00151 typedef int FL_Coord;
00152 typedef int FL_COLOR;
00153
00155 // fltk interaction:
00156
00157 #define FL_CMD_OPT void
00158 extern FL_EXPORT void fl_initialize(int*, char*[], const char*, FL_CMD_OPT*, int);
00159 inline void fl_finish() {}
00160
00161 typedef void (*FL_IO_CALLBACK) (FL_SOCKET, void*);
00162 inline void fl_add_io_callback(int fd, short w, FL_IO_CALLBACK cb, void* v) {
00163     Fl::add_fd(fd, w, cb, v);}
00164 inline void fl_remove_io_callback(int fd, short, FL_IO_CALLBACK) {
00165     Fl::remove_fd(fd);} // removes all the callbacks!
00166
00167 // type of callback is different and no "id" number is returned:
00168 inline void fl_add_timeout(long msec, void (*cb)(void*), void* v) {
00169     Fl::add_timeout(msec*.001, cb, v);}
00170 inline void fl_remove_timeout(int) {}
00171
00172 // type of callback is different!
00173 inline void fl_set_idle_callback(void (*cb)()) {Fl::set_idle(cb);}
00174
00175 FL_EXPORT Fl_Widget* fl_do_forms(void);
00176 FL_EXPORT Fl_Widget* fl_check_forms();
00177 inline Fl_Widget* fl_do_only_forms(void) {return fl_do_forms();}
00178 inline Fl_Widget* fl_check_only_forms(void) {return fl_check_forms();}
00179
00180 // because of new redraw behavior, these are no-ops:
00181 inline void fl_freeze_object(Fl_Widget*) {}
00182 inline void fl_unfreeze_object(Fl_Widget*) {}
00183 inline void fl_freeze_form(Fl_Window*) {}
00184 inline void fl_unfreeze_form(Fl_Window*) {}
00185 inline void fl_freeze_all_forms() {}
00186 inline void fl_unfreeze_all_forms() {}
00187
00188 inline void fl_set_focus_object(Fl_Window*, Fl_Widget* o) {Fl::focus(o);}
00189 inline void fl_reset_focus_object(Fl_Widget* o) {Fl::focus(o);}
00190 #define fl_set_object_focus fl_set_focus_object

```

```

00191
00192 // void fl_set_form_atclose(Fl_Window*w,int (*cb)(Fl_Window*,void*),void* v)
00193 // void fl_set_atclose(int (*cb)(Fl_Window*,void*),void*)
00194 // fl_set_form_atactivate/atdeactivate not implemented!
00195
00197 // Fl_Widget:
00198
00199 inline void fl_set_object_boxtype(Fl_Widget* o, Fl_Boxtype a) {o->box(a);}
00200 inline void fl_set_object_lsize(Fl_Widget* o,int s) {o->labelsize(s);}
00201
00202 /* forms lib font indexes must be byte sized - extract correct byte from style word */
00203 inline void fl_set_object_lstyle(Fl_Widget* o,int a) {
00204     o->labelfont((Fl_Font)(a&0xff)); o->labeltype((Fl_Labeltype)(a>>8));}
00205 inline void fl_set_object_lcol(Fl_Widget* o, Fl_Color a) {o->labelcolor(a);}
00206 #define fl_set_object_lcolor fl_set_object_lcol
00207 inline void fl_set_object_lalign(Fl_Widget* o, Fl_Align a) {o->align(a);}
00208 #define fl_set_object_align fl_set_object_lalign
00209 inline void fl_set_object_color(Fl_Widget* o,Fl_Color a,Fl_Color b) {o->color(a,b);}
00210 inline void fl_set_object_label(Fl_Widget* o, const char* a) {o->label(a); o->redraw();}
00211 inline void fl_set_object_position(Fl_Widget*o,int x,int y) {o->position(x,y);}
00212 inline void fl_set_object_size(Fl_Widget* o, int w, int h) {o->size(w,h);}
00213 inline void fl_set_object_geometry(Fl_Widget* o,int x,int y,int w,int h) {o->resize(x,y,w,h);}
00214
00215 inline void fl_get_object_geometry(Fl_Widget* o,int*x,int*y,int*w,int*h) {
00216     *x = o->x(); *y = o->y(); *w = o->w(); *h = o->h();}
00217 inline void fl_get_object_position(Fl_Widget* o,int*x,int*y) {
00218     *x = o->x(); *y = o->y();}
00219
00220 typedef void (*Forms_CB)(Fl_Widget*, long);
00221 inline void fl_set_object_callback(Fl_Widget*o,Forms_CB c,long a) {o->callback(c,a);}
00222 #define fl_set_call_back fl_set_object_callback
00223 inline void fl_call_object_callback(Fl_Widget* o) {o->do_callback();}
00224 inline void fl_trigger_object(Fl_Widget* o) {o->do_callback();}
00225 inline void fl_set_object_return(Fl_Widget* o, int v) {
00226     o->when((Fl_When)(v|FL_WHEN_RELEASE));}
00227
00228 inline void fl_redraw_object(Fl_Widget* o) {o->redraw();}
00229 inline void fl_show_object(Fl_Widget* o) {o->show();}
00230 inline void fl_hide_object(Fl_Widget* o) {o->hide();}
00231 inline void fl_free_object(Fl_Widget* x) {delete x;}
00232 inline void fl_delete_object(Fl_Widget* o) {o->parent()->remove(*o);}
00233 inline void fl_activate_object(Fl_Widget* o) {o->activate();}
00234 inline void fl_deactivate_object(Fl_Widget* o) {o->deactivate();}
00235
00236 inline void fl_add_object(Fl_Window* f, Fl_Widget* x) {f->add(x);}
00237 inline void fl_insert_object(Fl_Widget* o, Fl_Widget* b) {b->parent()->insert(*o,b);}
00238
00239 inline Fl_Window* FL_ObjWin(Fl_Widget* o) {return o->window();}
00240
00242 // things that appered in the demos a lot that I don't emulate, but
00243 // I did not want to edit out of all the demos...
00244
00245 inline int fl_get_border_width() {return 3;}
00246 inline void fl_set_border_width(int) {}
00247 inline void fl_set_object_dblbuffer(Fl_Widget*, int) {}
00248 inline void fl_set_form_dblbuffer(Fl_Window*, int) {}
00249
00251 // Fl_Window:
00252
00253 inline void fl_free_form(Fl_Window* x) {delete x;}
00254 inline void fl_redraw_form(Fl_Window* f) {f->redraw();}
00255
00256 inline Fl_Window* fl_bgn_form(Fl_Boxtype b,int w,int h) {
00257     Fl_Window* g = new Fl_Window(w,h,0);
00258     g->box(b);
00259     return g;
00260 }
00261 FL_EXPORT void fl_end_form();
00262 inline void fl_addto_form(Fl_Window* f) {f->begin();}
00263 inline Fl_Group* fl_bgn_group() {return new Fl_Group(0,0,0,0);}
00264 inline void fl_end_group() {Fl_Group::current()->forms_end();}
00265 inline void fl_addto_group(Fl_Widget* o) {((Fl_Group*)o)->begin();}
00266 #define resizebox_ddfdesign_kludge()
00267
00268 inline void fl_scale_form(Fl_Window* f, double x, double y) {
00269     f->resizable(f); f->size(int(f->w()*x),int(f->h()*y));}
00270 inline void fl_set_form_position(Fl_Window* f,int x,int y) {f->position(x,y);}
00271 inline void fl_set_form_size(Fl_Window* f, int w, int h) {f->size(w,h);}
00272 inline void fl_set_form_geometry(Fl_Window* f,int x,int y,int w,int h) {
00273     f->resize(x,y,w,h);}
00274 #define fl_set_initial_placement fl_set_form_geometry
00275 inline void fl_adjust_form_size(Fl_Window*) {}
00276
00277 FL_EXPORT void fl_show_form(Fl_Window* f,int p,int b,const char* n);
00278 enum { // "p" argument values:
00279     FL_PLACE_FREE = 0, // make resizable
00280     FL_PLACE_MOUSE = 1, // mouse centered on form

```



```

00281 FL_PLACE_CENTER = 2, // center of the screen
00282 FL_PLACE_POSITION = 4, // fixed position, resizable
00283 FL_PLACE_SIZE = 8, // fixed size, normal fltk behavior
00284 FL_PLACE_GEOMETRY = 16, // fixed size and position
00285 FL_PLACE_ASPECT = 32, // keep aspect ratio (ignored)
00286 FL_PLACE_FULLSCREEN = 64, // fill screen
00287 FL_PLACE_HOTSPOT = 128, // enables hotspot
00288 FL_PLACE_ICONIC = 256, // iconic (ignored)
00289 FL_FREE_SIZE = (1<14), // force resizable
00290 FL_FIX_SIZE = (1<15) // force off resizable
00291 };
00292 #define FL_PLACE_FREE_CENTER (FL_PLACE_CENTER|FL_FREE_SIZE)
00293 #define FL_PLACE_CENTERFREE (FL_PLACE_CENTER|FL_FREE_SIZE)
00294 enum { // "b" argument values:
00295     FL_NOBORDER = 0,
00296     FL_FULLBORDER,
00297     FL_TRANSIENT
00298 //FL_MODAL = (1<8) // not implemented yet in Forms
00299 };
00300 inline void fl_set_form_hotspot(Fl_Window* w, int x, int y) {w->hotspot(x,y);}
00301 inline void fl_set_form_hotobject(Fl_Window* w, Fl_Widget* o) {w->hotspot(o);}
00302 extern FL_EXPORT char fl_flip; // in forms.C
00303 inline void fl_flip_yorigin() {fl_flip = 1;}
00304
00305 #define fl_prepare_form_window fl_show_form
00306 inline void fl_show_form_window(Fl_Window*) {}
00307
00308 inline void fl_raise_form(Fl_Window* f) {f->show();}
00309
00310 inline void fl_hide_form(Fl_Window* f) {f->hide();}
00311 inline void fl_pop_form(Fl_Window* f) {f->show();}
00312
00313 extern FL_EXPORT char fl_modal_next; // in forms.C
00314 inline void fl_activate_all_forms() {}
00315 inline void fl_deactivate_all_forms() {fl_modal_next = 1;}
00316 inline void fl_deactivate_form(Fl_Window* w) {w->deactivate();}
00317 inline void fl_activate_form(Fl_Window* w) {w->activate();}
00318
00319 inline void fl_set_form_title(Fl_Window* f, const char* s) {f->label(s);}
00320 inline void fl_title_form(Fl_Window* f, const char* s) {f->label(s);}
00321
00322 typedef void (*Forms_FormCB)(Fl_Widget*);
00323 inline void fl_set_form_callback(Fl_Window* f, Forms_FormCB c) {f->callback(c);}
00324 #define fl_set_form_call_back fl_set_form_callback
00325
00326 inline void fl_init() {}
00327 FL_EXPORT void fl_set_graphics_mode(int, int);
00328
00329 inline int fl_form_is_visible(Fl_Window* f) {return f->visible();}
00330
00331 inline int fl_mouse_button() {return Fl::event_button();}
00332 #define fl_mousebutton fl_mouse_button
00333
00334 #define fl_free free
00335 #define fl_malloc malloc
00336 #define fl_calloc calloc
00337 #define fl_realloc realloc
00338
00340 // Drawing functions. Only usable inside an Fl_Free object?
00341
00342 inline void fl_drw_box(Fl_Boxtype b, int x, int y, int w, int h, Fl_Color bgc, int=3) {
00343     fl_draw_box(b, x, y, w, h, bgc);}
00344 inline void fl_drw_frame(Fl_Boxtype b, int x, int y, int w, int h, Fl_Color bgc, int=3) {
00345     fl_draw_box(b, x, y, w, h, bgc);}
00346
00347 inline void fl_drw_text(Fl_Align align, int x, int y, int w, int h,
00348     Fl_Color fgcolor, int size, Fl_Font style,
00349     const char* s) {
00350     fl_font(style, size);
00351     fl_color(fgcolor);
00352     fl_draw(s, x, y, w, h, align);
00353 }
00354
00355 // this does not work except for CENTER...
00356 inline void fl_drw_text_beside(Fl_Align align, int x, int y, int w, int h,
00357     Fl_Color fgcolor, int size, Fl_Font style,
00358     const char* s) {
00359     fl_font(style, size);
00360     fl_color(fgcolor);
00361     fl_draw(s, x, y, w, h, align);
00362 }
00363
00364 inline void fl_set_font_name(Fl_Font n, const char* s) {Fl::set_font(n, s);}
00365
00366 inline void fl_mapcolor(Fl_Color c, uchar r, uchar g, uchar b) {Fl::set_color(c, r, g, b);}
00367
00368 #define fl_set_clipping(x, y, w, h) fl_push_clip(x, y, w, h)

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00369 #define fl_unset_clipping() fl_pop_clip()
00370
00372 // Forms classes:
00373
00374 inline Fl_Widget* fl_add_new(Fl_Widget* p) {return p;}
00375 inline Fl_Widget* fl_add_new(uchar t, Fl_Widget* p) {p->type(t); return p;}
00376
00377 #define forms_constructor(type,name) \
00378 inline type* name(uchar t,int x,int y,int w,int h,const char* l) { \
00379     return (type*)(fl_add_new(t, new type(x,y,w,h,l)));}
00380 #define forms_constructorb(type,name) \
00381 inline type* name(uchar t,int x,int y,int w,int h,const char* l) { \
00382     return (type*)(fl_add_new(new type(t,x,y,w,h,l)));}
00383 #define forms_constructorb(type,name) \
00384 inline type* name(Fl_Boxtype t,int x,int y,int w,int h,const char* l) { \
00385     return (type*)(fl_add_new(new type(t,x,y,w,h,l)));}
00386
00387 #include "Fl_FormsBitmap.H"
00388 #define FL_NORMAL_BITMAP FL_NO_BOX
00389 forms_constructorb(Fl_FormsBitmap, fl_add_bitmap)
00390 inline void fl_set_bitmap_data(Fl_Widget* o, int w, int h, const uchar* b) {
00391     ((Fl_FormsBitmap*)o)->set(w,h,b);
00392 }
00393
00394 #include "Fl_FormsPixmap.H"
00395 #define FL_NORMAL_PIXMAP FL_NO_BOX
00396 forms_constructorb(Fl_FormsPixmap, fl_add_pixmap)
00397 inline void fl_set_pixmap_data(Fl_Widget* o, char*const* b) {
00398     ((Fl_FormsPixmap*)o)->set(b);
00399 }
00400 //inline void fl_set_pixmap_file(Fl_Widget*, const char*);
00401 inline void fl_set_pixmap_align(Fl_Widget* o, Fl_Align a,int,int) {o->align(a);}
00402 //inline void fl_set_pixmap_colorcloseness(int, int, int);
00403
00404 #include "Fl_Box.H"
00405 forms_constructorb(Fl_Box, fl_add_box)
00406
00407 #include "Fl_Browser.H"
00408 forms_constructor(Fl_Browser, fl_add_browser)
00409
00410 inline void fl_clear_browser(Fl_Widget* o) {
00411     ((Fl_Browser*)o)->clear();}
00412 inline void fl_add_browser_line(Fl_Widget* o, const char* s) {
00413     ((Fl_Browser*)o)->add(s);}
00414 inline void fl_addto_browser(Fl_Widget* o, const char* s) {
00415     ((Fl_Browser*)o)->add(s);} /* should also scroll to bottom */
00416 //inline void fl_addto_browser_chars(Fl_Widget*, const char*)
00417 //define fl_append_browser fl_addto_browser_chars
00418 inline void fl_insert_browser_line(Fl_Widget* o, int n, const char* s) {
00419     ((Fl_Browser*)o)->insert(n,s);}
00420 inline void fl_delete_browser_line(Fl_Widget* o, int n) {
00421     ((Fl_Browser*)o)->remove(n);}
00422 inline void fl_replace_browser_line(Fl_Widget* o, int n, const char* s) {
00423     ((Fl_Browser*)o)->replace(n,s);}
00424 inline char* fl_get_browser_line(Fl_Widget* o, int n) {
00425     return (char*)((Fl_Browser*)o)->text(n);}
00426 inline int fl_load_browser(Fl_Widget* o, const char* f) {
00427     return ((Fl_Browser*)o)->load(f);}
00428 inline void fl_select_browser_line(Fl_Widget* o, int n) {
00429     ((Fl_Browser*)o)->select(n,1);}
00430 inline void fl_deselect_browser_line(Fl_Widget* o, int n) {
00431     ((Fl_Browser*)o)->select(n,0);}
00432 inline void fl_deselect_browser(Fl_Widget* o) {
00433     ((Fl_Browser*)o)->deselect();}
00434 inline int fl_isselected_browser_line(Fl_Widget* o, int n) {
00435     return ((Fl_Browser*)o)->selected(n);}
00436 inline int fl_get_browser_topline(Fl_Widget* o) {
00437     return ((Fl_Browser*)o)->topline();}
00438 inline int fl_get_browser(Fl_Widget* o) {
00439     return ((Fl_Browser*)o)->value();}
00440 inline int fl_get_browser_maxline(Fl_Widget* o) {
00441     return ((Fl_Browser*)o)->size();}
00442 //inline int fl_get_browser_screenlines(Fl_Widget*);
00443 inline void fl_set_browser_topline(Fl_Widget* o, int n) {
00444     ((Fl_Browser*)o)->topline(n);}
00445 inline void fl_set_browser_fontsize(Fl_Widget* o, int s) {
00446     ((Fl_Browser*)o)->textsize(s);}
00447 inline void fl_set_browser_fontstyle(Fl_Widget* o, Fl_Font s) {
00448     ((Fl_Browser*)o)->textfont(s);}
00449 inline void fl_set_browser_specialkey(Fl_Widget* o, char c) {
00450     ((Fl_Browser*)o)->format_char(c);}
00451 //inline void fl_set_browser_vscrollbar(Fl_Widget*, int);
00452 //inline void fl_set_browser_hscrollbar(Fl_Widget*, int);
00453 //inline void fl_set_browser_leftslider(Fl_Widget*, int);
00454 //define fl_set_browser_leftscrollbar fl_set_browser_leftslider
00455 //inline void fl_set_browser_line_selectable(Fl_Widget*, int, int);
00456 //inline void fl_get_browser_dimension(Fl_Widget*,int*,int*,int*,int*);

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00457 //inline void fl_set_browser_dblclick_callback(Fl_Widget*,FL_CALLBACKPTR,long);
00458 //inline void fl_set_browser_xoffset(Fl_Widget*, FL_Coord);
00459 //inline void fl_set_browser_scrollbarsize(Fl_Widget*, int, int);
00460 inline void fl_setdisplayed_browser_line(Fl_Widget* o, int n, int i) {
00461     ((Fl_Browser*)o)->display(n,i);}
00462 inline int fl_isdisplayed_browser_line(Fl_Widget* o, int n) {
00463     return ((Fl_Browser*)o)->displayed(n);}
00464
00465 #include "Fl_Button.H"
00466
00467 #define FL_NORMAL_BUTTON      0
00468 #define FL_TOUCH_BUTTON      4
00469 #define FL_INOUT_BUTTON      5
00470 #define FL_RETURN_BUTTON     6
00471 #define FL_HIDDEN_RET_BUTTON 7
00472 #define FL_PUSH_BUTTON       FL_TOGGLE_BUTTON
00473 #define FL_MENU_BUTTON       9
00474
00475 FL_EXPORT Fl_Button* fl_add_button(uchar t,int x,int y,int w,int h,const char* l);
00476 inline int fl_get_button(Fl_Widget* b) {return ((Fl_Button*)b)->value();}
00477 inline void fl_set_button(Fl_Widget* b, int v) {((Fl_Button*)b)->value(v);}
00478 inline int fl_get_button_num(Fl_Widget*) {return Fl::event_button();}
00479 inline void fl_set_button_shortcut(Fl_Widget* b, const char* s,int=0) {
00480     ((Fl_Button*)b)->shortcut(s);}
00481 //define fl_set_object_shortcut(b,s) fl_set_button_shortcut(b,s)
00482
00483 #include "Fl_Light_Button.H"
00484 forms_constructor(Fl_Light_Button, fl_add_lightbutton)
00485
00486 #include "Fl_Round_Button.H"
00487 forms_constructor(Fl_Round_Button, fl_add_roundbutton)
00488 forms_constructor(Fl_Round_Button, fl_add_round3dbutton)
00489
00490 #include "Fl_Check_Button.H"
00491 forms_constructor(Fl_Check_Button, fl_add_checkbutton)
00492
00493 inline Fl_Widget* fl_add_bitmapbutton(int t,int x,int y,int w,int h,const char* l) {Fl_Widget* o =
fl_add_button(t,x,y,w,h,l); return o;}
00494 inline void fl_set_bitmapbutton_data(Fl_Widget* o,int a,int b,uchar* c) {
00495     (new Fl_Bitmap(c,a,b))->label(o);} // does not delete old Fl_Bitmap!
00496
00497 inline Fl_Widget* fl_add_pixmapbutton(int t,int x,int y,int w,int h,const char* l) {Fl_Widget* o =
fl_add_button(t,x,y,w,h,l); return o;}
00498 inline void fl_set_pixmapbutton_data(Fl_Widget* o, const char*const* c) {
00499     (new Fl_Pixmap(c))->label(o);} // does not delete old Fl_Pixmap!
00500
00501 // Fl_Canvas object not yet implemented!
00502
00503 #include "Fl_Chart.H"
00504
00505 forms_constructor(Fl_Chart, fl_add_chart)
00506 inline void fl_clear_chart(Fl_Widget* o) {
00507     ((Fl_Chart*)o)->clear();}
00508 inline void fl_add_chart_value(Fl_Widget* o,double v,const char* s,uchar c){
00509     ((Fl_Chart*)o)->add(v,s,c);}
00510 inline void fl_insert_chart_value(Fl_Widget* o, int i, double v, const char* s, uchar c) {
00511     ((Fl_Chart*)o)->insert(i,v,s,c);}
00512 inline void fl_replace_chart_value(Fl_Widget* o, int i, double v, const char* s, uchar c) {
00513     ((Fl_Chart*)o)->replace(i,v,s,c);}
00514 inline void fl_set_chart_bounds(Fl_Widget* o, double a, double b) {
00515     ((Fl_Chart*)o)->bounds(a,b);}
00516 inline void fl_set_chart_maxnumb(Fl_Widget* o, int v) {
00517     ((Fl_Chart*)o)->maxsize(v);}
00518 inline void fl_set_chart_autosize(Fl_Widget* o, int v) {
00519     ((Fl_Chart*)o)->autosize(v);}
00520 inline void fl_set_chart_lstyle(Fl_Widget* o, Fl_Font v) {
00521     ((Fl_Chart*)o)->textfont(v);}
00522 inline void fl_set_chart_lsize(Fl_Widget* o, int v) {
00523     ((Fl_Chart*)o)->textsize(v);}
00524 inline void fl_set_chart_lcolor(Fl_Widget* o, Fl_Color v) {
00525     ((Fl_Chart*)o)->textcolor(v);}
00526 #define fl_set_chart_lcol    fl_set_chart_lcolor
00527
00528 #include "Fl_Choice.H"
00529
00530 #define FL_NORMAL_CHOICE      0
00531 #define FL_NORMAL_CHOICE2    0
00532 #define FL_DROPLIST_CHOICE   0
00533
00534 forms_constructor(Fl_Choice, fl_add_choice)
00535 inline void fl_clear_choice(Fl_Widget* o) {
00536     ((Fl_Choice*)o)->clear();}
00537 inline void fl_addto_choice(Fl_Widget* o, const char* s) {
00538     ((Fl_Choice*)o)->add(s);}
00539 inline void fl_replace_choice(Fl_Widget* o, int i, const char* s) {
00540     ((Fl_Choice*)o)->replace(i-1,s);}
00541 inline void fl_delete_choice(Fl_Widget* o, int i) {

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```

00542     ((Fl_Choice*)o)->remove(i-1);}
00543 inline void fl_set_choice(Fl_Widget* o, int i) {
00544     ((Fl_Choice*)o)->value(i-1);}
00545 // inline void fl_set_choice_text(Fl_Widget*, const char*);
00546 inline int fl_get_choice(Fl_Widget* o) {
00547     return ((Fl_Choice*)o)->value()+1;}
00548 // inline const char* fl_get_choice_item_text(Fl_Widget*, int);
00549 // inline int fl_get_choice_maxitems(Fl_Widget*);
00550 inline const char* fl_get_choice_text(Fl_Widget* o) {
00551     return ((Fl_Choice*)o)->text();}
00552 inline void fl_set_choice_fontsize(Fl_Widget* o, int x) {
00553     ((Fl_Choice*)o)->textsize(x);}
00554 inline void fl_set_choice_fontstyle(Fl_Widget* o, Fl_Font x) {
00555     ((Fl_Choice*)o)->textfont(x);}
00556 // inline void fl_set_choice_item_mode(Fl_Widget*, int, unsigned);
00557 // inline void fl_set_choice_item_shortcut(Fl_Widget*, int, const char*);
00558
00559 #include "Fl_Clock.H"
00560 forms_constructor(Fl_Clock, fl_add_clock)
00561 inline void fl_get_clock(Fl_Widget* o, int* h, int* m, int* s) {
00562     *h = ((Fl_Clock*)o)->hour();
00563     *m = ((Fl_Clock*)o)->minute();
00564     *s = ((Fl_Clock*)o)->second();
00565 }
00566
00567 #include "Fl_Counter.H"
00568 forms_constructor(Fl_Counter, fl_add_counter)
00569 inline void fl_set_counter_value(Fl_Widget* o, double v) {
00570     ((Fl_Counter*)o)->value(v);}
00571 inline void fl_set_counter_bounds(Fl_Widget* o, double a, double b) {
00572     ((Fl_Counter*)o)->bounds(a,b);}
00573 inline void fl_set_counter_step(Fl_Widget* o, double a, double b) {
00574     ((Fl_Counter*)o)->step(a,b);}
00575 inline void fl_set_counter_precision(Fl_Widget* o, int v) {
00576     ((Fl_Counter*)o)->precision(v);}
00577 inline void fl_set_counter_return(Fl_Widget* o, int v) {
00578     ((Fl_Counter*)o)->when((Fl_When)(v|FL_WHEN_RELEASE));}
00579 inline double fl_get_counter_value(Fl_Widget* o) {
00580     return ((Fl_Counter*)o)->value();}
00581 inline void fl_get_counter_bounds(Fl_Widget* o, float* a, float* b) {
00582     *a = float(((Fl_Counter*)o)->minimum());
00583     *b = float(((Fl_Counter*)o)->maximum());
00584 }
00585 //inline void fl_set_counter_filter(Fl_Widget*,const char* (*)(Fl_Widget*,double,int));
00586
00587 // Cursor stuff cannot be emulated because it uses X stuff
00588 inline void fl_set_cursor(Fl_Window* w, Fl_Cursor c) {w->cursor(c);}
00589 #define FL_INVISIBLE_CURSOR FL_CURSOR_NONE
00590 #define FL_DEFAULT_CURSOR FL_CURSOR_DEFAULT
00591
00592 #include "Fl_Dial.H"
00593
00594 #define FL_DIAL_COL1 FL_GRAY
00595 #define FL_DIAL_COL2 37
00596
00597 forms_constructor(Fl_Dial, fl_add_dial)
00598 inline void fl_set_dial_value(Fl_Widget* o, double v) {
00599     ((Fl_Dial*)o)->value(v);}
00600 inline double fl_get_dial_value(Fl_Widget* o) {
00601     return ((Fl_Dial*)o)->value();}
00602 inline void fl_set_dial_bounds(Fl_Widget* o, double a, double b) {
00603     ((Fl_Dial*)o)->bounds(a, b);}
00604 inline void fl_get_dial_bounds(Fl_Widget* o, float* a, float* b) {
00605     *a = float(((Fl_Dial*)o)->minimum());
00606     *b = float(((Fl_Dial*)o)->maximum());
00607 }
00608 inline void fl_set_dial_return(Fl_Widget* o, int i) {
00609     ((Fl_Dial*)o)->when((Fl_When)(i|FL_WHEN_RELEASE));}
00610 inline void fl_set_dial_angles(Fl_Widget* o, int a, int b) {
00611     ((Fl_Dial*)o)->angles((short)a, (short)b);}
00612 //inline void fl_set_dial_cross(Fl_Widget* o, int);
00613 // inline void fl_set_dial_direction(Fl_Widget* o, uchar d) {
00614 //     ((Fl_Dial*)o)->direction(d);}
00615 inline void fl_set_dial_step(Fl_Widget* o, double v) {
00616     ((Fl_Dial*)o)->step(v);}
00617
00618 // Frames:
00619
00620 inline Fl_Widget* fl_add_frame(Fl_Boxtype i,int x,int y,int w,int h,const char* l) {
00621     return fl_add_box(i,x-3,y-3,w+6,h+6,l);}
00622
00623 // labelframe nyi
00624 inline Fl_Widget* fl_add_labelframe(Fl_Boxtype i,int x,int y,int w,int h,const char* l) {
00625     Fl_Widget* o = fl_add_box(i,x-3,y-3,w+6,h+6,l);
00626     o->align(FL_ALIGN_TOP_LEFT);
00627     return o;
00628 }

```

```

00629
00630 #include "Fl_Free.H"
00631 inline Fl_Free*
00632 fl_add_free(int t,double x,double y,double w,double h,const char* l,
00633             FL_HANDLEPTR hdl) {
00634     return (Fl_Free*)(fl_add_new(
00635         new Fl_Free(t,int(x),int(y),int(w),int(h),l,hdl)));
00636 }
00637
00638 #include "fl_ask.H"
00639 #include "fl_show_colormap.H"
00640
00641 inline int fl_show_question(const char* c, int = 0) {return fl_choice("%s",fl_no,fl_yes,0L,c);}
00642 FL_EXPORT void fl_show_message(const char *,const char *,const char *);
00643 FL_EXPORT void fl_show_alert(const char *,const char *,const char *,int=0);
00644 FL_EXPORT int fl_show_question(const char *,const char *,const char *);
00645 inline const char *fl_show_input(const char *l,const char*d=0) {return fl_input("%s",d,l);}
00646 FL_EXPORT /*const*/ char *fl_show_simple_input(const char *label, const char *deflt = 0);
00647 FL_EXPORT int fl_show_choice(
00648     const char *m1,
00649     const char *m2,
00650     const char *m3,
00651     int numb,
00652     const char *b0,
00653     const char *b1,
00654     const char *b2);
00655
00656 inline void fl_set_goodies_font(Fl_Font a, Fl_Fonsize b) {fl_message_font(a,b);}
00657 #define fl_show_messages fl_message
00658 inline int fl_show_choices(const char* c,int n,const char* b1,const char* b2,
00659                           const char* b3, int) {
00660     return fl_show_choice(0,c,0,n,b1,b2,b3);
00661 }
00662
00663 #include "filename.H"
00664 #include "Fl_File_Chooser.H"
00665 inline int do_matching(char* a, const char* b) {return fl_filename_match(a,b);}
00666
00667 // Forms-compatible file chooser (implementation in fselect.C):
00668 FL_EXPORT char* fl_show_file_selector(const char* message,const char* dir,
00669                                       const char* pat,const char* fname);
00670 FL_EXPORT char* fl_get_directory();
00671 FL_EXPORT char* fl_get_pattern();
00672 FL_EXPORT char* fl_get_filename();
00673
00674 #include "Fl_Input.H"
00675 forms_constructor(Fl_Input, fl_add_input)
00676 inline void fl_set_input(Fl_Widget* o, const char* v) {
00677     ((Fl_Input*)o)->value(v);}
00678 inline void fl_set_input_return(Fl_Widget* o, int x) {
00679     ((Fl_Input*)o)->when((Fl_When)(x | FL_WHEN_RELEASE));}
00680 inline void fl_set_input_color(Fl_Widget* o, Fl_Color a, Fl_Color b) {
00681     ((Fl_Input*)o)->textcolor(a);
00682     ((Fl_Input*)o)->cursor_color(b);
00683 }
00684 // inline void fl_set_input_scroll(Fl_Widget*, int);
00685 inline void fl_set_input_cursorpos(Fl_Widget* o, int x, int /*y*/) {
00686     ((Fl_Input*)o)->insert_position(x);}
00687 // inline void fl_set_input_selected(Fl_Widget*, int);
00688 // inline void fl_set_input_selected_range(Fl_Widget*, int, int);
00689 // inline void fl_set_input_maxchars(Fl_Widget*, int);
00690 // inline void fl_set_input_format(Fl_Widget*, int, int);
00691 // inline void fl_set_input_hscrollbar(Fl_Widget*, int);
00692 // inline void fl_set_input_vscrollbar(Fl_Widget*, int);
00693 // inline void fl_set_input_xoffset(Fl_Widget*, int);
00694 // inline void fl_set_input_topline(Fl_Widget*, int);
00695 // inline void fl_set_input_scrollbarsize(Fl_Widget*, int, int);
00696 // inline int fl_get_input_topline(Fl_Widget*);
00697 // inline int fl_get_input_screenlines(Fl_Widget*);
00698 inline int fl_get_input_cursorpos(Fl_Widget* o, int*x, int*y) {
00699     *x = ((Fl_Input*)o)->insert_position(); *y = 0; return *x;}
00700 // inline int fl_get_input_numberoflines(Fl_Widget*);
00701 // inline void fl_get_input_format(Fl_Widget*, int*, int*);
00702 inline const char* fl_get_input(Fl_Widget* o) {return ((Fl_Input*)o)->value();}
00703
00704 #include "Fl_Menu_Button.H"
00705
00706 // types are not implemented, they all act like FL_PUSH_MENU:
00707 #define FL_TOUCH_MENU      0
00708 #define FL_PUSH_MENU      1
00709 #define FL_PULLDOWN_MENU  2
00710 forms_constructor(Fl_Menu_Button, fl_add_menu)
00711
00712 inline void fl_clear_menu(Fl_Widget* o) {
00713     ((Fl_Menu_Button*)o)->clear();}
00714 inline void fl_set_menu(Fl_Widget* o, const char* s) {
00715     ((Fl_Menu_Button*)o)->clear(); ((Fl_Menu_Button*)o)->add(s);}

```

```

00716 inline void fl_addto_menu(Fl_Widget* o, const char* s) {
00717     ((Fl_Menu_Button*)o)->add(s);}
00718 inline void fl_replace_menu_item(Fl_Widget* o, int i, const char* s) {
00719     ((Fl_Menu_Button*)o)->replace(i-1,s);}
00720 inline void fl_delete_menu_item(Fl_Widget* o, int i) {
00721     ((Fl_Menu_Button*)o)->remove(i-1);}
00722 inline void fl_set_menu_item_shortcut(Fl_Widget* o, int i, const char* s) {
00723     ((Fl_Menu_Button*)o)->shortcut(i-1,fl_old_shortcut(s));}
00724 inline void fl_set_menu_item_mode(Fl_Widget* o, int i, long x) {
00725     ((Fl_Menu_Button*)o)->mode(i-1,(int)x);}
00726 inline void fl_show_menu_symbol(Fl_Widget*, int) {
00727     /* ((Fl_Menu_Button*)o)->show_menu_symbol(i); */}
00728 // inline void fl_set_menu_popup(Fl_Widget*, int);
00729 inline int fl_get_menu(Fl_Widget* o) {
00730     return ((Fl_Menu_Button*)o)->value()+1;}
00731 inline const char* fl_get_menu_item_text(Fl_Widget* o, int i) {
00732     return ((Fl_Menu_Button*)o)->text(i);}
00733 inline int fl_get_menu_maxitems(Fl_Widget* o) {
00734     return ((Fl_Menu_Button*)o)->size();}
00735 inline int fl_get_menu_item_mode(Fl_Widget* o, int i) {
00736     return ((Fl_Menu_Button*)o)->mode(i);}
00737 inline const char* fl_get_menu_text(Fl_Widget* o) {
00738     return ((Fl_Menu_Button*)o)->text();}
00739
00740 #include "Fl_Positioner.H"
00741 #define FL_NORMAL_POSITIONER 0
00742 forms_constructor(Fl_Positioner, fl_add_positioner)
00743 inline void fl_set_positioner_xvalue(Fl_Widget* o, double v) {
00744     ((Fl_Positioner*)o)->xvalue(v);}
00745 inline double fl_get_positioner_xvalue(Fl_Widget* o) {
00746     return ((Fl_Positioner*)o)->xvalue();}
00747 inline void fl_set_positioner_xbounds(Fl_Widget* o, double a, double b) {
00748     ((Fl_Positioner*)o)->xbounds(a,b);}
00749 inline void fl_get_positioner_xbounds(Fl_Widget* o, float* a, float* b) {
00750     *a = float(((Fl_Positioner*)o)->xminimum());
00751     *b = float(((Fl_Positioner*)o)->xmaximum());
00752 }
00753 inline void fl_set_positioner_yvalue(Fl_Widget* o, double v) {
00754     ((Fl_Positioner*)o)->yvalue(v);}
00755 inline double fl_get_positioner_yvalue(Fl_Widget* o) {
00756     return ((Fl_Positioner*)o)->yvalue();}
00757 inline void fl_set_positioner_ybounds(Fl_Widget* o, double a, double b) {
00758     ((Fl_Positioner*)o)->ybounds(a,b);}
00759 inline void fl_get_positioner_ybounds(Fl_Widget* o, float* a, float* b) {
00760     *a = float(((Fl_Positioner*)o)->yminimum());
00761     *b = float(((Fl_Positioner*)o)->ymaximum());
00762 }
00763 inline void fl_set_positioner_xstep(Fl_Widget* o, double v) {
00764     ((Fl_Positioner*)o)->xstep(v);}
00765 inline void fl_set_positioner_ystep(Fl_Widget* o, double v) {
00766     ((Fl_Positioner*)o)->ystep(v);}
00767 inline void fl_set_positioner_return(Fl_Widget* o, int v) {
00768     ((Fl_Positioner*)o)->when((Fl_When)(v|FL_WHEN_RELEASE));}
00769
00770 #include "Fl_Slider.H"
00771
00772 #define FL_HOR_BROWSER_SLIDER FL_HOR_SLIDER
00773 #define FL_VERT_BROWSER_SLIDER FL_VERT_SLIDER
00774
00775 forms_constructort(Fl_Slider, fl_add_slider)
00776 #define FL_SLIDER_COL1 FL_GRAY
00777 inline void fl_set_slider_value(Fl_Widget* o, double v) {
00778     ((Fl_Slider*)o)->value(v);}
00779 inline double fl_get_slider_value(Fl_Widget* o) {
00780     return ((Fl_Slider*)o)->value();}
00781 inline void fl_set_slider_bounds(Fl_Widget* o, double a, double b) {
00782     ((Fl_Slider*)o)->bounds(a, b);}
00783 inline void fl_get_slider_bounds(Fl_Widget* o, float* a, float* b) {
00784     *a = float(((Fl_Slider*)o)->minimum());
00785     *b = float(((Fl_Slider*)o)->maximum());
00786 }
00787 inline void fl_set_slider_return(Fl_Widget* o, int i) {
00788     ((Fl_Slider*)o)->when((Fl_When)(i|FL_WHEN_RELEASE));}
00789 inline void fl_set_slider_step(Fl_Widget* o, double v) {
00790     ((Fl_Slider*)o)->step(v);}
00791 // inline void fl_set_slider_increment(Fl_Widget* o, double v, double);
00792 inline void fl_set_slider_size(Fl_Widget* o, double v) {
00793     ((Fl_Slider*)o)->slider_size(v);}
00794
00795 #include "Fl_Value_Slider.H"
00796 forms_constructor(Fl_Value_Slider, fl_add_valslider)
00797
00798 inline void fl_set_slider_precision(Fl_Widget* o, int i) {
00799     ((Fl_Value_Slider*)o)->precision(i);}
00800 // filter function!
00801
00802 // The forms text object was the same as an Fl_Box except it inverted the

```

```

00803 // meaning of FL_ALIGN_INSIDE. Implementation in forms.cxx
00804 class FL_EXPORT Fl_FormsText : public Fl_Widget {
00805 protected:
00806     void draw() FL_OVERRIDE;
00807 public:
00808     Fl_FormsText(Fl_Boxtype b, int X, int Y, int W, int H, const char* l=0)
00809         : Fl_Widget(X,Y,W,H,l) {box(b); align(FL_ALIGN_LEFT);}
00810 };
00811 #define FL_NORMAL_TEXT FL_NO_BOX
00812 forms_constructorb(Fl_FormsText, fl_add_text)
00813
00814 #include "Fl_Timer.H"
00815 forms_constructort(Fl_Timer, fl_add_timer)
00816 inline void fl_set_timer(Fl_Widget* o, double v) {((Fl_Timer*)o)->value(v);}
00817 inline double fl_get_timer(Fl_Widget* o) {return ((Fl_Timer*)o)->value();}
00818 inline void fl_suspend_timer(Fl_Widget* o) {((Fl_Timer*)o)->suspended(1);}
00819 inline void fl_resume_timer(Fl_Widget* o) {((Fl_Timer*)o)->suspended(0);}
00820 inline void fl_set_timer_countup(Fl_Widget* o, char d) {((Fl_Timer*)o)->direction(d);}
00821 void FL_EXPORT fl_gettime(long* sec, long* usec);
00822
00823 // Fl_XYPlot nyl
00824
00825
00826 // stuff from DDForms:
00827
00828 inline int fl_double_click() {return Fl::event_clicks();}
00829 inline void fl_draw() {Fl::flush();}
00830
00831 #endif /* define __FORMS_H__ */

```

13.185 gl.h File Reference

This file defines wrapper functions for OpenGL in FLTK.

```

#include "Enumerations.H"
#include <GL/gl.h>

```

Functions

- void [gl_color](#) (Fl_Color i)

Sets the current OpenGL color to an FLTK color.
- void [gl_color](#) (int c)

back compatibility
- int [gl_descent](#) ()

Returns the current font's descent.
- void [gl_draw](#) (const char *)

Draws a nul-terminated string in the current font at the current position.
- void [gl_draw](#) (const char *, float x, float y)

Draws a nul-terminated string in the current font at the given position.
- void [gl_draw](#) (const char *, int n)

Draws an array of n characters of the string in the current font at the current position.
- void [gl_draw](#) (const char *, int n, float x, float y)

Draws n characters of the string in the current font at the given position.
- void [gl_draw](#) (const char *, int n, int x, int y)

Draws n characters of the string in the current font at the given position.
- void [gl_draw](#) (const char *, int x, int y)

Draws a nul-terminated string in the current font at the given position.
- void [gl_draw](#) (const char *, int x, int y, int w, int h, Fl_Align)

Draws a string formatted into a box, with newlines and tabs expanded, other control characters changed to ^X.
- void [gl_draw_image](#) (const uchar *, int x, int y, int w, int h, int d=3, int ld=0)
- void [gl_finish](#) ()

Releases an OpenGL context.
- void [gl_font](#) (int fontid, int size)

- Sets the current OpenGL font to the same font as calling [fl_font\(\)](#).*
- **int [gl_height](#) ()**

Returns the current font's height.
- **void [gl_measure](#) (const char *, int &x, int &y)**

Measure how wide and tall the string will be when drawn by the [gl_draw\(\)](#) function.
- **void [gl_rect](#) (int x, int y, int w, int h)**

Outlines the given rectangle with the current color.
- **void [gl_rectf](#) (int x, int y, int w, int h)**

Fills the given rectangle with the current color.
- **void [gl_start](#) ()**

Creates an OpenGL context.
- **int [gl_texture_pile_height](#) ()**

Returns the current maximum height of the pile of pre-computed string textures.
- **void [gl_texture_pile_height](#) (int max)**

Changes the maximum height of the pile of pre-computed string textures.
- **void [gl_texture_reset](#) ()**

To call after GL operations that may invalidate textures used to draw text in GL scenes (e.g., switch between [FL_↔DOUBLE](#) / [FL_SINGLE](#) modes).
- **double [gl_width](#) (const char *)**

Returns the width of the string in the current font.
- **double [gl_width](#) (const char *, int n)**

Returns the width of n characters of the string in the current font.
- **double [gl_width](#) (uchar)**

Returns the width of the character in the current font.

13.185.1 Detailed Description

This file defines wrapper functions for OpenGL in FLTK.

To use OpenGL from within an FLTK application you MUST use [gl_visual\(\)](#) to select the default visual before doing [show\(\)](#) on any windows. Mesa will crash if you try to use a visual not returned by [glxChooseVisual](#).

Historically, this did not always work well with [FL_Double_Window](#)'s! It can try to draw into the front buffer. Depending on the system this might either crash or do nothing (when pixmaps are being used as back buffer and GL is being done by hardware), work correctly (when GL is done with software, such as Mesa), or draw into the front buffer and be erased when the buffers are swapped (when double buffer hardware is being used)

13.185.2 Function Documentation

13.185.2.1 [gl_color\(\)](#)

```
void gl_color (
    Fl\_Color i )
```

Sets the current OpenGL color to an FLTK color.

For color-index modes it will use [fl_xpixel\(c\)](#), which is only right if the window uses the default colormap!

13.185.2.2 [gl_draw\(\)](#) [1/7]

```
void gl_draw (
    const char * str )
```

Draws a nul-terminated string in the current font at the current position.

See also

[gl_texture_pile_height\(int\)](#)

13.185.2.3 gl_draw() [2/7]

```
void gl_draw (
    const char * str,
    float x,
    float y )
```

Draws a nul-terminated string in the current font at the given position.

See also

`gl_texture_pile_height(int)`

13.185.2.4 gl_draw() [3/7]

```
void gl_draw (
    const char * str,
    int n )
```

Draws an array of n characters of the string in the current font at the current position.

See also

`gl_texture_pile_height(int)`

13.185.2.5 gl_draw() [4/7]

```
void gl_draw (
    const char * str,
    int n,
    float x,
    float y )
```

Draws n characters of the string in the current font at the given position.

See also

`gl_texture_pile_height(int)`

13.185.2.6 gl_draw() [5/7]

```
void gl_draw (
    const char * str,
    int n,
    int x,
    int y )
```

Draws n characters of the string in the current font at the given position.

See also

`gl_texture_pile_height(int)`

13.185.2.7 gl_draw() [6/7]

```
void gl_draw (
    const char * str,
    int x,
    int y )
```

Draws a nul-terminated string in the current font at the given position.

See also

`gl_texture_pile_height(int)`

13.185.2.8 `gl_draw()` [7/7]

```
void gl_draw (
    const char * str,
    int x,
    int y,
    int w,
    int h,
    Fl\_Align align )
```

Draws a string formatted into a box, with newlines and tabs expanded, other control characters changed to ^X. and aligned with the edges or center. Exactly the same output as `fl_draw()`.

13.185.2.9 `gl_font()`

```
void gl_font (
    int fontid,
    int size )
```

Sets the current OpenGL font to the same font as calling `fl_font()`.

See also

[Fl::draw_GL_text_with_textures\(int val\)](#)

13.185.2.10 `gl_rect()`

```
void gl_rect (
    int x,
    int y,
    int w,
    int h )
```

Outlines the given rectangle with the current color.

If [Fl_Gl_Window::ortho\(\)](#) has been called, then the rectangle will exactly fill the given pixel rectangle.

13.185.2.11 `gl_rectf()`

```
void gl_rectf (
    int x,
    int y,
    int w,
    int h )
```

Fills the given rectangle with the current color.

See also

`gl_rect(int x, int y, int w, int h)`

13.185.2.12 `gl_texture_pile_height()` [1/2]

```
int gl_texture_pile_height (
    void )
```

Returns the current maximum height of the pile of pre-computed string textures. The default value is 100

See also

[Fl::draw_GL_text_with_textures\(int\)](#)

13.185.2.13 gl_texture_pile_height() [2/2]

```
void gl_texture_pile_height (
    int max )
```

Changes the maximum height of the pile of pre-computed string textures.

Strings that are often re-displayed can be processed much faster if this pile is set high enough to hold all of them.

Parameters

<i>max</i>	Maximum height of the texture pile
------------	------------------------------------

See also

[Fl::draw_GL_text_with_textures\(int\)](#)

13.186 gl.h

[Go to the documentation of this file.](#)

```
00001 //
00002 // OpenGL header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2018 by Bill Spitzak and others.
00005 //
00006 // You must include this instead of GL/gl.h to get the Microsoft
00007 // APIENTRY stuff included (from <windows.h>) prior to the OpenGL
00008 // header files.
00009 //
00010 // This file also provides "missing" OpenGL functions, and
00011 // gl_start() and gl_finish() to allow OpenGL to be used in any window
00012 //
00013 // This library is free software. Distribution and use rights are outlined in
00014 // the file "COPYING" which should have been included with this file. If this
00015 // file is missing or damaged, see the license at:
00016 //
00017 //     https://www.fltk.org/COPYING.php
00018 //
00019 // Please see the following page on how to report bugs and issues:
00020 //
00021 //     https://www.fltk.org/bugs.php
00022 //
00023
00042 #ifndef FL_gl_H
00043 # define FL_gl_H
00044
00045 # include "Enumerations.H" // for color names
00046 # ifdef _WIN32
00047 #   include <windows.h>
00048 # endif
00049 # ifndef APIENTRY
00050 #   if defined(__CYGWIN__)
00051 #     define APIENTRY __attribute__((stdcall))
00052 #   else
00053 #     define APIENTRY
00054 #   endif
00055 # endif
00056
00057 # ifdef __APPLE__ // PORTME: OpenGL path abstraction
00058 #   ifndef GL_SILENCE_DEPRECATED
00059 #     define GL_SILENCE_DEPRECATED 1
00060 #   endif
00061 #   if !defined(__gl3_h_) // make sure OpenGL/gl3.h was not included before
00062 #     include <OpenGL/gl.h>
00063 #   endif
00064 #   else
00065 #     include <GL/gl.h>
00066 #   endif // __APPLE__ // PORTME: OpenGL Path abstraction
00067
00068 FL_EXPORT void gl_start();
00069 FL_EXPORT void gl_finish();
00070
00071 FL_EXPORT void gl_color(Fl_Color i);
00073 inline void gl_color(int c) {gl_color((Fl_Color)c);}
00074
00075 FL_EXPORT void gl_rect(int x,int y,int w,int h);
00076 FL_EXPORT void gl_rectf(int x,int y,int w,int h);
00077
00078 FL_EXPORT void gl_font(int fontid, int size);
00079 FL_EXPORT int gl_height();
```

```

00080 FL_EXPORT int   gl_descent();
00081 FL_EXPORT double gl_width(const char *);
00082 FL_EXPORT double gl_width(const char *, int n);
00083 FL_EXPORT double gl_width(uchar);
00084
00085 FL_EXPORT void gl_draw(const char*);
00086 FL_EXPORT void gl_draw(const char*, int n);
00087 FL_EXPORT void gl_draw(const char*, int x, int y);
00088 FL_EXPORT void gl_draw(const char*, float x, float y);
00089 FL_EXPORT void gl_draw(const char*, int n, int x, int y);
00090 FL_EXPORT void gl_draw(const char*, int n, float x, float y);
00091 FL_EXPORT void gl_draw(const char*, int x, int y, int w, int h, Fl_Align);
00092 FL_EXPORT void gl_measure(const char*, int& x, int& y);
00093 FL_EXPORT void gl_texture_pile_height(int max);
00094 FL_EXPORT int   gl_texture_pile_height();
00095 FL_EXPORT void gl_texture_reset();
00096
00097 FL_EXPORT void gl_draw_image(const uchar *, int x,int y,int w,int h, int d=3, int ld=0);
00098
00099 #endif // !FL_gl_H

```

13.187 gl2opengl.h

```

00001 /*      gl.h
00002
00003      GL to OpenGL translator.
00004      If you include this, you might be able to port old GL programs.
00005      There are also much better emulators available on the net.
00006
00007 */
00008
00009 #ifndef _FL_gl2opengl_h_
00010 #define _FL_gl2opengl_h_
00011
00012 #include <FL/gl.h>
00013 #include "gl_draw.H"
00014
00015 inline void clear() {glClear(GL_COLOR_BUFFER_BIT|GL_DEPTH_BUFFER_BIT);}
00016 #define RGBcolor(r,g,b) glColor3ub(r,g,b)
00017 #define bgnline() glBegin(GL_LINE_STRIP)
00018 #define bgnpolygon() glBegin(GL_POLYGON)
00019 #define bgnclosedline() glBegin(GL_LINE_LOOP)
00020 #define endline() glEnd()
00021 #define endpolygon() glEnd()
00022 #define endclosedline() glEnd()
00023 #define v2f(v) glVertex2fv(v)
00024 #define v2s(v) glVertex2sv(v)
00025 #define cmov(x,y,z) glRasterPos3f(x,y,z)
00026 #define charstr(s) gl_draw(s)
00027 #define fmprstr(s) gl_draw(s)
00028 typedef float Matrix[4][4];
00029 inline void pushmatrix() {glPushMatrix();}
00030 inline void popmatrix() {glPopMatrix();}
00031 inline void multmatrix(Matrix m) {glMultMatrixf((float *)m);}
00032 inline void color(int n) {glIndexi(n);}
00033 inline void rect(int x,int y,int r,int t) {gl_rect(x,y,r-x,t-y);}
00034 inline void rectf(int x,int y,int r,int t) {glRectf(x,y,r+1,t+1);}
00035 inline void recti(int x,int y,int r,int t) {gl_rect(x,y,r-x,t-y);}
00036 inline void rectfi(int x,int y,int r,int t) {glRecti(x,y,r+1,t+1);}
00037 inline void rects(int x,int y,int r,int t) {gl_rect(x,y,r-x,t-y);}
00038 inline void rectfs(int x,int y,int r,int t) {glRects(x,y,r+1,t+1);}
00039
00040 #endif /* _FL_gl2opengl_h_ */

```

13.188 gl_draw.H

```

00001 //
00002 // OpenGL header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016

```

```
00017 #include "gl.h"
00018
00019 extern FL_EXPORT void gl_remove_displaylist_fonts();
```

13.189 glu.h

```
00001 //
00002 // GLu header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // You must include this instead of GL/gl.h to get the Microsoft
00007 // APIENTRY stuff included (from <windows.h>) prior to the OpenGL
00008 // header files.
00009 //
00010 // This file also provides "missing" OpenGL functions, and
00011 // gl_start() and gl_finish() to allow OpenGL to be used in any window
00012 //
00013 // This library is free software. Distribution and use rights are outlined in
00014 // the file "COPYING" which should have been included with this file. If this
00015 // file is missing or damaged, see the license at:
00016 //
00017 //     https://www.fltk.org/COPYING.php
00018 //
00019 // Please see the following page on how to report bugs and issues:
00020 //
00021 //     https://www.fltk.org/bugs.php
00022 //
00023
00024 #ifndef FL_glu_H
00025 #   define FL_glu_H
00026
00027 #   include "Enumerations.H" // for color names
00028 #   ifdef _WIN32
00029 #       include <windows.h>
00030 #   endif
00031 #   ifndef APIENTRY
00032 #       if defined(__CYGWIN__)
00033 #           define APIENTRY __attribute__((stdcall))
00034 #       else
00035 #           define APIENTRY
00036 #       endif
00037 #   endif
00038
00039 #   ifdef __APPLE__ // PORTME: OpenGL Path abstraction
00040 #       include <OpenGL/glu.h>
00041 #   else
00042 #       include <GL/glu.h>
00043 #   endif
00044
00045 #endif // !FL_glu_H
```

13.190 glut.H

```
00001 //
00002 // GLUT emulation header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 // Emulation of GLUT using fltk.
00018
00019 // GLUT is Copyright (c) Mark J. Kilgard, 1994, 1995, 1996:
00020 // "This program is freely distributable without licensing fees and is
00021 // provided without guarantee or warranty expressed or implied. This
00022 // program is -not- in the public domain."
00023
00024 // Although I have copied the GLUT API, none of my code is based on
00025 // any GLUT implementation details and is therefore covered by the LGPL.
00026
00027 // Commented out lines indicate parts of GLUT that are not emulated.
00028
```

```

00029 // Notes: as pointed out in STR #3458 the current GLUT window,
00030 // i.e. the global static variable 'glut_window' can be NULL ...
00031 // (a) if not (yet) initialized
00032 // (b) if the current GLUT window is deleted at any time.
00033 // The FLTK implementation silently ignores function calls if the current
00034 // window is NULL to avoid dereferencing a NULL pointer. This is obviously
00035 // compatible with GLUT version 3.7 according to comment #5 on STR #3458.
00036 // According to the same comment FreeGLUT 3.0 would issue an error message
00037 // and quit.
00038 // Albrecht-S, Oct 2023
00039
00040 #ifndef _FL_glut_H_
00041 # define _FL_glut_H_
00042
00043 # include "gl.h"
00044
00045
00046 # include "Fl.H"
00047 # include "Fl_Gl_Window.H"
00048
00053 class FL_EXPORT Fl_Glut_Window : public Fl_Gl_Window {
00054     void _init();
00055     int mouse_down;
00056 protected:
00057     void draw() FL_OVERRIDE;
00058     void draw_overlay() FL_OVERRIDE;
00059     int handle(int) FL_OVERRIDE;
00060 public: // so the inline functions work
00061     int number;
00062     int menu[3];
00063     void make_current();
00064     void (*display)();
00065     void (*overlaydisplay)();
00066     void (*reshape)(int w, int h);
00067     void (*keyboard)(uchar, int x, int y);
00068     void (*mouse)(int b, int state, int x, int y);
00069     void (*motion)(int x, int y);
00070     void (*passivemotion)(int x, int y);
00071     void (*entry)(int);
00072     void (*visibility)(int);
00073     void (*special)(int, int x, int y);
00074     Fl_Glut_Window(int w, int h, const char *t=0);
00075     Fl_Glut_Window(int x, int y, int w, int h, const char *t=0);
00076     ~Fl_Glut_Window();
00077 };
00078
00079 extern FL_EXPORT Fl_Glut_Window *glut_window; // the current window
00080 extern FL_EXPORT int glut_menu; // the current menu
00081
00082 // function pointers that are not per-window:
00083 extern FL_EXPORT void (*glut_idle_function)();
00084 extern FL_EXPORT void (*glut_menustate_function)(int);
00085 extern FL_EXPORT void (*glut_menustatus_function)(int,int,int);
00086
00088
00089 //# define GLUT_API_VERSION This does not match any version of GLUT exactly...
00090
00091 FL_EXPORT void glutInit(int *argc, char **argv); // creates first window
00092
00093 FL_EXPORT void glutInitDisplayMode(unsigned int mode);
00094 // the FL_ symbols have the same value as the GLUT ones:
00095 # define GLUT_RGB FL_RGB
00096 # define GLUT_RGBA FL_RGBA
00097 # define GLUT_INDEX FL_INDEX
00098 # define GLUT_SINGLE FL_SINGLE
00099 # define GLUT_DOUBLE FL_DOUBLE
00100 # define GLUT_ACCUM FL_ACCUM
00101 # define GLUT_ALPHA FL_ALPHA
00102 # define GLUT_DEPTH FL_DEPTH
00103 # define GLUT_STENCIL FL_STENCIL
00104 # define GLUT_MULTISAMPLE FL_MULTISAMPLE
00105 # define GLUT_STEREO FL_STEREO
00106 // # define GLUT_LUMINANCE 512
00107
00108 FL_EXPORT void glutInitWindowPosition(int x, int y);
00109
00110 FL_EXPORT void glutInitWindowSize(int w, int h);
00111
00112 FL_EXPORT void glutMainLoop();
00113
00114 FL_EXPORT int glutCreateWindow(char *title);
00115 FL_EXPORT int glutCreateWindow(const char *title);
00116
00117 FL_EXPORT int glutCreateSubWindow(int win, int x, int y, int width, int height);
00118
00119 FL_EXPORT void glutDestroyWindow(int win);
00120

```

```

00121 inline void glutPostRedisplay() {
00122     if (glut_window) glut_window->redraw();
00123 }
00124
00125 FL_EXPORT void glutPostWindowRedisplay(int win);
00126
00127 FL_EXPORT void glutSwapBuffers();
00128
00129 inline int glutGetWindow() {
00130     return glut_window ? glut_window->number : 0;
00131 }
00132
00133 FL_EXPORT void glutSetWindow(int win);
00134
00135 inline void glutSetWindowTitle(char *t) {
00136     if (glut_window) glut_window->label(t);
00137 }
00138
00139 inline void glutSetIconTitle(char *t) {
00140     if (glut_window) glut_window->iconlabel(t);
00141 }
00142
00143 inline void glutPositionWindow(int x, int y) {
00144     if (glut_window) glut_window->position(x,y);
00145 }
00146
00147 inline void glutReshapeWindow(int w, int h) {
00148     if (glut_window) glut_window->size(w,h);
00149 }
00150
00151 inline void glutPopWindow() {
00152     if (glut_window) glut_window->show();
00153 }
00154
00155 inline void glutPushWindow() { /* do nothing */ }
00156
00157 inline void glutIconifyWindow() {
00158     if (glut_window) glut_window->iconize();
00159 }
00160
00161 inline void glutShowWindow() {
00162     if (glut_window) glut_window->show();
00163 }
00164
00165 inline void glutHideWindow() {
00166     if (glut_window) glut_window->hide();
00167 }
00168
00169 inline void glutFullScreen() {
00170     if (glut_window) glut_window->fullscreen();
00171 }
00172
00173 inline void glutSetCursor(Fl_Cursor cursor) {
00174     if (glut_window) glut_window->cursor(cursor);
00175 }
00176
00177 // notice that the numeric values are different than glut:
00178 # define GLUT_CURSOR_RIGHT_ARROW      ((Fl_Cursor)2)
00179 # define GLUT_CURSOR_LEFT_ARROW      ((Fl_Cursor)67)
00180 # define GLUT_CURSOR_INFO            FL_CURSOR_HAND
00181 # define GLUT_CURSOR_DESTROY        ((Fl_Cursor)45)
00182 # define GLUT_CURSOR_HELP            FL_CURSOR_HELP
00183 # define GLUT_CURSOR_CYCLE           ((Fl_Cursor)26)
00184 # define GLUT_CURSOR_SPRAY          ((Fl_Cursor)63)
00185 # define GLUT_CURSOR_WAIT           FL_CURSOR_WAIT
00186 # define GLUT_CURSOR_TEXT           FL_CURSOR_INSERT
00187 # define GLUT_CURSOR_CROSSHAIR      FL_CURSOR_CROSS
00188 # define GLUT_CURSOR_UP_DOWN        FL_CURSOR_NS
00189 # define GLUT_CURSOR_LEFT_RIGHT     FL_CURSOR_WE
00190 # define GLUT_CURSOR_TOP_SIDE       FL_CURSOR_N
00191 # define GLUT_CURSOR_BOTTOM_SIDE    FL_CURSOR_S
00192 # define GLUT_CURSOR_LEFT_SIDE      FL_CURSOR_W
00193 # define GLUT_CURSOR_RIGHT_SIDE     FL_CURSOR_E
00194 # define GLUT_CURSOR_TOP_LEFT_CORNER FL_CURSOR_NW
00195 # define GLUT_CURSOR_TOP_RIGHT_CORNER FL_CURSOR_NE
00196 # define GLUT_CURSOR_BOTTOM_RIGHT_CORNER FL_CURSOR_SE
00197 # define GLUT_CURSOR_BOTTOM_LEFT_CORNER FL_CURSOR_SW
00198 # define GLUT_CURSOR_INHERIT        FL_CURSOR_DEFAULT
00199 # define GLUT_CURSOR_NONE           FL_CURSOR_NONE
00200 # define GLUT_CURSOR_FULL_CROSSHAIR FL_CURSOR_CROSS
00201
00202 inline void glutWarpPointer(int, int) { /* do nothing */ }
00203
00204 inline void glutEstablishOverlay() {
00205     if (glut_window) glut_window->make_overlay_current();
00206 }
00207

```

```
00208 inline void glutRemoveOverlay() {
00209     if (glut_window) glut_window->hide_overlay();
00210 }
00211
00212 inline void glutUseLayer(GLenum layer) {
00213     if (!glut_window)
00214         return;
00215     layer ? glut_window->make_overlay_current() : glut_window->make_current();
00216 }
00217
00218 enum {GLUT_NORMAL, GLUT_OVERLAY};
00219
00220 inline void glutPostOverlayRedisplay() {
00221     if (glut_window) glut_window->redraw_overlay();
00222 }
00223
00224 inline void glutShowOverlay() {
00225     if (glut_window) glut_window->redraw_overlay();
00226 }
00227
00228 inline void glutHideOverlay() {
00229     if (glut_window) glut_window->hide_overlay();
00230 }
00231
00232 FL_EXPORT int glutCreateMenu(void (*)(int));
00233
00234 FL_EXPORT void glutDestroyMenu(int menu);
00235
00236 inline int glutGetMenu() {return glut_menu;}
00237
00238 inline void glutSetMenu(int m) {glut_menu = m;}
00239
00240 FL_EXPORT void glutAddMenuEntry(const char *label, int value);
00241
00242 FL_EXPORT void glutAddSubMenu(char *label, int submenu);
00243
00244 FL_EXPORT void glutChangeToMenuEntry(int item, char *labela, int value);
00245
00246 FL_EXPORT void glutChangeToSubMenu(int item, char *label, int submenu);
00247
00248 FL_EXPORT void glutRemoveMenuItem(int item);
00249
00250 inline void glutAttachMenu(int b) {
00251     if (glut_window) glut_window->menu[b] = glut_menu;
00252 }
00253
00254 inline void glutDetachMenu(int b) {
00255     if (glut_window) glut_window->menu[b] = 0;
00256 }
00257
00258 inline void glutDisplayFunc(void (*f)()) {
00259     if (glut_window) glut_window->display = f;
00260 }
00261
00262 inline void glutReshapeFunc(void (*f)(int w, int h)) {
00263     if (glut_window) glut_window->reshape = f;
00264 }
00265
00266 inline void glutKeyboardFunc(void (*f)(uchar key, int x, int y)) {
00267     if (glut_window) glut_window->keyboard = f;
00268 }
00269
00270 inline void glutMouseFunc(void (*f)(int b, int state, int x, int y)) {
00271     if (glut_window) glut_window->mouse = f;
00272 }
00273
00274 # define GLUT_LEFT_BUTTON          0
00275 # define GLUT_MIDDLE_BUTTON        1
00276 # define GLUT_RIGHT_BUTTON         2
00277 # define GLUT_DOWN                  0
00278 # define GLUT_UP                    1
00279
00280 inline void glutMotionFunc(void (*f)(int x, int y)) {
00281     if (glut_window) glut_window->motion = f;
00282 }
00283
00284 inline void glutPassiveMotionFunc(void (*f)(int x, int y)) {
00285     if (glut_window) glut_window->passivemotion = f;
00286 }
00287
00288 inline void glutEntryFunc(void (*f)(int s)) {
00289     if (glut_window) glut_window->entry = f;
00290 }
00291
00292 enum {GLUT_LEFT, GLUT_ENTERED};
00293
00294 inline void glutVisibilityFunc(void (*f)(int s)) {
```



```

00295     if (glut_window) glut_window->visibility = f;
00296 }
00297 enum {GLUT_NOT_VISIBLE, GLUT_VISIBLE};
00298
00299 FL_EXPORT void glutIdleFunc(void (*f)());
00300
00301 inline void glutTimerFunc(unsigned int msec, void (*f)(int), int value) {
00302     FL::add_timeout(msec*.001, (void *) (void *)f, (void *) (fl_intptr_t)value);
00303 }
00304
00305 inline void glutMenuStateFunc(void (*f)(int state)) {
00306     glut_menustate_function = f;
00307 }
00308 inline void glutMenuStatusFunc(void (*f)(int status, int x, int y)) {
00309     glut_menustatus_function = f;
00310 }
00311 enum {GLUT_MENU_NOT_IN_USE, GLUT_MENU_IN_USE};
00312
00312 inline void glutSpecialFunc(void (*f)(int key, int x, int y)) {
00313     if (glut_window) glut_window->special = f;
00314 }
00315
00316 # define GLUT_KEY_F1          1
00317 # define GLUT_KEY_F2          2
00318 # define GLUT_KEY_F3          3
00319 # define GLUT_KEY_F4          4
00320 # define GLUT_KEY_F5          5
00321 # define GLUT_KEY_F6          6
00322 # define GLUT_KEY_F7          7
00323 # define GLUT_KEY_F8          8
00324 # define GLUT_KEY_F9          9
00325 # define GLUT_KEY_F10         10
00326 # define GLUT_KEY_F11         11
00327 # define GLUT_KEY_F12         12
00328 // WARNING: Different values than GLUT uses:
00329 # define GLUT_KEY_LEFT        FL_Left
00330 # define GLUT_KEY_UP          FL_Up
00331 # define GLUT_KEY_RIGHT       FL_Right
00332 # define GLUT_KEY_DOWN        FL_Down
00333 # define GLUT_KEY_PAGE_UP     FL_Page_Up
00334 # define GLUT_KEY_PAGE_DOWN   FL_Page_Down
00335 # define GLUT_KEY_HOME        FL_Home
00336 # define GLUT_KEY_END         FL_End
00337 # define GLUT_KEY_INSERT      FL_Insert
00338
00339 // inline void glutSpaceballMotionFunc(void (*)(int x, int y, int z));
00340
00341 // inline void glutSpaceballRotateFunc(void (*)(int x, int y, int z));
00342
00343 // inline void glutSpaceballButtonFunc(void (*)(int button, int state));
00344
00345 // inline void glutButtonBoxFunc(void (*)(int button, int state));
00346
00347 // inline void glutDialsFunc(void (*)(int dial, int value));
00348
00349 // inline void glutTabletMotionFunc(void (*)(int x, int y));
00350
00351 // inline void glutTabletButtonFunc(void (*)(int button, int state, int x, int y));
00352
00353 inline void glutOverlayDisplayFunc(void (*f)()) {
00354     if (glut_window) glut_window->overlaydisplay = f;
00355 }
00356
00357 // inline void glutWindowStatusFunc(void (*)(int state));
00358 // enum {GLUT_HIDDEN, GLUT_FULLY_RETAINED, GLUT_PARTIALLY_RETAINED,
00359 //        GLUT_FULLY_COVERED};
00360
00361 // inline void glutSetColor(int, GLfloat red, GLfloat green, GLfloat blue);
00362
00363 // inline GLfloat glutGetColor(int ndx, int component);
00364 // #define GLUT_RED            0
00365 // #define GLUT_GREEN          1
00366 // #define GLUT_BLUE           2
00367
00368 // inline void glutCopyColormap(int win);
00369
00370 // Warning: values are changed from GLUT!
00371 // Also relies on the GL_ symbols having values greater than 100
00372 FL_EXPORT int glutGet(GLenum type);
00373 enum {
00374     GLUT_RETURN_ZERO = 0,
00375     GLUT_WINDOW_X,
00376     GLUT_WINDOW_Y,
00377     GLUT_WINDOW_WIDTH,
00378     GLUT_WINDOW_HEIGHT,
00379     GLUT_WINDOW_PARENT,
00380     GLUT_SCREEN_WIDTH,
00381     GLUT_SCREEN_HEIGHT,

```

```

00382 GLUT_MENU_NUM_ITEMS,
00383 GLUT_DISPLAY_MODE_POSSIBLE,
00384 GLUT_INIT_WINDOW_X,
00385 GLUT_INIT_WINDOW_Y,
00386 GLUT_INIT_WINDOW_WIDTH,
00387 GLUT_INIT_WINDOW_HEIGHT,
00388 GLUT_INIT_DISPLAY_MODE,
00389 GLUT_WINDOW_BUFFER_SIZE,
00390 GLUT_VERSION,
00391 //GLUT_WINDOW_NUM_CHILDREN,
00392 //GLUT_WINDOW_CURSOR,
00393 //GLUT_SCREEN_WIDTH_MM,
00394 //GLUT_SCREEN_HEIGHT_MM,
00395 GLUT_ELAPSED_TIME
00396 };
00397
00398 # define GLUT_WINDOW_STENCIL_SIZE      GL_STENCIL_BITS
00399 # define GLUT_WINDOW_DEPTH_SIZE       GL_DEPTH_BITS
00400 # define GLUT_WINDOW_RED_SIZE         GL_RED_BITS
00401 # define GLUT_WINDOW_GREEN_SIZE      GL_GREEN_BITS
00402 # define GLUT_WINDOW_BLUE_SIZE       GL_BLUE_BITS
00403 # define GLUT_WINDOW_ALPHA_SIZE      GL_ALPHA_BITS
00404 # define GLUT_WINDOW_ACCUM_RED_SIZE  GL_ACCUM_RED_BITS
00405 # define GLUT_WINDOW_ACCUM_GREEN_SIZE GL_ACCUM_GREEN_BITS
00406 # define GLUT_WINDOW_ACCUM_BLUE_SIZE GL_ACCUM_BLUE_BITS
00407 # define GLUT_WINDOW_ACCUM_ALPHA_SIZE GL_ACCUM_ALPHA_BITS
00408 # define GLUT_WINDOW_DOUBLEBUFFER    GL_DOUBLEBUFFER
00409 # define GLUT_WINDOW_RGBA            GL_RGBA
00410 # define GLUT_WINDOW_COLORMAP_SIZE   GL_INDEX_BITS
00411 # ifdef GL_SAMPLES_SGIS
00412 #   define GLUT_WINDOW_NUM_SAMPLES   GL_SAMPLES_SGIS
00413 # else
00414 #   define GLUT_WINDOW_NUM_SAMPLES   GLUT_RETURN_ZERO
00415 # endif
00416 # define GLUT_WINDOW_STEREO          GL_STEREO
00417
00418 # define GLUT_HAS_KEYBOARD            600
00419 # define GLUT_HAS_MOUSE               601
00420 # define GLUT_HAS_SPACEBALL           602
00421 # define GLUT_HAS_DIAL_AND_BUTTON_BOX 603
00422 # define GLUT_HAS_TABLET              604
00423 # define GLUT_NUM_MOUSE_BUTTONS       605
00424 # define GLUT_NUM_SPACEBALL_BUTTONS   606
00425 # define GLUT_NUM_BUTTON_BOX_BUTTONS  607
00426 # define GLUT_NUM_DIALS                608
00427 # define GLUT_NUM_TABLET_BUTTONS      609
00428 FL_EXPORT int glutDeviceGet(GLenum type);
00429
00430 // WARNING: these values are different than GLUT uses:
00431 # define GLUT_ACTIVE_SHIFT            FL_SHIFT
00432 # define GLUT_ACTIVE_CTRL             FL_CTRL
00433 # define GLUT_ACTIVE_ALT              FL_ALT
00434
00435 inline int glutGetModifiers() {
00436     return Fl::event_state() & (GLUT_ACTIVE_SHIFT | GLUT_ACTIVE_CTRL | GLUT_ACTIVE_ALT);
00437 }
00438
00439 FL_EXPORT int glutLayerGet(GLenum);
00440 # define GLUT_OVERLAY_POSSIBLE        800
00441 // #define GLUT_LAYER_IN_USE           801
00442 // #define GLUT_HAS_OVERLAY           802
00443 # define GLUT_TRANSPARENT_INDEX       803
00444 # define GLUT_NORMAL_DAMAGED         804
00445 # define GLUT_OVERLAY_DAMAGED        805
00446
00447 extern "C" {
00448     typedef void (*GLUTproc)();
00449 }
00450
00451 FL_EXPORT GLUTproc glutGetProcAddress(const char *procName);
00452
00453 // inline int glutVideoResizeGet(GLenum param);
00454 // #define GLUT_VIDEO_RESIZE_POSSIBLE  900
00455 // #define GLUT_VIDEO_RESIZE_IN_USE    901
00456 // #define GLUT_VIDEO_RESIZE_X_DELTA   902
00457 // #define GLUT_VIDEO_RESIZE_Y_DELTA   903
00458 // #define GLUT_VIDEO_RESIZE_WIDTH_DELTA 904
00459 // #define GLUT_VIDEO_RESIZE_HEIGHT_DELTA 905
00460 // #define GLUT_VIDEO_RESIZE_X        906
00461 // #define GLUT_VIDEO_RESIZE_Y        907
00462 // #define GLUT_VIDEO_RESIZE_WIDTH    908
00463 // #define GLUT_VIDEO_RESIZE_HEIGHT   909
00464
00465 // inline void glutSetupVideoResizing();
00466
00467 // inline void glutStopVideoResizing();
00468

```

```

00469 // inline void glutVideoResize(int x, int y, int width, int height);
00470
00471 // inline void glutVideoPan(int x, int y, int width, int height);
00472
00473 // Font argument must be a void* for compatibility, so...
00475 struct Fl_Glut_Bitmap_Font {Fl_Font font; Fl_Fontsize size;};
00476
00477 extern FL_EXPORT struct Fl_Glut_Bitmap_Font
00478     glutBitmap9By15, glutBitmap8By13, glutBitmapTimesRoman10,
00479     glutBitmapTimesRoman24, glutBitmapHelvetica0, glutBitmapHelvetica12,
00480     glutBitmapHelvetica18;
00481 # define GLUT_BITMAP_9_BY_15           (&glutBitmap9By15)
00482 # define GLUT_BITMAP_8_BY_13           (&glutBitmap8By13)
00483 # define GLUT_BITMAP_TIMES_ROMAN_10    (&glutBitmapTimesRoman10)
00484 # define GLUT_BITMAP_TIMES_ROMAN_24    (&glutBitmapTimesRoman24)
00485 # define GLUT_BITMAP_HELVETICA_10      (&glutBitmapHelvetica10)
00486 # define GLUT_BITMAP_HELVETICA_12      (&glutBitmapHelvetica12)
00487 # define GLUT_BITMAP_HELVETICA_18      (&glutBitmapHelvetica18)
00488
00489 FL_EXPORT void glutBitmapCharacter(void *font, int character);
00490 FL_EXPORT int glutBitmapHeight(void *font);
00491 FL_EXPORT int glutBitmapLength(void *font, const unsigned char *string);
00492 FL_EXPORT void glutBitmapString(void *font, const unsigned char *string);
00493 FL_EXPORT int glutBitmapWidth(void *font, int character);
00494
00495 FL_EXPORT int glutExtensionSupported(char *name);
00496
00497 /* GLUT stroked font sub-API */
00498 struct Fl_Glut_StrokeVertex {
00499     GLfloat X, Y;
00500 };
00501
00502 struct Fl_Glut_StrokeStrip {
00503     int Number;
00504     const Fl_Glut_StrokeVertex* Vertices;
00505 };
00506
00507 struct Fl_Glut_StrokeChar {
00508     GLfloat Right;
00509     int Number;
00510     const Fl_Glut_StrokeStrip* Strips;
00511 };
00512
00513 struct Fl_Glut_StrokeFont {
00514     char* Name; // The source font name
00515     int Quantity; // Number of chars in font
00516     GLfloat Height; // Height of the characters
00517     const Fl_Glut_StrokeChar** Characters; // The characters mapping
00518 };
00519 extern FL_EXPORT Fl_Glut_StrokeFont glutStrokeRoman;
00520 extern FL_EXPORT Fl_Glut_StrokeFont glutStrokeMonoRoman;
00521 # define GLUT_STROKE_ROMAN             (&glutStrokeRoman)
00522 # define GLUT_STROKE_MONO_ROMAN        (&glutStrokeMonoRoman)
00523
00524 FL_EXPORT void glutStrokeCharacter(void *font, int character);
00525 FL_EXPORT GLfloat glutStrokeHeight(void *font);
00526 FL_EXPORT int glutStrokeLength(void *font, const unsigned char *string);
00527 FL_EXPORT void glutStrokeString(void *font, const unsigned char *string);
00528 FL_EXPORT int glutStrokeWidth(void *font, int character);
00529
00530 /* GLUT pre-built models sub-API */
00531 FL_EXPORT void glutWireSphere(GLdouble radius, GLint slices, GLint stacks);
00532 FL_EXPORT void glutSolidSphere(GLdouble radius, GLint slices, GLint stacks);
00533 FL_EXPORT void glutWireCone(GLdouble base, GLdouble height, GLint slices, GLint stacks);
00534 FL_EXPORT void glutSolidCone(GLdouble base, GLdouble height, GLint slices, GLint stacks);
00535 FL_EXPORT void glutWireCube(GLdouble size);
00536 FL_EXPORT void glutSolidCube(GLdouble size);
00537 FL_EXPORT void glutWireTorus(GLdouble innerRadius, GLdouble outerRadius, GLint sides, GLint rings);
00538 FL_EXPORT void glutSolidTorus(GLdouble innerRadius, GLdouble outerRadius, GLint sides, GLint rings);
00539 FL_EXPORT void glutWireDodecahedron();
00540 FL_EXPORT void glutSolidDodecahedron();
00541 FL_EXPORT void glutWireTeapot(GLdouble size);
00542 FL_EXPORT void glutSolidTeapot(GLdouble size);
00543 FL_EXPORT void glutWireOctahedron();
00544 FL_EXPORT void glutSolidOctahedron();
00545 FL_EXPORT void glutWireTetrahedron();
00546 FL_EXPORT void glutSolidTetrahedron();
00547 FL_EXPORT void glutWireIcosahedron();
00548 FL_EXPORT void glutSolidIcosahedron();
00549
00550 #endif // !_FL_glut_H_

```

13.191 mac.H File Reference

Mac OS X-specific symbols.

Classes

- class [Fl_Mac_App_Menu](#)

Functions

- [Fl_Window](#) * [fl_mac_find](#) (FLWindow *)
Returns the [Fl_Window](#) corresponding to the given macOS-specific window reference.
- CGContextRef [fl_mac_gc](#) ()
Returns the macOS-specific graphics context for the current window.
- void [fl_mac_set_about](#) (FL_Callback *cb, void *user_data, int shortcut=0)
Attaches a callback to the "About myprog" item of the system application menu.
- FLWindow * [fl_mac_xid](#) (const [Fl_Window](#) *win)
Returns the macOS-specific window reference corresponding to the given [Fl_Window](#) object.

Variables

- int [fl_mac_os_version](#)
The version number of the running Mac OS X (e.g., 100604 for 10.6.4, 101300 for 10.13, 140102 for 14.1.2).

13.191.1 Detailed Description

Mac OS X-specific symbols.

13.192 mac.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Mac header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2018 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 // Do not directly include this file, instead use <FL/platform.H>. It will
00018 // include this file if "__APPLE__" is defined. This is to encourage
00019 // portability of even the system-specific code...
00020 #ifndef FL_DOXYGEN
00021
00022 #if !defined(FL_PLATFORM_H)
00023 #   error "Never use <FL/mac.H> directly; include <FL/platform.H> instead."
00024 #endif // !FL_PLATFORM_H
00025
00026 #ifdef __OBJC__
00027     @class NSOpenGLContext;
00028 #   ifndef GL_SILENCE_DEPRECATION
00029 #       define GL_SILENCE_DEPRECATION 1
00030 #   endif
00031 #elif defined(__cplusplus)
00032     class NSOpenGLContext;
00033 #endif /* __OBJC__ */
00034 extern NSOpenGLContext *fl_mac_glcontext (GLContext rc);
00035
00036 #ifdef __OBJC__
00037 @class FLWindow; // a subclass of the NSWindow Cocoa class
00038 typedef FLWindow *Window;
00039 #else

```

```

00040 typedef class FLWindow *Window; // pointer to the FLWindow objective-c class
00041 #endif // __OBJC__
00042
00043 #include <FL/Fl_Widget.H> // for Fl_Callback
00044
00045 #if (defined(FL_LIBRARY) || defined(FL_INTERNALS)) // this part must be compiled when building the
    FLTK libraries
00046
00047 // Standard MacOS C/C++ includes...
00048 #include <ApplicationServices/ApplicationServices.h>
00049 #undef check // because of Fl::check()
00050
00051 #ifndef MAC_OS_X_VERSION_10_4
00052 #define MAC_OS_X_VERSION_10_4 1040
00053 #endif
00054 #ifndef MAC_OS_X_VERSION_10_5
00055 #define MAC_OS_X_VERSION_10_5 1050
00056 #endif
00057 #ifndef MAC_OS_X_VERSION_10_6
00058 #define MAC_OS_X_VERSION_10_6 1060
00059 #endif
00060 #ifndef MAC_OS_X_VERSION_10_7
00061 #define MAC_OS_X_VERSION_10_7 1070
00062 #endif
00063 #ifndef MAC_OS_X_VERSION_10_8
00064 #define MAC_OS_X_VERSION_10_8 1080
00065 #endif
00066 #ifndef MAC_OS_X_VERSION_10_9
00067 #define MAC_OS_X_VERSION_10_9 1090
00068 #endif
00069 #ifndef MAC_OS_X_VERSION_10_10
00070 #define MAC_OS_X_VERSION_10_10 101000
00071 #endif
00072 #ifndef MAC_OS_X_VERSION_10_11
00073 #define MAC_OS_X_VERSION_10_11 101100
00074 #endif
00075 #ifndef MAC_OS_X_VERSION_10_12
00076 #define MAC_OS_X_VERSION_10_12 101200
00077 #endif
00078 #ifndef MAC_OS_X_VERSION_10_13
00079 #define MAC_OS_X_VERSION_10_13 101300
00080 #endif
00081 #ifndef MAC_OS_X_VERSION_10_14
00082 #define MAC_OS_X_VERSION_10_14 101400
00083 #endif
00084 #ifndef MAC_OS_X_VERSION_10_15
00085 #define MAC_OS_X_VERSION_10_15 101500
00086 #endif
00087 #ifndef MAC_OS_X_VERSION_10_16
00088 #define MAC_OS_X_VERSION_10_16 101600
00089 #endif
00090 #ifndef MAC_OS_VERSION_11_0
00091 #define MAC_OS_VERSION_11_0 110000
00092 #endif
00093 #ifndef MAC_OS_VERSION_12_0
00094 #define MAC_OS_VERSION_12_0 120000
00095 #endif
00096 #ifndef MAC_OS_VERSION_13_0
00097 #define MAC_OS_VERSION_13_0 130000
00098 #endif
00099 #ifndef MAC_OS_VERSION_14_0
00100 #define MAC_OS_VERSION_14_0 140000
00101 #endif
00102
00103
00104 #ifndef NSINTEGER_DEFINED // appears with 10.5 in NSObjCRuntime.h
00105 #if defined(__LP64__) && __LP64__
00106 typedef long NSInteger;
00107 typedef unsigned long NSUInteger;
00108 #else
00109 typedef int NSInteger;
00110 typedef unsigned int NSUInteger;
00111 #endif
00112 #endif
00113
00114 #if MAC_OS_X_VERSION_MAX_ALLOWED < MAC_OS_X_VERSION_10_4
00115 typedef CGImageAlphaInfo CGBitmapInfo;
00116 #endif
00117
00118 struct flCocoaRegion {
00119     int count;
00120     CGRect *rects;
00121 }; // a region is the union of a series of rectangles
00122
00123 #ifndef CGFLOAT_DEFINED //appears with 10.5 in CGBase.h
00124 #if defined(__LP64__) && __LP64__
00125 typedef double CGFloat;

```

```

00126 #else
00127 typedef float CGFloat;
00128 #endif
00129 #endif // CGFLOAT_DEFINED
00130
00131 #else
00132
00133 typedef struct CGContext* CGContextRef;
00134
00135 #endif // FL_LIBRARY || FL_INTERNALS
00136
00137 extern CGContextRef fl_gc;
00138
00139 #endif // FL_DOXYGEN
00154 void fl_mac_set_about(FL_Callback *cb, void *user_data, int shortcut = 0);
00155
00157 extern CGContextRef fl_mac_gc();
00159 extern FLWindow *fl_mac_xid(const FL_Window *win);
00161 extern FL_Window *fl_mac_find(FLWindow *);
00162 class FL_Gl_Window;
00163
00169 extern int fl_mac_os_version;
00170
00171 struct FL_Menu_Item;
00172
00173 class FL_Mac_App_Menu {
00174 public:
00176     static const char *about;
00181     static const char *print;
00183     static const char *print_no_titlebar;
00185     static const char *toggle_print_titlebar;
00187     static const char *services;
00189     static const char *hide;
00191     static const char *hide_others;
00193     static const char *show;
00195     static const char *quit;
00201     static void custom_application_menu_items(const FL_Menu_Item *m);
00202 };
00203

```

13.193 math.h

```

00001 //
00002 // Math header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2020 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 // Xcode on macOS includes files by recursing down into directories.
00018 // This code catches the cycle and directly includes the required file.
00019 #ifndef fl_math_h_cyclic_include
00020 # include "/usr/include/math.h"
00021 #endif
00022
00023 #ifndef fl_math_h
00024 # define fl_math_h
00025
00026 # define fl_math_h_cyclic_include
00027 # include <math.h>
00028 # undef fl_math_h_cyclic_include
00029
00030 # ifndef M_PI
00031 #     define M_PI                3.14159265358979323846
00032 #     define M_PI_2              1.57079632679489661923
00033 #     define M_PI_4              0.78539816339744830962
00034 #     define M_1_PI              0.31830988618379067154
00035 #     define M_2_PI              0.63661977236758134308
00036 # endif // !M_PI
00037
00038 # ifndef M_SQRT2
00039 #     define M_SQRT2             1.41421356237309504880
00040 #     define M_SQRT1_2          0.70710678118654752440
00041 # endif // !M_SQRT2
00042
00043 # if (defined(WIN32) || defined(CRAY)) && !defined(__MINGW32__)

```

```

00044
00045 inline double rint(double v) {return floor(v+.5);}
00046 inline double copysign(double a, double b) {return b<0 ? -a : a;}
00047
00048 #  endif //  (_WIN32 || CRAY) && !__MINGW32__
00049
00050 #endif //  !fl_math_h

```

13.194 names.h File Reference

This file defines arrays of human readable names for FLTK symbolic constants.

Variables

- const char *const [fl_callback_reason_names](#) []
This is an array of callback reason names you can use to convert font numbers into names.
- const char *const [fl_eventnames](#) []
This is an array of event names you can use to convert event numbers into names.
- const char *const [fl_fontnames](#) []
This is an array of font names you can use to convert font numbers into names.

13.194.1 Detailed Description

This file defines arrays of human readable names for FLTK symbolic constants.

13.195 names.h

[Go to the documentation of this file.](#)

```

00001 //
00002 // Event names header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 // Thanks to Greg Ercolano for this addition.
00018
00024 #ifndef FL_NAMES_H
00025 #define FL_NAMES_H
00026
00046 const char * const fl_eventnames[] =
00047 {
00048     "FL_NO_EVENT",
00049     "FL_PUSH",
00050     "FL_RELEASE",
00051     "FL_ENTER",
00052     "FL_LEAVE",
00053     "FL_DRAG",
00054     "FL_FOCUS",
00055     "FL_UNFOCUS",
00056     "FL_KEYDOWN",
00057     "FL_KEYUP",
00058     "FL_CLOSE",
00059     "FL_MOVE",
00060     "FL_SHORTCUT",
00061     "FL_DEACTIVATE",
00062     "FL_ACTIVATE",
00063     "FL_HIDE",
00064     "FL_SHOW",
00065     "FL_PASTE",
00066     "FL_SELECTIONCLEAR",
00067     "FL_MOUSEWHEEL",
00068     "FL_DND_ENTER",
00069     "FL_DND_DRAG",

```

```

00070 "FL_DND_LEAVE",
00071 "FL_DND_RELEASE",
00072 "FL_SCREEN_CONFIGURATION_CHANGED",
00073 "FL_FULLSCREEN",
00074 "FL_ZOOM_GESTURE",
00075 "FL_ZOOM_EVENT",
00076 "FL_EVENT_28", // not yet defined, just in case it /will/ be defined ...
00077 "FL_EVENT_29", // not yet defined, just in case it /will/ be defined ...
00078 "FL_EVENT_30" // not yet defined, just in case it /will/ be defined ...
00079 };
00080
00098 const char * const fl_fontnames[] =
00099 {
00100 "FL_HELVETICA",
00101 "FL_HELVETICA_BOLD",
00102 "FL_HELVETICA_ITALIC",
00103 "FL_HELVETICA_BOLD_ITALIC",
00104 "FL_COURIER",
00105 "FL_COURIER_BOLD",
00106 "FL_COURIER_ITALIC",
00107 "FL_COURIER_BOLD_ITALIC",
00108 "FL_TIMES",
00109 "FL_TIMES_BOLD",
00110 "FL_TIMES_ITALIC",
00111 "FL_TIMES_BOLD_ITALIC",
00112 "FL_SYMBOL",
00113 "FL_SCREEN",
00114 "FL_SCREEN_BOLD",
00115 "FL_ZAPF_DINGBATS",
00116 };
00117
00123 const char * const fl_callback_reason_names[] =
00124 {
00125 "FL_REASON_UNKNOWN",
00126 "FL_REASON_SELECTED",
00127 "FL_REASON_DESELECTED",
00128 "FL_REASON_RESELECTED",
00129 "FL_REASON_OPENED",
00130 "FL_REASON_CLOSED",
00131 "FL_REASON_DRAGGED",
00132 "FL_REASON_CANCELLED",
00133 "FL_REASON_CHANGED",
00134 "FL_REASON_GOT_FOCUS",
00135 "FL_REASON_LOST_FOCUS",
00136 "FL_REASON_RELEASED",
00137 "FL_REASON_ENTER_KEY",
00138 NULL, NULL, NULL,
00139 NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL,
00140 NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL,
00141 "FL_REASON_USER", "FL_REASON_USER+1", "FL_REASON_USER+2", "FL_REASON_USER+3",
00142 };
00143
00146 #endif /* FL_NAMES_H */

```

13.196 platform.H

```

00001 //
00002 // Platform header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 // https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 // https://www.fltk.org/bugs.php
00015 //
00016
00017 // These are FLTK symbols that are necessary or useful for calling
00018 // platform specific functions. This file #include's certain platform
00019 // specific system header files that are necessary to declare platform
00020 // specific FLTK functions, for instance "Windows.h" under Windows.
00021
00022 // You should include this file if (and ONLY if) you need to call
00023 // platform specific functions directly.
00024
00025 // See FLTK documentation: chapter "Operating System Issues" on when
00026 // you need to #include <FL/platform.H>
00027
00028 #if !defined(FL_PLATFORM_H) && !defined(FL_DOXYGEN)
00029 # define FL_PLATFORM_H

```



```

00030
00031 #   include <FL/Fl_Export.H>
00032 #   include <FL/platform_types.h> // will bring in FL/fl_config.h
00033 #   include <FL/fl_types.h> // for uchar
00034 class Fl_Window;
00035
00036 #   ifdef _WIN32
00037 #       include "win32.H"
00038 #   elif defined(FLTK_USE_WAYLAND)
00039 #       include "wayland.H"
00040 #   elif defined(FLTK_USE_X11)
00041 #       include "x11.H"
00042 #   elif defined(__APPLE__)
00043 #       include "mac.H"
00044 #   endif // _WIN32
00045
00046 //
00047 // cross-platform declarations
00048 //
00049 #if defined(FL_LIBRARY) || defined(FL_INTERNALS)
00050 #   include <FL/Fl_Window.H>
00051
00052 class FL_EXPORT Fl_X {
00053 public:
00054     fl_uintptr_t xid;
00055     Fl_Window* w;
00056     Fl_Region region;
00057     Fl_X *next;
00058     // static variables, static functions and member functions
00059     static Fl_X* first;
00060     static Fl_X* flx(const Fl_Window* w) {return w ? (Fl_X*)w->flx_ : 0;}
00061 #   if defined(FLTK_USE_X11) && FLTK_USE_X11 // for backward compatibility
00062     static void make_xid(Fl_Window*, XVisualInfo* =fl_visual, Colormap=fl_colormap);
00063     static Fl_X* set_xid(Fl_Window*, Window);
00064     static inline Fl_X* i(const Fl_Window* w) {return flx(w);}
00065 #   endif
00066 };
00067
00068 inline Window fl_xid(const Fl_Window* w) { Fl_X *xTemp = Fl_X::flx(w); return xTemp ?
(Window)xTemp->xid : 0; }
00069 #else
00070 extern FL_EXPORT Window fl_xid_(const Fl_Window* w);
00071 #   define fl_xid(w) fl_xid_(w)
00072 #endif // FL_LIBRARY || FL_INTERNALS
00073
00074 extern FL_EXPORT Fl_Window* fl_find(Window xid);
00075 extern FL_EXPORT void fl_open_display();
00076 extern FL_EXPORT void fl_close_display();
00077 extern FL_EXPORT Window fl_window;
00078 extern FL_EXPORT int fl_parse_color(const char* p, uchar& r, uchar& g, uchar& b);
00079 extern FL_EXPORT void fl_open_callback(void (*)(const char *));
00080
00081 #endif // !FL_PLATFORM_H

```

13.197 platform_types.h File Reference

Definitions of platform-dependent types.

Macros

- #define **FL_COMMAND** opaque
An alias for FL_CTRL on Windows and X11, or FL_META on MacOS X.
- #define **FL_CONTROL** opaque
An alias for FL_META on Windows and X11, or FL_CTRL on MacOS X.

Typedefs

- typedef opaque **fl_intptr_t**
An integral type large enough to store a pointer or a long value.
- typedef opaque **Fl_Offscreen**
Platform-specific value representing an offscreen drawing buffer.
- typedef struct opaque * **Fl_Region**
Pointer to a platform-specific structure representing a collection of rectangles.
- typedef opaque **FL_SOCKET**

- socket or file descriptor*

 - typedef opaque [Fl_Timestamp](#)
Platform-specific point in time, used for delta time calculation.
 - typedef opaque [fl_uintptr_t](#)
An unsigned integral type large enough to store a pointer or an unsigned long value.
 - typedef struct opaque * [GLContext](#)
Pointer to a platform-specific structure representing the window's OpenGL rendering context.

13.197.1 Detailed Description

Definitions of platform-dependent types.

The exact nature of these types varies with the platform. Therefore, portable FLTK applications should not assume these types have a specific size, or that they are pointers.

13.197.2 Typedef Documentation

13.197.2.1 fl_intptr_t

```
typedef opaque fl_intptr_t
```

An integral type large enough to store a pointer or a long value.

A pointer value can be safely cast to `fl_intptr_t`, and later cast back to its initial pointer type without change to the pointer value. A variable of type `fl_intptr_t` can also store a long int value.

13.197.2.2 Fl_Offscreen

```
typedef opaque Fl_Offscreen
```

Platform-specific value representing an offscreen drawing buffer.

Note

This value can be safely cast to these types on each platform:

- X11: Pixmap
- Wayland: `cairo_t *`
- Windows: HBITMAP
- macOS: `CGContextRef`

13.197.2.3 Fl_Region

```
typedef struct opaque* Fl_Region
```

Pointer to a platform-specific structure representing a collection of rectangles.

Note

This pointer can be safely cast to these types on each platform:

- X11: Region as defined by X11
- Wayland: `struct flCairoRegion *`
- Windows: HRGN
- macOS: `struct flCocoaRegion *`

13.197.2.4 Fl_Timestamp

```
typedef opaque Fl_Timestamp
```

Platform-specific point in time, used for delta time calculation.

Note

This type may be a struct. `sizeof(Fl_Timestamp)` may be different on different platforms. `Fl_Timestamp` may change with future ABI changes.

13.197.2.5 fl_uintptr_t

```
typedef opaque fl_uintptr_t
```

An unsigned integral type large enough to store a pointer or an unsigned long value.

A pointer value can be safely cast to fl_uintptr_t, and later cast back to its initial pointer type without change to the pointer value. A variable of type fl_uintptr_t can also store an unsigned long int value.

13.197.2.6 GLContext

```
typedef struct opaque* GLContext
```

Pointer to a platform-specific structure representing the window's OpenGL rendering context.

Note

This pointer can be safely cast to these types on each platform:

- X11: GLXContext
- Wayland: EGLContext
- Windows: HGLRC
- macOS: NSOpenGLContext *

13.198 platform_types.h

[Go to the documentation of this file.](#)

```
00001 /*
00002  * Copyright 2016-2023 by Bill Spitzak and others.
00003  *
00004  * This library is free software. Distribution and use rights are outlined in
00005  * the file "COPYING" which should have been included with this file. If this
00006  * file is missing or damaged, see the license at:
00007  *
00008  *     https://www.fltk.org/COPYING.php
00009  *
00010  * Please see the following page on how to report bugs and issues:
00011  *
00012  *     https://www.fltk.org/bugs.php
00013  */
00014
00015 #ifndef Fl_Platform_Types_H
00016 #define Fl_Platform_Types_H
00017
00025 #ifndef FL_DOXYGEN
00026
00031 typedef opaque fl_intptr_t;
00036 typedef opaque fl_uintptr_t;
00037
00046 typedef opaque Fl_Offscreen;
00047
00056 typedef struct opaque *Fl_Region;
00057 typedef opaque FL_SOCKET;
00066 typedef struct opaque *GLContext;
00067
00073 typedef opaque Fl_Timestamp;
00074
00075 # define FL_COMMAND opaque
00076 # define FL_CONTROL opaque
00078 #else /* FL_DOXYGEN */
00079
00080 #ifndef FL_PLATFORM_TYPES_H
00081 #define FL_PLATFORM_TYPES_H
00082
00083 #include <FL/fl_config.h>
00084 #include <time.h> // for time_t
00085
00086 /* Platform-dependent types are defined here.
00087  These types must be defined by any platform:
00088  FL_SOCKET, struct dirent, fl_intptr_t, fl_uintptr_t
00089
00090  NOTE: *FIXME* AlbrechtS 13 Apr 2016 (concerning FL_SOCKET)
00091  -----
00092  The Fl::add_fd() API is partially inconsistent because some of the methods
00093  explicitly use 'int', but the callback typedefs use FL_SOCKET. With the
00094  definition of FL_SOCKET below we can have different data sizes and
00095  different signedness of socket numbers on *some* platforms.
00096  */
00097
```

```

00098 #ifdef _WIN64
00099
00100 #if defined(_MSC_VER) && (_MSC_VER < 1600)
00101 # include <stdint.h> /*stdint.h not available before VS 2010 (1600) */
00102 #else
00103 # include <stdint.h>
00104 #endif
00105
00106 typedef intptr_t fl_intptr_t;
00107 typedef uintptr_t fl_uintptr_t;
00108
00109 #else /* !_WIN64 */
00110
00111 typedef long fl_intptr_t;
00112 typedef unsigned long fl_uintptr_t;
00113
00114 #endif /* !_WIN64 */
00115
00116 typedef void *GLContext;
00117 typedef void *Fl_Region;
00118 typedef fl_uintptr_t Fl_Offscreen;
00119
00120 /* Allows all hybrid combinations except WIN32 + X11 with MSVC */
00121 #if defined(_WIN32) && !defined(__MINGW32__)
00122 struct dirent {char d_name[1];};
00123 #else
00124 # include <dirent.h>
00125 #endif
00126
00127 # if defined(_WIN64) && defined(_MSC_VER)
00128 typedef unsigned __int64 FL_SOCKET; /* *FIXME* - FL_SOCKET (see above) */
00129 # else
00130 typedef int FL_SOCKET;
00131 # endif
00132
00133 #include <FL/Fl_Export.H>
00134 extern FL_EXPORT int fl_command_modifier();
00135 extern FL_EXPORT int fl_control_modifier();
00136 # define FL_COMMAND fl_command_modifier()
00137 # define FL_CONTROL fl_control_modifier()
00138
00139 #endif /* FL_PLATFORM_TYPES_H */
00140
00141 // This is currently the same for all platforms, but may change in the future
00142 struct Fl_Timestamp_t {
00143     time_t sec;
00144     int usec;
00145 };
00146
00147 typedef struct Fl_Timestamp_t Fl_Timestamp;
00148
00149 #endif /* FL_DOXYGEN */
00150
00151 #endif /* Fl_Platform_Types_H */
00152

```

13.199 wayland.H File Reference

Definitions of functions specific to the Wayland platform.

Typedefs

- typedef struct _cairo **cairo_t**
- typedef void * **EGLContext**

Functions

- struct wl_compositor * **fl_wl_compositor** ()
Returns the wl_compositor of the current Wayland session.
- struct wl_display * **fl_wl_display** ()
Returns the Wayland display in use.
- [Fl_Window](#) * **fl_wl_find** (struct wld_window *)
Returns the [Fl_Window](#) corresponding to a given the platform-specific window reference.
- cairo_t * **fl_wl_gc** ()
Returns the cairo context associated to the current window or [Fl_Image_Surface](#).

- EGLContext **fl_wl_glcontext** (GLContext rc)
Returns the EGLContext corresponding to the given GLContext.
- struct wl_surface * **fl_wl_surface** (struct wld_window *xid)
Returns the wl_surface associated to a shown window.
- struct wld_window * **fl_wl_xid** (const FL_Window *win)
Returns a platform-specific reference associated to a shown window.

13.199.1 Detailed Description

Definitions of functions specific to the Wayland platform.

13.199.2 Function Documentation

13.199.2.1 fl_wl_compositor()

```
struct wl_compositor * fl_wl_compositor ( ) [extern]
```

Returns the wl_compositor of the current Wayland session.

This allows, for example, to create a wl_surface with

```
struct wl_surface *my_wl_surface = wl_compositor_create_surface(fl_wl_compositor());
```

13.200 wayland.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // Wayland/X11 hybrid platform header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #if !defined(FL_PLATFORM_H)
00018 #   error "Never use <FL/wayland.H> directly; include <FL/platform.H> instead."
00019 #endif // !FL_PLATFORM_H
00020
00025 // ***** for Wayland component *****
00026
00027 typedef struct _cairo cairo_t;
00028
00030 extern FL_EXPORT struct wl_display *fl_wl_display();
00032 extern FL_EXPORT struct wl_surface *fl_wl_surface(struct wld_window *xid);
00034 extern FL_EXPORT struct wld_window *fl_wl_xid(const FL_Window *win);
00036 extern FL_EXPORT FL_Window *fl_wl_find(struct wld_window *);
00038 extern FL_EXPORT cairo_t *fl_wl_gc();
00045 extern FL_EXPORT struct wl_compositor *fl_wl_compositor();
00046 typedef void *EGLContext;
00048 extern FL_EXPORT EGLContext fl_wl_glcontext(GLContext rc);
00049
00050 #ifndef FL_DOXYGEN
00051
00052 #   ifdef FLTK_USE_X11
00053 // ***** for X11 component *****
00054 #       include "x11.H"
00055 #   else
00056         typedef struct wld_window *Window;
00057 #   endif
00058
00059 #endif // FL_DOXYGEN
```

13.201 win32.H File Reference

Definitions of functions specific to the Windows platform.

Functions

- `HINSTANCE fl_win32_display ()`
Returns the Windows-specific display in use
- `FL_Window * fl_win32_find (HWND)`
Returns the `FL_Window` corresponding to the given Windows-specific window reference.
- `HDC fl_win32_gc ()`
Returns the Windows-specific graphics context for the current window
- `HGLRC fl_win32_glcontext (GLContext rc)`
Returns the Windows-specific GL rendering context corresponding to the given `GLContext`
- `HWND fl_win32_xid (const FL_Window *win)`
Returns the Windows-specific window reference corresponding to the given `FL_Window` object.

13.201.1 Detailed Description

Definitions of functions specific to the Windows platform.

13.202 win32.H

[Go to the documentation of this file.](#)

```

00001 //
00002 // Windows platform header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 // Do not directly include this file, instead use <FL/platform.H>. It will
00018 // include this file if _WIN32 is defined. This is to encourage
00019 // portability of even the system-specific code...
00020
00021 #ifndef FL_DOXYGEN
00022
00028 extern HWND fl_win32_xid(const FL_Window *win);
00030 extern FL_Window *fl_win32_find(HWND);
00032 extern HGLRC fl_win32_glcontext(GLContext rc);
00034 extern HDC fl_win32_gc();
00036 extern HINSTANCE fl_win32_display();
00037
00038 #else
00039
00040 #ifndef FL_PLATFORM_H
00041 # error "Never use <FL/win32.H> directly; include <FL/platform.H> instead."
00042 #endif // !FL_PLATFORM_H
00043
00044 #include <windows.h>
00045 typedef HWND Window;
00046
00047 typedef struct HGLRC__ *HGLRC;
00048 extern FL_EXPORT HGLRC fl_win32_glcontext(GLContext rc);
00049 extern FL_EXPORT HWND fl_win32_xid(const FL_Window *win);
00050 extern FL_EXPORT FL_Window *fl_win32_find(HWND);
00051
00052 // this part is included only when compiling the FLTK library or if requested explicitly
00053 #if defined(FL_LIBRARY) || defined(FL_INTERNALS)
00054
00055 // In some of the distributions, the gcc header files are missing some stuff:
00056 #ifndef LPMINMAXINFO
00057 #define LPMINMAXINFO MINMAXINFO*
00058 #endif
00059 #ifndef VK_LWIN
00060 #define VK_LWIN 0x5B

```

```

00061 #define VK_RWIN 0x5C
00062 #define VK_APPS 0x5D
00063 #endif
00064
00065 extern FL_EXPORT UINT fl_wake_msg;
00066 extern FL_EXPORT char fl_override_redirect; // hack into Fl_Window::make_xid()
00067 extern FL_EXPORT HPALETTE fl_palette; // non-zero only on 8-bit displays!
00068 extern void fl_release_dc(HWND w, HDC dc);
00069 extern FL_EXPORT void fl_save_dc( HWND w, HDC dc);
00070
00071 #ifndef FL_LIBRARY || FL_INTERNALS
00072
00073 // most recent fl_color() or fl_rgbcolor() points at one of these:
00074 extern FL_EXPORT struct Fl_XMap {
00075     COLORREF rgb; // this should be the type the RGB() macro returns
00076     HPEN pen; // pen, 0 if none created yet
00077     int brush; // ref to solid brush, 0 if none created yet
00078     int pwidth; // the width of the pen, if present
00079 } *fl_current_xmap;
00080 inline COLORREF fl_RGB() {return fl_current_xmap->rgb;}
00081 inline HPEN fl_pen() {return fl_current_xmap->pen;}
00082 FL_EXPORT HBRUSH fl_brush(); // allocates a brush if necessary
00083 FL_EXPORT HBRUSH fl_brush_action(int); // now does the real work
00084
00085 extern FL_EXPORT HINSTANCE fl_display;
00086 extern FL_EXPORT HINSTANCE fl_win32_display();
00087 extern FL_EXPORT HDC fl_gc;
00088 extern FL_EXPORT HDC fl_win32_gc();
00089 extern FL_EXPORT MSG fl_msg;
00090 extern FL_EXPORT HDC fl_GetDC(Window);
00091 extern FL_EXPORT HDC fl_makeDC(HBITMAP);
00092
00093 #endif // FL_DOXYGEN

```

13.203 x.H

```

00001 //
00002 // *Deprecated* platform header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2018 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 // IMPORTANT: This file is deprecated since FLTK 1.4.0. DO NOT include it.
00018 // FL/x.H will be removed in a future FLTK release.
00019
00020 // Please #include <FL/platform.H> instead if you really need it. See
00021 // documentation in FL/platform.H to decide whether you need that file.
00022
00023 #if !defined(FL_X_H) && !defined(FL_DOXYGEN)
00024 # define FL_X_H
00025 # include <FL/platform.H>
00026 #endif // !FL_X_H

```

13.204 x11.H File Reference

Definitions of functions specific to the X11 platform.

Functions

- `cairo_t * fl_cairo_gc ()`
Returns the Cairo-specific currently active graphics context (FLTK_GRAPHICS_CAIRO=On)
- `Display * fl_x11_display ()`
Returns the X11 Display in use.
- `Fl_Window * fl_x11_find (Window xid)`
Returns the *Fl_Window* corresponding to the given Window reference.

- GC `fl_x11_gc()`
Returns the X11-specific currently active graphics context.
- void `fl_x11_use_display` (Display *d)
Have FLTK use a pre-established X11 connection.
- Window `fl_x11_xid` (const `Fl_Window` *win)
Returns the Window reference for the given `Fl_Window`, or zero if not shown().

13.204.1 Detailed Description

Definitions of functions specific to the X11 platform.

13.204.2 Function Documentation

13.204.2.1 `fl_x11_find()`

```
Fl_Window * fl_x11_find (
    Window xid ) [extern]
```

Returns the `Fl_Window` corresponding to the given Window reference.

13.204.2.2 `fl_x11_gc()`

```
GC fl_x11_gc ( ) [extern]
```

Returns the X11-specific currently active graphics context.

13.204.2.3 `fl_x11_use_display()`

```
void fl_x11_use_display (
    Display * d ) [extern]
```

Have FLTK use a pre-established X11 connection.

This function must be called before FLTK attempts to open its own X11 connection, that is, as long as `fl_x11_display()` returns NULL.

Parameters

<code>d</code>	the X11 Display* value representing a valid, pre-established X11 connection
----------------	---

13.204.2.4 `fl_x11_xid()`

```
Window fl_x11_xid (
    const Fl_Window * win ) [extern]
```

Returns the Window reference for the given `Fl_Window`, or zero if not shown().

13.205 x11.H

[Go to the documentation of this file.](#)

```
00001 //
00002 // X11 platform header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
```



```

00009 //
00010 //      https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //      https://www.fltk.org/bugs.php
00015 //
00016 //
00017 // Do not directly include this file, instead use <FL/platform.H>. It will
00018 // include this file if FLTK_USE_X11 is defined. This is to encourage
00019 // portability of even the system-specific code...
00020 //
00021 #ifndef FL_DOXYGEN
00022 //
00023 extern Display *fl_x11_display();
00034 extern void fl_x11_use_display(Display *d);
00036 extern Window fl_x11_xid(const Fl_Window *win);
00038 extern Fl_Window *fl_x11_find(Window xid);
00040 extern GC fl_x11_gc();
00042 extern cairo_t* fl_cairo_gc();
00043 #else // ! FL_DOXYGEN
00044 //
00045 #ifndef FL_PLATFORM_H
00046 #   error "Never use <FL/x11.H> directly; include <FL/platform.H> instead."
00047 #endif // !FL_PLATFORM_H
00048 //
00049 #include <FL/Enumerations.H>
00050 //
00051 #if defined(_ABIN32) || defined(_ABI64) // fix for broken SGI Irix X .h files
00052 #   pragma set woff 3322
00053 #endif
00054 #include <X11/Xlib.h>
00055 #include <X11/Xutil.h>
00056 #if defined(_ABIN32) || defined(_ABI64)
00057 #   pragma reset woff 3322
00058 #endif
00059 #include <X11/Xatom.h>
00060 //
00061 typedef struct __GLXcontextRec *GLXContext;
00062 extern GLXContext fl_x11_glcontext(GLContext rc);
00063 //
00064 // constant info about the X server connection:
00065 extern FL_EXPORT Display *fl_display;
00066 extern FL_EXPORT Display *fl_x11_display();
00067 extern FL_EXPORT void fl_x11_use_display(Display *);
00068 extern FL_EXPORT Window fl_x11_xid(const Fl_Window *win);
00069 extern FL_EXPORT Fl_Window *fl_x11_find(Window);
00070 extern FL_EXPORT int fl_screen;
00071 extern FL_EXPORT XVisualInfo *fl_visual;
00072 extern FL_EXPORT Colormap fl_colormap;
00073 //
00074 // drawing functions:
00075 extern FL_EXPORT GC fl_gc;
00076 #if FLTK_USE_CAIRO
00077     typedef struct _cairo cairo_t;
00078     extern FL_EXPORT cairo_t* fl_cairo_gc();
00079 #endif
00080 extern FL_EXPORT GC fl_x11_gc();
00081 FL_EXPORT ulong fl_xpixel(Fl_Color i);
00082 FL_EXPORT ulong fl_xpixel(uchar r, uchar g, uchar b);
00083 //
00084 // feed events into fltk:
00085 FL_EXPORT int fl_handle(const XEvent&);
00086 //
00087 // you can use these in Fl::add_handler() to look at events:
00088 extern FL_EXPORT const XEvent* fl_xevent;
00089 extern FL_EXPORT ulong fl_event_time;
00090 //
00091 #if defined(FL_LIBRARY) || defined(FL_INTERNALS)
00092 extern FL_EXPORT Window fl_message_window;
00093 extern FL_EXPORT void *fl_xftfont;
00094 //
00095 // access to core fonts:
00096 // This class provides a "smart pointer" that returns a pointer to an XFontStruct.
00097 // The global variable fl_xfont can be called wherever a bitmap "core" font is
00098 // needed, e.g. when rendering to a GL context under X11.
00099 // With Xlib / X11 fonts, fl_xfont will return the current selected font.
00100 // With XFT / X11 fonts, fl_xfont will attempt to return the bitmap "core" font most
00101 // similar to (usually the same as) the current XFT font.
00102 class FL_EXPORT Fl_XFont_On_Demand
00103 {
00104 public:
00105     Fl_XFont_On_Demand(XFontStruct* p = NULL) : ptr(p) { }
00106     Fl_XFont_On_Demand& operator=(const Fl_XFont_On_Demand& x)
00107     { ptr = x.ptr; return *this; }
00108     Fl_XFont_On_Demand& operator=(XFontStruct* p)
00109     { ptr = p; return *this; }

```

```

00110 XFontStruct* value();
00111 operator XFontStruct*() { return value(); }
00112 XFontStruct& operator*() { return *value(); }
00113 XFontStruct* operator->() { return value(); }
00114 bool operator==(const Fl_XFont_On_Demand& x) { return ptr == x.ptr; }
00115 bool operator!=(const Fl_XFont_On_Demand& x) { return ptr != x.ptr; }
00116 private:
00117 XFontStruct *ptr;
00118 };
00119 extern FL_EXPORT Fl_XFont_On_Demand fl_xfont;
00120
00121 extern FL_EXPORT char fl_override_redirect; // hack into Fl_X::make_xid()
00122
00123 #endif // FL_LIBRARY || FL_INTERNALS
00124
00125 #endif // FL_DOXYGEN

```

13.206 cgdebug.h

```

00001 //
00002 // OS X Core Graphics debugging help for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 // This file allows easier debugging of Mac OS X Core Graphics
00018 // code. This file is normally not included into any FLTK builds,
00019 // but since it has proven to be tremendously useful in debugging
00020 // the FLTK port to "Quartz", I decided to add this file in case
00021 // more bugs show up.
00022 //
00023 // This header is activated by adding the following
00024 // line to "config.h"
00025 // #include "src/cgdebug.h"
00026 //
00027 // Running "./configure" will remove this line from "config.h".
00028 //
00029 // When used erroneously, Core Graphics prints warnings to
00030 // stderr. This is helpful, however it is not possible to
00031 // associate a line number or source file with the warning message.
00032 // This header file outputs a trace of CG calls, interweaving
00033 // them with CG warnings.
00034 //
00035 // Matthias
00036 //
00037 #ifndef CGDEBUG
00038 #define CGDEBUG
00039
00040 #include <stdio.h>
00041 #include <Carbon/Carbon.h>
00042
00043 //+BitmapContextCreate
00044 //+BitmapContextGetData
00045 // ClipCGContextToRegion
00046 // QDBeginCGContext
00047 // QDEndCGContext
00048
00049 //+AddArc
00050 //+AddLineToPoint
00051 // ClipToRect
00052 // ClosePath
00053 //+ConcatCTM
00054 //+DrawImage
00055 // FillPath
00056 // FillRect
00057 // Flush
00058 //+GetCTM
00059 // MoveToPoint
00060 //+Release
00061 // RestoreGState
00062 // SaveGState
00063 //+ScaleCTM
00064 //+SetLineCap
00065 //+SetLineDash
00066 //+SetLineJoin

```

```

00067 //+SetLineWidth
00068 //+SetRGBFillColor
00069 //+SetRGBStrokeColor
00070 //+SetShouldAntialias
00071 //+SetTextMatrix
00072 //+StrokePath
00073 //+TranslateCTM
00074
00075 inline OSStatus dbgLocation(const char *file, int line)
00076 {
00077     fprintf(stderr, "%s:%d ", file, line);
00078     return 0;
00079 }
00080
00081 inline OSStatus dbgEndl()
00082 {
00083     fprintf(stderr, "\n");
00084     return 0;
00085 }
00086
00087
00088 inline void dbgCGContextClipToRect(CGContextRef a, CGRect b)
00089 {
00090     CGContextClipToRect(a, b);
00091 }
00092
00093 #define CGContextClipToRect(a, b) { \
00094     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00095     dbgCGContextClipToRect(a, b); \
00096     fprintf(stderr, "\n"); }
00097
00098 inline void dbgCGContextFillRect(CGContextRef a, CGRect b)
00099 {
00100     CGContextFillRect(a, b);
00101 }
00102
00103 #define CGContextFillRect(a, b) { \
00104     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00105     dbgCGContextFillRect(a, b); \
00106     fprintf(stderr, "\n"); }
00107
00108 inline OSStatus dbgQDEndCGContext(CGrafPtr a, CGContextRef *b)
00109 {
00110     return QDEndCGContext(a, b);
00111 }
00112
00113 #define QDEndCGContext(a, b) ( \
00114     dbgLocation(__FILE__, __LINE__) + \
00115     dbgQDEndCGContext(a, b) + \
00116     dbgEndl() )
00117
00118 inline OSStatus dbgQDBeginCGContext(CGrafPtr a, CGContextRef *b)
00119 {
00120     return QDBeginCGContext(a, b);
00121 }
00122
00123 #define QDBeginCGContext(a, b) ( \
00124     dbgLocation(__FILE__, __LINE__) + \
00125     dbgQDBeginCGContext(a, b) + \
00126     dbgEndl() )
00127
00128 inline void dbgClipCGContextToRegion(CGContextRef a, const Rect *b, RgnHandle c)
00129 {
00130     ClipCGContextToRegion(a, b, c);
00131 }
00132
00133 #define ClipCGContextToRegion(a, b, c) { \
00134     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00135     dbgClipCGContextToRegion(a, b, c); \
00136     fprintf(stderr, "\n"); }
00137
00138 inline void dbgCGContextMoveToPoint(CGContextRef context, float x, float y)
00139 {
00140     CGContextMoveToPoint(context, x, y);
00141 }
00142
00143 #define CGContextMoveToPoint(a, b, c) { \
00144     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00145     dbgCGContextMoveToPoint(a, b, c); \
00146     fprintf(stderr, "\n"); }
00147
00148 inline void dbgCGContextFillPath(CGContextRef context)
00149 {
00150     CGContextFillPath(context);
00151 }
00152
00153 #define CGContextFillPath(a) { \

```

```

00154     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00155     dbgCGContextFillPath(a); \
00156     fprintf(stderr, "\n"); }
00157
00158 inline void dbgCGContextClosePath(CGContextRef context)
00159 {
00160     CGContextClosePath(context);
00161 }
00162
00163 #define CGContextClosePath(a) { \
00164     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00165     dbgCGContextClosePath(a); \
00166     fprintf(stderr, "\n"); }
00167
00168 inline void dbgCGContextFlush(CGContextRef context)
00169 {
00170     CGContextFlush(context);
00171 }
00172
00173 #define CGContextFlush(a) { \
00174     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00175     dbgCGContextFlush(a); \
00176     fprintf(stderr, "\n"); }
00177
00178 inline void dbgCGContextSaveGState(CGContextRef context)
00179 {
00180     CGContextSaveGState(context);
00181 }
00182
00183 #define CGContextSaveGState(a) { \
00184     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00185     dbgCGContextSaveGState(a); \
00186     fprintf(stderr, "\n"); }
00187
00188 inline void dbgCGContextRestoreGState(CGContextRef context)
00189 {
00190     CGContextRestoreGState(context);
00191 }
00192
00193 #define CGContextRestoreGState(a) { \
00194     fprintf(stderr, "%s:%d ", __FILE__, __LINE__); \
00195     dbgCGContextRestoreGState(a); \
00196     fprintf(stderr, "\n"); }
00197
00198
00199 #endif
00200

```

13.207 fastarrow.h

```

00001 #define fastarrow_width 16
00002 #define fastarrow_height 16
00003 static const unsigned char fastarrow_bits[] = {
00004     0x00, 0x00, 0x00, 0x07, 0xe0, 0x07, 0xfc, 0x03, 0xff, 0xff, 0xfc, 0x03,
00005     0xe0, 0x07, 0x00, 0x07, 0xe0, 0x00, 0xe0, 0x07, 0xc0, 0x3f, 0xff, 0xff,
00006     0xc0, 0x3f, 0xe0, 0x07, 0xe0, 0x00, 0x00, 0x00};

```

13.208 Fl.cxx File Reference

Implementation of the member functions of class [Fl](#).

```

#include <FL/Fl.H>
#include <FL/platform.H>
#include "Fl_Screen_Driver.H"
#include "Fl_Window_Driver.H"
#include "Fl_System_Driver.H"
#include "Fl_Timeout.h"
#include <FL/Fl_Window.H>
#include <FL/Fl_Tooltip.H>
#include <FL/fl_draw.H>
#include <ctype.h>
#include <stdlib.h>
#include "flstring.h"

```

Macros

- `#define FOREVER 1e20`

Functions

- `bool fl_clipboard_notify_empty` (void)
- `void fl_close_display` ()
- `const char * fl_filename_name` (const char *name)
Gets the file name from a path.
- `Fl_Window * fl_find` (Window xid)
Returns the `Fl_Window` that corresponds to the given window reference, or `NULL` if not found.
- `void fl_fix_focus` ()
- `void fl_open_callback` (void(*cb)(const char *))
Register a function called for each file dropped onto an application icon.
- `void fl_open_display` ()
Opens the display.
- `int fl_send_system_handlers` (void *e)
- `void fl_throw_focus` (`Fl_Widget` *o)
- `void fl_trigger_clipboard_notify` (int source)
- `Window fl_xid_` (const `Fl_Window` *w)

Variables

- `bool fl_disable_wayland` = true
Prevent the FLTK library from using its Wayland backend and forces it to use its X11 backend.
- `const char * fl_local_alt` = `Fl::system_driver()->alt_name()`
string pointer used in shortcuts, you can change it to another language
- `const char * fl_local_ctrl` = `Fl::system_driver()->control_name()`
string pointer used in shortcuts, you can change it to another language
- `int(* fl_local_grab)` (int)
- `const char * fl_local_meta` = `Fl::system_driver()->meta_name()`
string pointer used in shortcuts, you can change it to another language
- `const char * fl_local_shift` = `Fl::system_driver()->shift_name()`
string pointer used in shortcuts, you can change it to another language
- `Fl_Widget * fl_oldfocus`
- `Fl_Widget * fl_selection_requestor`

13.208.1 Detailed Description

Implementation of the member functions of class `Fl`.

13.208.2 Function Documentation

13.208.2.1 fl_find()

```
Fl_Window * fl_find (
    Window xid )
```

Returns the `Fl_Window` that corresponds to the given window reference, or `NULL` if not found.

Deprecated Kept in the X11, Windows, and macOS platforms for compatibility with FLTK versions before 1.4. Please use `fl_x11_find(Window)`, `fl_wl_find(struct wld_window*)`, `fl_win32_find(HWND)` or `fl_mac_find(FLWindow*)` with FLTK 1.4.0 and above.

13.208.2.2 fl_open_display()

```
void fl_open_display ( )
```

Opens the display.

Automatically called by the library when the first window is show()'\n. Does nothing if the display is already open.

13.208.3 Variable Documentation

13.208.3.1 fl_disable_wayland

```
bool fl_disable_wayland = true
```

Prevent the FLTK library from using its Wayland backend and forces it to use its X11 backend.

Put this declaration somewhere in your code outside the body of any function :

```
FL_EXPORT bool fl_disable_wayland = true;
```

This declaration makes sure source code developed for FLTK 1.3, including X11-specific code, will build and run with FLTK 1.4 and its Wayland platform with this single source code level change. This declaration has no effect on non-Wayland platforms. Don't put this declaration if you want the Wayland backend to be used when it's available.

13.209 fl_arc.cxx File Reference

Utility functions for drawing arcs and circles.

```
#include <FL/fl_draw.H>
```

```
#include <FL/math.h>
```

13.209.1 Detailed Description

Utility functions for drawing arcs and circles.

13.210 fl_ask.cxx File Reference

Utility functions for common dialogs.

```
#include <FL/Fl.H>
```

```
#include <FL/Fl_Box.H>
```

```
#include <FL/Fl_Input_.H>
```

```
#include "flstring.h"
```

```
#include "Fl_Screen_Driver.H"
```

```
#include <FL/fl_ask.H>
```

```
#include "Fl_Message.h"
```

```
#include <stdio.h>
```

```
#include <stdarg.h>
```

Functions

- void [fl_alert](#) (const char *fmt,...)
Shows an alert message dialog box.
- int [fl_ask](#) (const char *fmt,...)
*Shows a dialog displaying the *fmt* message, this dialog features 2 yes/no buttons.*
- void [fl_beep](#) (int type)
Emits a system beep.
- int [fl_choice](#) (const char *fmt, const char *b0, const char *b1, const char *b2,...)
*Shows a dialog displaying the printf style *fmt* message.*
- int [fl_choice_n](#) (const char *fmt, const char *b0, const char *b1, const char *b2,...)
*Shows a dialog displaying the printf style *fmt* message.*
- const char * [fl_input](#) (const char *fmt, const char *defstr,...)

- Shows an input dialog displaying the `fmt` message with variable arguments.*

 - `const char * fl_input` (int maxchar, const char *fmt, const char *defstr,...)

Shows an input dialog displaying the `fmt` message with variable arguments.
- `void fl_message` (const char *fmt,...)

Shows an information message dialog box.
- `int fl_message_hotspot` ()

Gets whether or not to move the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.
- `void fl_message_hotspot` (int enable)

Sets whether or not to move the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.
- `FL_Widget * fl_message_icon` ()

Gets the `FL_Box` icon container of the current default dialog used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.
- `void fl_message_icon_label` (const char *str)

Sets the icon label of the dialog window used in many common dialogs.
- `void fl_message_position` (const int x, const int y, const int center)

Sets the preferred position for the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.
- `void fl_message_position` (FL_Widget *widget)

Sets the preferred position for the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.
- `int fl_message_position` (int *x, int *y)

Gets the preferred position for the message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`.
- `void fl_message_title` (const char *title)

Sets the title of the dialog window used in many common dialogs.
- `void fl_message_title_default` (const char *title)

Sets the default title of the dialog window used in many common dialogs.
- `const char * fl_password` (const char *fmt, const char *defstr,...)

Shows an input dialog displaying the `fmt` message with variable arguments.
- `const char * fl_password` (int maxchar, const char *fmt, const char *defstr,...)

Shows an input dialog displaying the `fmt` message with variable arguments.

Variables

- `const char * fl_cancel` = "Cancel"

string pointer used in common dialogs, you can change it to another language
- `const char * fl_close` = "Close"

string pointer used in common dialogs, you can change it to another language
- `FL_Font fl_message_font` = `FL_HELVETICA`
- `FL_Fontsize fl_message_size` = -1
- `const char * fl_no` = "No"

string pointer used in common dialogs, you can change it to another language
- `const char * fl_ok` = "OK"

string pointer used in common dialogs, you can change it to another language
- `const char * fl_yes` = "Yes"

string pointer used in common dialogs, you can change it to another language

13.210.1 Detailed Description

Utility functions for common dialogs.

This file defines the functions

- [fl_alert\(\)](#)
- [fl_beep\(\)](#)
- [fl_message\(\)](#)
- [fl_ask\(\)](#)
- [fl_choice\(\)](#)
- [fl_input\(\)](#)
- [fl_input_str\(\)](#)
- [fl_password\(\)](#)
- [fl_password_str\(\)](#)

and some more functions to change their behavior (positioning, window title, and more).

Since FLTK 1.4.0 a big part of these functions is implemented in class `Fl_Message`.

13.211 fl_boxtype.cxx File Reference

Drawing code for common box types.

```
#include <FL/Fl.H>
#include <FL/Fl_Widget.H>
#include <FL/fl_draw.H>
#include <config.h>
```

Macros

- `#define D1 BORDER_WIDTH`
- `#define D2 (BORDER_WIDTH+BORDER_WIDTH)`
- `#define fl_border_box fl_rectbound`
allow consistent naming

Functions

- void **fl_border_frame** (int x, int y, int w, int h, [Fl_Color](#) c)
Draws a frame of type FL_BORDER_FRAME.
- void **fl_down_box** (int x, int y, int w, int h, [Fl_Color](#) c)
Draws a box of type FL_DOWN_BOX.
- void **fl_down_frame** (int x, int y, int w, int h, [Fl_Color](#))
Draws a frame of type FL_DOWN_FRAME.
- void **fl_draw_box** ([Fl_Boxtype](#) t, int x, int y, int w, int h, [Fl_Color](#) c)
Draws a box using given type, position, size and color.
- void **fl_embossed_box** (int x, int y, int w, int h, [Fl_Color](#) c)
Draws a box of type FL_EMBOSSED_BOX.
- void **fl_embossed_frame** (int x, int y, int w, int h, [Fl_Color](#))
Draws a frame of type FL_EMBOSSED_FRAME.
- void **fl_engraved_box** (int x, int y, int w, int h, [Fl_Color](#) c)
Draws a box of type FL_ENGRAVED_BOX.
- void **fl_engraved_frame** (int x, int y, int w, int h, [Fl_Color](#))

- Draws a frame of type FL_ENGRAVED_FRAME.*
- void **fl_flat_box** (int x, int y, int w, int h, [Fl_Color](#) c)
 - Draws a box of type FL_FLAT_BOX.*
- void **fl_frame** (const char *s, int x, int y, int w, int h)
 - Draws a series of line segments around the given box.*
- void **fl_frame2** (const char *s, int x, int y, int w, int h)
 - Draws a series of line segments around the given box.*
- const [uchar](#) * **fl_gray_ramp** ()
- void **fl_internal_boxtype** ([Fl_Boxtype](#) t, [Fl_Box_Draw_F](#) *f)
 - Sets the drawing function for a given box type.*
- void **fl_no_box** (int, int, int, int, [Fl_Color](#))
 - Draws a box of type FL_NO_BOX.*
- void **fl_rectbound** (int x, int y, int w, int h, [Fl_Color](#) bgcolor)
 - Draws a bounded rectangle with a given position, size and color.*
- void **fl_thin_down_box** (int x, int y, int w, int h, [Fl_Color](#) c)
 - Draws a box of type FL_THIN_DOWN_BOX.*
- void **fl_thin_down_frame** (int x, int y, int w, int h, [Fl_Color](#))
 - Draws a frame of type FL_THIN_DOWN_FRAME.*
- void **fl_thin_up_box** (int x, int y, int w, int h, [Fl_Color](#) c)
 - Draws a box of type FL_THIN_UP_BOX.*
- void **fl_thin_up_frame** (int x, int y, int w, int h, [Fl_Color](#))
 - Draws a frame of type FL_THIN_UP_FRAME.*
- void **fl_up_box** (int x, int y, int w, int h, [Fl_Color](#) c)
 - Draws a box of type FL_UP_BOX.*
- void **fl_up_frame** (int x, int y, int w, int h, [Fl_Color](#))
 - Draws a frame of type FL_UP_FRAME.*

13.211.1 Detailed Description

Drawing code for common box types.

13.211.2 Function Documentation

13.211.2.1 fl_internal_boxtype()

```
void fl_internal_boxtype (
    Fl\_Boxtype t,
    Fl\_Box\_Draw\_F * f )
```

Sets the drawing function for a given box type.

Parameters

in	<i>t</i>	box type
in	<i>f</i>	box drawing function

13.211.2.2 fl_rectbound()

```
void fl_rectbound (
    int x,
    int y,
    int w,
    int h,
    Fl\_Color bgcolor )
```

Draws a bounded rectangle with a given position, size and color.
Equivalent to drawing a box of type FL_BORDER_BOX.

13.212 fl_cmap.h

```
00001 //
00002 // DO NOT EDIT THIS FILE !
00003 //
00004 // This file must be generated by "util/cmap.cxx".
00005 // See instructions in this file.
00006 //
00007 // Copyright 1998-2022 by Bill Spitzak and others.
00008 //
00009 // This library is free software. Distribution and use rights are outlined in
00010 // the file "COPYING" which should have been included with this file. If this
00011 // file is missing or damaged, see the license at:
00012 //
00013 //     https://www.fltk.org/COPYING.php
00014 //
00015 // Please see the following page on how to report bugs and issues:
00016 //
00017 //     https://www.fltk.org/bugs.php
00018 //
00019 // 0x00000000, // 0
00020 // 0xff000000, // 1
00021 // 0x00ff0000, // 2
00022 // 0xffff0000, // 3
00023 // 0x0000ff00, // 4
00024 // 0xff00ff00, // 5
00025 // 0x00ffff00, // 6
00026 // 0xffffffff00, // 7
00027 // 0x55555500, // 8
00028 // 0xc6717100, // 9
00029 // 0x71c67100, // 10
00030 // 0x8e8e3800, // 11
00031 // 0x7171c600, // 12
00032 // 0x8e388e00, // 13
00033 // 0x388e8e00, // 14
00034 // 0x00008000, // 15
00035 // 0xa8a89800, // 16
00036 // 0xe8e8d800, // 17
00037 // 0x68685800, // 18
00038 // 0x98a8a800, // 19
00039 // 0xd8e8e800, // 20
00040 // 0x58686800, // 21
00041 // 0x9c9ca800, // 22
00042 // 0xdcdce800, // 23
00043 // 0x5c5c6800, // 24
00044 // 0x9ca89c00, // 25
00045 // 0xdce8dc00, // 26
00046 // 0x5c685c00, // 27
00047 // 0x90909000, // 28
00048 // 0xc0c0c000, // 29
00049 // 0x50505000, // 30
00050 // 0xa0a0a000, // 31
00051 // 0x00000000, // 32
00052 // 0xd0d0d000, // 33
00053 // 0x1a1a1a00, // 34
00054 // 0x26262600, // 35
00055 // 0x31313100, // 36
00056 // 0x3d3d3d00, // 37
00057 // 0x48484800, // 38
00058 // 0x55555500, // 39
00059 // 0x5f5f5f00, // 40
00060 // 0x6a6a6a00, // 41
00061 // 0x75757500, // 42
00062 // 0x80808000, // 43
00063 // 0x8a8a8a00, // 44
00064 // 0x95959500, // 45
00065 // 0xa0a0a000, // 46
00066 // 0xaaaaaaaa00, // 47
00067 // 0xb5b5b500, // 48
00068 // 0xc0c0c000, // 49
00069 // 0xcbcbcb00, // 50
00070 // 0xd5d5d500, // 51
00071 // 0xe0e0e000, // 52
00072 // 0xeaeaea00, // 53
00073 // 0xf5f5f500, // 54
00074 // 0xffffffff00, // 55
00075 // 0x00000000, // 56
00076 // 0x00240000, // 57
00077 // 0x00480000, // 58
00078 // 0x006d0000, // 59
00079 // 0x00910000, // 60
```

```
00080 0x00b60000, // 61
00081 0x00da0000, // 62
00082 0x00ff0000, // 63
00083 0x3f000000, // 64
00084 0x3f240000, // 65
00085 0x3f480000, // 66
00086 0x3f6d0000, // 67
00087 0x3f910000, // 68
00088 0x3fb60000, // 69
00089 0x3fda0000, // 70
00090 0x3fff0000, // 71
00091 0x7f000000, // 72
00092 0x7f240000, // 73
00093 0x7f480000, // 74
00094 0x7f6d0000, // 75
00095 0x7f910000, // 76
00096 0x7fb60000, // 77
00097 0x7fda0000, // 78
00098 0x7fff0000, // 79
00099 0xbf000000, // 80
00100 0xbf240000, // 81
00101 0xbf480000, // 82
00102 0xbf6d0000, // 83
00103 0xbf910000, // 84
00104 0xbfb60000, // 85
00105 0xbfda0000, // 86
00106 0xbfff0000, // 87
00107 0xff000000, // 88
00108 0xff240000, // 89
00109 0xff480000, // 90
00110 0xff6d0000, // 91
00111 0xff910000, // 92
00112 0xffb60000, // 93
00113 0xffda0000, // 94
00114 0xffff0000, // 95
00115 0x00003f00, // 96
00116 0x00243f00, // 97
00117 0x00483f00, // 98
00118 0x006d3f00, // 99
00119 0x00913f00, // 100
00120 0x00b63f00, // 101
00121 0x00da3f00, // 102
00122 0x00ff3f00, // 103
00123 0x3f003f00, // 104
00124 0x3f243f00, // 105
00125 0x3f483f00, // 106
00126 0x3f6d3f00, // 107
00127 0x3f913f00, // 108
00128 0x3fb63f00, // 109
00129 0x3fda3f00, // 110
00130 0x3fff3f00, // 111
00131 0x7f003f00, // 112
00132 0x7f243f00, // 113
00133 0x7f483f00, // 114
00134 0x7f6d3f00, // 115
00135 0x7f913f00, // 116
00136 0x7fb63f00, // 117
00137 0x7fda3f00, // 118
00138 0x7fff3f00, // 119
00139 0xbf003f00, // 120
00140 0xbf243f00, // 121
00141 0xbf483f00, // 122
00142 0xbf6d3f00, // 123
00143 0xbf913f00, // 124
00144 0xbfb63f00, // 125
00145 0xbfda3f00, // 126
00146 0xbfff3f00, // 127
00147 0xff003f00, // 128
00148 0xff243f00, // 129
00149 0xff483f00, // 130
00150 0xff6d3f00, // 131
00151 0xff913f00, // 132
00152 0xffb63f00, // 133
00153 0xffda3f00, // 134
00154 0xffff3f00, // 135
00155 0x00007f00, // 136
00156 0x00247f00, // 137
00157 0x00487f00, // 138
00158 0x006d7f00, // 139
00159 0x00917f00, // 140
00160 0x00b67f00, // 141
00161 0x00da7f00, // 142
00162 0x00ff7f00, // 143
00163 0x3f007f00, // 144
00164 0x3f247f00, // 145
00165 0x3f487f00, // 146
00166 0x3f6d7f00, // 147
```

```
00167 0x3f917f00, // 148
00168 0x3fb67f00, // 149
00169 0x3fda7f00, // 150
00170 0x3fff7f00, // 151
00171 0x7f007f00, // 152
00172 0x7f247f00, // 153
00173 0x7f487f00, // 154
00174 0x7f6d7f00, // 155
00175 0x7f917f00, // 156
00176 0x7fb67f00, // 157
00177 0x7fda7f00, // 158
00178 0x7fff7f00, // 159
00179 0xbf007f00, // 160
00180 0xbf247f00, // 161
00181 0xbf487f00, // 162
00182 0xbf6d7f00, // 163
00183 0xbf917f00, // 164
00184 0xbfb67f00, // 165
00185 0xbfda7f00, // 166
00186 0xbfff7f00, // 167
00187 0xff007f00, // 168
00188 0xff247f00, // 169
00189 0xff487f00, // 170
00190 0xff6d7f00, // 171
00191 0xff917f00, // 172
00192 0xffb67f00, // 173
00193 0xffda7f00, // 174
00194 0xffff7f00, // 175
00195 0x0000bf00, // 176
00196 0x0024bf00, // 177
00197 0x0048bf00, // 178
00198 0x006dbf00, // 179
00199 0x0091bf00, // 180
00200 0x00b6bf00, // 181
00201 0x00dabf00, // 182
00202 0x00ffbf00, // 183
00203 0x3f00bf00, // 184
00204 0x3f24bf00, // 185
00205 0x3f48bf00, // 186
00206 0x3f6dbf00, // 187
00207 0x3f91bf00, // 188
00208 0x3fb6bf00, // 189
00209 0x3fdabf00, // 190
00210 0x3fffbf00, // 191
00211 0x7f00bf00, // 192
00212 0x7f24bf00, // 193
00213 0x7f48bf00, // 194
00214 0x7f6dbf00, // 195
00215 0x7f91bf00, // 196
00216 0x7fb6bf00, // 197
00217 0x7fdabf00, // 198
00218 0x7fffbf00, // 199
00219 0xbf00bf00, // 200
00220 0xbf24bf00, // 201
00221 0xbf48bf00, // 202
00222 0xbf6dbf00, // 203
00223 0xbf91bf00, // 204
00224 0xbfb6bf00, // 205
00225 0xbfdabf00, // 206
00226 0xbfffbf00, // 207
00227 0xff00bf00, // 208
00228 0xff24bf00, // 209
00229 0xff48bf00, // 210
00230 0xff6dbf00, // 211
00231 0xff91bf00, // 212
00232 0xffb6bf00, // 213
00233 0xffdabf00, // 214
00234 0xffffbf00, // 215
00235 0x0000ff00, // 216
00236 0x0024ff00, // 217
00237 0x0048ff00, // 218
00238 0x006dff00, // 219
00239 0x0091ff00, // 220
00240 0x00b6ff00, // 221
00241 0x00daff00, // 222
00242 0x00ffff00, // 223
00243 0x3f00ff00, // 224
00244 0x3f24ff00, // 225
00245 0x3f48ff00, // 226
00246 0x3f6dff00, // 227
00247 0x3f91ff00, // 228
00248 0x3fb6ff00, // 229
00249 0x3fdaff00, // 230
00250 0x3fffff00, // 231
00251 0x7f00ff00, // 232
00252 0x7f24ff00, // 233
00253 0x7f48ff00, // 234
```

```

00254     0x7f6dff00, // 235
00255     0x7f91ff00, // 236
00256     0x7fb6ff00, // 237
00257     0x7fdaff00, // 238
00258     0x7fffff00, // 239
00259     0xbf00ff00, // 240
00260     0xbf24ff00, // 241
00261     0xbf48ff00, // 242
00262     0xbf6dff00, // 243
00263     0xbf91ff00, // 244
00264     0xbfb6ff00, // 245
00265     0xbfdaff00, // 246
00266     0xbfffff00, // 247
00267     0xff00ff00, // 248
00268     0xff24ff00, // 249
00269     0xff48ff00, // 250
00270     0xff6dff00, // 251
00271     0xff91ff00, // 252
00272     0xffb6ff00, // 253
00273     0xffdaff00, // 254
00274     0xffffff00 // 255
00275 //
00276 // End of fl_cmap.h - generated by cmap.cxx
00277 //

```

13.213 fl_color.cxx File Reference

Color handling.

```

#include <FL/Fl.H>
#include <FL/Fl_Device.H>
#include <FL/Fl_Graphics_Driver.H>
#include "fl_cmap.h"

```

Functions

- [Fl_Color fl_color_average](#) ([Fl_Color](#) color1, [Fl_Color](#) color2, float weight)
Returns the weighted average color between the two given colors.
- [Fl_Color fl_inactive](#) ([Fl_Color](#) c)
Returns the inactive, dimmed version of the given color.

Variables

- unsigned [fl_cmap](#) [256]

13.213.1 Detailed Description

Color handling.

13.213.2 Variable Documentation

13.213.2.1 fl_cmap

```
unsigned fl_cmap[256]
```

Initial value:

```
= {
}

```

13.214 Fl_compose.cxx File Reference

Utility functions to support text input.

```

#include <FL/Fl.H>
#include "Fl_Screen_Driver.H"

```

13.214.1 Detailed Description

Utility functions to support text input.

13.215 fl_contrast.cxx File Reference

Color contrast handling.

```
#include <FL/FL.H>
#include <math.h>
```

Functions

- [FI_Color fl_contrast](#) ([FI_Color](#) fg, [FI_Color](#) bg, [FI_Fontsize](#) fs, int context)

Returns a color that contrasts with the background color.
- void [fl_contrast_function](#) ([FI_Contrast_Function](#) *f)

Register a custom contrast function.
- int [fl_contrast_level](#) ()

Get the contrast level (sensitivity) of the [fl_contrast\(\)](#) method.
- void [fl_contrast_level](#) (int level)

Set the contrast level (sensitivity) of the [fl_contrast\(\)](#) method.
- int [fl_contrast_mode](#) ()

Return the current contrast algorithm (mode).
- void [fl_contrast_mode](#) (int mode)

Set the contrast algorithm (mode).
- double [fl_lightness](#) ([FI_Color](#) color)

Return the perceived lightness of a color.
- double [fl_luminance](#) ([FI_Color](#) color)

Return the raw / physical luminance of a color.
- unsigned [get_color](#) ([FI_Color](#) i)

Variables

- unsigned [fl_cmap](#) [256]

13.215.1 Detailed Description

Color contrast handling.

Implementation of [fl_contrast\(\)](#) and its variants.

13.216 fl_curve.cxx File Reference

Utility for drawing Bézier curves, adding the points to the current [fl_begin/fl_vertex/fl_end](#) path.

```
#include <FL/fl_draw.H>
#include <math.h>
```

13.216.1 Detailed Description

Utility for drawing Bézier curves, adding the points to the current [fl_begin/fl_vertex/fl_end](#) path.

Incremental math implementation: I very much doubt this is optimal! From Foley/vanDam page 511. If anybody has a better algorithm, please send it!

13.217 Fl_Double_Window.cxx File Reference

[Fl_Double_Window](#) implementation.

```
#include <FL/Fl.H>
#include <FL/platform.H>
#include <FL/Fl_Double_Window.H>
#include <FL/fl_draw.H>
#include "Fl_Window_Driver.H"
```

13.217.1 Detailed Description

[Fl_Double_Window](#) implementation.

13.218 Fl_get_system_colors.cxx File Reference

System color support.

```
#include <FL/Fl.H>
#include "Fl_Screen_Driver.H"
#include "Fl_System_Driver.H"
#include <FL/fl_draw.H>
#include <FL/platform.H>
#include <FL/math.h>
#include <FL/fl_utf8.h>
#include <FL/fl_string_functions.h>
#include "flstring.h"
#include <stdio.h>
#include <stdlib.h>
#include <FL/Fl_Pixmap.H>
#include <FL/Fl_Tiled_Image.H>
#include "tile.xpm"
```

Macros

- `#define D1 BORDER_WIDTH`
- `#define D2 (BORDER_WIDTH+BORDER_WIDTH)`

Functions

- void **fl_down_box** (int, int, int, int, [Fl_Color](#))
Draws a box of type FL_DOWN_BOX.
- void **fl_down_frame** (int, int, int, int, [Fl_Color](#))
Draws a frame of type FL_DOWN_FRAME.
- int **fl_parse_color** (const char *p, [uchar](#) &r, [uchar](#) &g, [uchar](#) &b)
Parse a string containing a description of a color and write r, g, and b.
- void **fl_round_down_box** (int, int, int, int, [Fl_Color](#))
- void **fl_round_up_box** (int, int, int, int, [Fl_Color](#))
- void **fl_thin_down_box** (int, int, int, int, [Fl_Color](#))
Draws a box of type FL_THIN_DOWN_BOX.
- void **fl_thin_down_frame** (int, int, int, int, [Fl_Color](#))
Draws a frame of type FL_THIN_DOWN_FRAME.
- void **fl_thin_up_box** (int, int, int, int, [Fl_Color](#))
Draws a box of type FL_THIN_UP_BOX.
- void **fl_thin_up_frame** (int, int, int, int, [Fl_Color](#))
Draws a frame of type FL_THIN_UP_FRAME.

- void **fl_up_box** (int, int, int, int, [FL_Color](#))
Draws a box of type FL_UP_BOX.
- void **fl_up_frame** (int, int, int, int, [FL_Color](#))
Draws a frame of type FL_UP_FRAME.

Variables

- const char * **fl_bg** = NULL
- const char * **fl_bg2** = NULL
- const char * **fl_fg** = NULL

13.218.1 Detailed Description

System color support.

13.218.2 Function Documentation

13.218.2.1 fl_parse_color()

```
int fl_parse_color (
    const char * p,
    uchar & r,
    uchar & g,
    uchar & b )
```

Parse a string containing a description of a color and write r, g, and b.

This call is used by the Pixmap file format interpreter and by the command line arguments parser to set UI colors. RGB color triplets usually start with a '#' character, but it can be omitted if it does not conflict with the later rules. Color components are defined in hexadecimal notation with 1, 2, 3, or four hex digits per component, making color triplets 3, 6, 9, or 12 characters long. The interpreter is case insensitive. Valid code examples include "FF0000" for red, "#0F0" for green, and "000000004444" for a dark blue.

On the X11 platform, color values can also be given a color name like "red". The list of accepted color names is provided by the X11 server.

If none of the color interpretations work, [fl_parse_color](#) returns 0. The Pixmap reader interprets those as transparent, and are usually written as "None", "#transparent", or "bg".

Parameters

in	<i>p</i>	a C-string describing the color
out	<i>r,g,b</i>	the color components in the 0...255 range

Returns

0 if the color cannot be interpreted, 1 otherwise

13.219 FI_GI_Choice.H

```
00001 //
00002 // OpenGL definitions for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2018 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 // Internal interface to set up OpenGL.
```



```

00018 //
00019 // A "Fl_Gl_Choice" is created from an OpenGL mode and holds information
00020 // necessary to create a window (on X) and to create an OpenGL "context"
00021 // (on both X and Win32).
00022 //
00023 // create_gl_context takes a window (necessary only on Win32) and an
00024 // Fl_Gl_Choice and returns a new OpenGL context. All contexts share
00025 // display lists with each other.
00026 //
00027 // On X another create_gl_context is provided to create it for any
00028 // X visual.
00029 //
00030 // set_gl_context makes the given OpenGL context current and makes
00031 // it draw into the passed window. It tracks the current one context
00032 // to avoid calling the context switching code when the same context
00033 // is used, though it is a mystery to me why the GLX/WGL libraries
00034 // don't do this themselves...
00035 //
00036 // delete_gl_context destroys the context.
00037 //
00038 // This code is used by Fl_Gl_Window, gl_start(), and gl_visual()
00039 //
00040 #ifndef Fl_Gl_Choice_H
00041 #define Fl_Gl_Choice_H
00042 //
00043 // Describes the platform-independent part of data needed to create a GLContext.
00044 class Fl_Gl_Choice {
00045     friend class Fl_Gl_Window_Driver;
00046     int mode_;
00047     const int *alist;
00048     Fl_Gl_Choice *next;
00049 public:
00050     Fl_Gl_Choice(int m, const int *alistp, Fl_Gl_Choice *n) : mode(m), alist(alistp), next(n) {}
00051 };
00052 //
00053 #endif // Fl_Gl_Choice_H

```

13.220 Fl_Gl_Window_Driver.H

```

00001 //
00002 // Definition of class Fl_Gl_Window_Driver, and of its platform-specific derived classes
00003 // for the Fast Light Tool Kit (FLTK).
00004 //
00005 // Copyright 2016-2018 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017 //
00024 #ifndef Fl_Gl_Window_Driver_H
00025 #define Fl_Gl_Window_Driver_H
00026 //
00027 #include <FL/Fl_Gl_Window.H>
00028 #include <FL/gl.h> // for GLint
00029 //
00030 class Fl_Gl_Choice;
00031 class Fl_Font_Descriptor;
00032 //
00033 /* The constructor of each Fl_Gl_Window object creates also an object from a
00034 platform-specific derived class from this class.
00035 */
00036 class Fl_Gl_Window_Driver {
00037 protected:
00038     GLint current_prog;
00039     Fl_Gl_Window *pWindow;
00040 public:
00041     static Fl_Window* cached_window;
00042     static int nContext;
00043     static GLContext *context_list;
00044     static Fl_Gl_Choice *first;
00045     static int copy;
00046     static float gl_scale;
00047     static GLContext gl_start_context;
00048     Fl_Gl_Choice* g() {return pWindow->g;}
00049     void g(Fl_Gl_Choice *c) {pWindow->g = c;}
00050     int mode() {return pWindow->mode_;}
00051     void mode(int m) { pWindow->mode_ = m;}
00052     const int *alist() {return pWindow->alist;}

```

```

00053 void alist(const int *l) { pWindow->alist = l;}
00054 void* overlay() {return pWindow->overlay;}
00055 void draw_overlay() {pWindow->draw_overlay();}
00056
00057 Fl_Gl_Window_Driver(Fl_Gl_Window *win) : pWindow(win) {current_prog=0;}
00058 virtual ~Fl_Gl_Window_Driver() {}
00059 static Fl_Gl_Window_Driver *newGlWindowDriver(Fl_Gl_Window *w);
00060 static Fl_Gl_Window_Driver *global();
00061 virtual float pixels_per_unit() {return 1;}
00062 virtual void before_show(int&) {}
00063 virtual void after_show() {}
00064 virtual void invalidate();
00065 virtual int mode_(int /*m*/, const int * /*a*/) {return 0;}
00066 virtual void make_current_before() {}
00067 virtual void make_current_after() {}
00068 virtual void swap_buffers() {}
00069 virtual void resize(int /*is_a_resize*/, int /*w*/, int /*h*/) {}
00070 virtual char swap_type();
00071 virtual void swap_interval(int) {}
00072 virtual int swap_interval() const { return -1; }
00073 virtual int flush_begin(char&) {return 0;}
00074 virtual void gl_hide_before(void *&) {} // the default implementation may be enough
00075 static Fl_Gl_Choice *find_begin(int m, const int *alistp);
00076 static void add_context(GLContext ctx);
00077 static void del_context(GLContext ctx);
00078 // Return one of these structures for a given gl mode.
00079 // The second argument is a GLX attribute list, and is used if mode is zero.
00080 // This is not supported on Win32:
00081 virtual Fl_Gl_Choice *find(int /*mode*/, const int * /*alistp*/) {return NULL;}
00082 virtual GLContext create_gl_context(Fl_Window*, const Fl_Gl_Choice*) {return 0;}
00083 virtual void set_gl_context(Fl_Window*, GLContext) {}
00084 virtual void delete_gl_context(GLContext) {}
00085 virtual void make_overlay(void* &o);
00086 virtual void hide_overlay() {} // the default implementation may be enough
00087 virtual void make_overlay_current() {}
00088 virtual void redraw_overlay() {}
00089 virtual int can_do_overlay() {return 0;}
00090 virtual void waitGL() {} // support for gl_finish() function
00091 virtual void gl_visual(Fl_Gl_Choice*); // support for Fl::gl_visual() function
00092 virtual void gl_start() {} // support for gl_start() function
00093 virtual void* GetProcAddress(const char *procName); // support for glutGetProcAddress()
00094 virtual void draw_string_legacy(const char* str, int n); // support for gl_draw()
00095 void draw_string_legacy_get_list(const char* str, int n); // support for gl_draw()
00096 static void draw_string_legacy_glut(const char* str, int n); // support for gl_draw()
00097 virtual void get_list(Fl_Font_Descriptor*, int) {} // support for gl_draw() without textures
00098 virtual void gl_bitmap_font(Fl_Font_Descriptor *) {} // support for gl_font() without textures
00099 virtual int overlay_color(Fl_Color) {return 0;} // support for gl_color() with HAVE_GL_OVERLAY
00100 static void draw_string_with_texture(const char* str, int n); // cross-platform
00101 // support for gl_draw(). The cross-platform version may be enough.
00102 virtual char *alpha_mask_for_string(const char *str, int n, int w, int h, Fl_Fontsize fs);
00103 virtual int genlistsize() { return 0; } // support for gl_draw()
00104 virtual Fl_Font_Descriptor** fontnum_to_fontdescriptor(int fnum);
00105 virtual Fl_RGB_Image* capture_gl_rectangle(int x, int y, int w, int h);
00106 static inline Fl_Gl_Window_Driver* driver(const Fl_Gl_Window *win) {return win->pGlWindowDriver;}
00107 // true means the platform uses glScissor() to make sure GL subwindows
00108 // don't leak outside their parent window
00109 virtual bool need_scissor() { return false; }
00110 virtual void switch_to_GL1();
00111 virtual void switch_back();
00112 };
00113
00114 #endif /* Fl_Gl_Window_Driver_H */
00115

```

13.221 Fl_Graphics_Driver.cxx File Reference

Implementation of class Fl_Graphics_Driver.

```

#include <config.h>
#include <FL/Fl_Graphics_Driver.H>

```

Variables

- Fl_Graphics_Driver * **fl_graphics_driver**

Points to the driver that currently receives all graphics requests.

13.221.1 Detailed Description

Implementation of class Fl_Graphics_Driver.

13.222 Fl_Grid.cxx File Reference

Implements the [Fl_Grid](#) container widget.

```
#include <FL/Fl_Grid.H>
```

```
#include <FL/fl_draw.H>
```

13.222.1 Detailed Description

Implements the [Fl_Grid](#) container widget.

Since

1.4.0

13.223 Fl_Image_Reader.h

```
00001 //
00002 // Internal (Image) Reader class for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2020-2021 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 /*
00018  This internal (undocumented) class reads data chunks from a file or from
00019  memory in LSB-first byte order.
00020
00021  This class is used in Fl_GIF_Image and Fl_BMP_Image to avoid code
00022  duplication and may be extended to be used in similar cases. Future
00023  options might be to read data in MSB-first byte order or to add more
00024  methods.
00025 */
00026
00027 #ifndef FL_IMAGE_READER_H
00028 #define FL_IMAGE_READER_H
00029
00030 #include <stdio.h>
00031
00032 class Fl_Image_Reader {
00033 public:
00034     // Create the reader.
00035     Fl_Image_Reader()
00036         : is_file_(0)
00037         , is_data_(0)
00038         , file_(0L)
00039         , data_(0L)
00040         , start_(0L)
00041         , end_((const unsigned char *)(-1L))
00042         , name_(0L)
00043         , error_(0) {}
00044
00045     // Initialize the reader to access the file system, filename is copied
00046     // and stored.
00047     int open(const char *filename);
00048
00049     // Initialize the reader for memory access, name is copied and stored
00050     int open(const char *imagename, const unsigned char *data, const size_t datasize);
00051     // Deprecated, DO NOT USE!
00052     int open(const char *imagename, const unsigned char *data);
00053
00054     // Close and destroy the reader
00055     ~Fl_Image_Reader();
00056
```

```

00057 // Read a single byte from memory or a file
00058 unsigned char read_byte();
00059
00060 // Read a 16-bit unsigned integer, LSB-first
00061 unsigned short read_word();
00062
00063 // Read a 32-bit unsigned integer, LSB-first
00064 unsigned int read_dword();
00065
00066 // Read a 32-bit signed integer, LSB-first
00067 int read_long() { return (int)read_dword(); }
00068
00069 // Move the current read position to a byte offset from the beginning
00070 // of the file or the original start address in memory
00071 void seek(unsigned int n);
00072
00073 // Get the current file or memory offset from the beginning
00074 // of the file or the original start address in memory
00075 long tell() const;
00076
00077 // Get the current EOF or error status of the file or data block
00078 int error() const { return error_; }
00079
00080 // return the name or filename for this reader
00081 const char *name() const { return name_; }
00082
00083 // skip a given number of bytes
00084 void skip(unsigned int n) { seek((unsigned int)tell() + n); }
00085
00086 private:
00087 // open() sets this if we read from a file
00088 char is_file_;
00089 // open() sets this if we read from memory
00090 char is_data_;
00091 // a pointer to the opened file
00092 FILE *file_;
00093 // a pointer to the current byte in memory
00094 const unsigned char *data_;
00095 // a pointer to the start of the image data
00096 const unsigned char *start_;
00097 // a pointer to the end of image data if reading from memory, otherwise undefined
00098 // note: currently (const unsigned char *)(-1L) if end of memory is not available
00099 // ... which means "unlimited"
00100 const unsigned char *end_;
00101 // a copy of the name associated with this reader
00102 char *name_;
00103 // a flag to store EOF or error status
00104 int error_;
00105 };
00106
00107 #endif // FL_IMAGE_READER_H

```

13.224 Fl_Int_Vector.H

```

00001 //
00002 // An STL-ish vector without templates for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2002 by Greg Ercolano.
00005 // Copyright 2022-2023 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00018 #ifndef Fl_Int_Vector_H
00019 #define Fl_Int_Vector_H
00020
00021 #include <FL/Fl_Export.H>
00022
00023 class FL_EXPORT Fl_Int_Vector {
00024     int *arr_;
00025     unsigned int size_;
00026
00027     void init() {
00028         arr_ = 0;
00029         size_ = 0;
00030     }
00031     void copy(int *newarr, unsigned int newsz);

```

```

00084
00085 public:
00087 Fl_Int_Vector() {
00088     init();
00089 }
00090
00091 ~Fl_Int_Vector();
00092
00094 Fl_Int_Vector(Fl_Int_Vector &o) {
00095     init();
00096     copy(o.arr_, o.size_);
00097 }
00098
00104 Fl_Int_Vector &operator=(Fl_Int_Vector &o) {
00105     init();
00106     copy(o.arr_, o.size_);
00107     return *this;
00108 }
00109
00114 int operator[](int x) const {
00115     return arr_[x];
00116 }
00117
00126 int &operator[](int x) {
00127     return arr_[x];
00128 }
00129
00131 unsigned int size() const {
00132     return size_;
00133 }
00134
00135 void size(unsigned int count);
00136
00143 int pop_back() {
00144     int tmp = arr_[size_ - 1];
00145     size_--;
00146     return tmp;
00147 }
00148
00150 void push_back(int val) {
00151     unsigned int x = size_;
00152     size(size_ + 1);
00153     arr_[x] = val;
00154 }
00155
00161 int back() const {
00162     return arr_[size_ - 1];
00163 }
00164
00169 bool empty() const {
00170     return (size_ == 0) ? true : false;
00171 }
00172 };
00173
00179 #endif // Fl_Int_Vector_H

```

13.225 Fl_Message.h

```

00001 //
00002 // Common dialog header file for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef _src_Fl_Message_h_
00018 #define _src_Fl_Message_h_
00019
00020 #include <FL/Fl_Window.H>
00021 #include <FL/Fl_Box.H>
00022 #include <FL/fl_ask.H>
00023
00024 class Fl_Button;
00025 class Fl_Input;
00026
00042 /* Note: Do not FL_EXPORT this class, it's for internal use only */

```

```

00043
00044 class Fl_Message_Box : public Fl_Box {
00045 public:
00046   Fl_Message_Box(int X, int Y, int W, int H)
00047     : Fl_Box(X, Y, W, H) {}
00048   int handle(int e) FL_OVERRIDE;
00049 }; // class Fl_Message_Box
00050
00072 /* Note: Do not FL_EXPORT this class, it's for internal use only */
00073
00074 class Fl_Message {
00075
00076   // static variables and methods
00077 private:
00078   static Fl_Box *message_icon_; // returned by Fl_Message::message_icon()
00080
00081   static const char *message_title_;
00082   static const char *message_title_default_;
00083
00084   // icon label for next dialog (STR #2762)
00085   static const char *message_icon_label_;
00086
00087   // Note: since Fl_Message objects are destroyed before fl_input()
00088   // and fl_password() return their input text, we *need* to store
00089   // the text in an internal (static) buffer. :-()
00090
00091   static char *input_buffer_; // points to the allocated text buffer
00092   static int input_size_;     // size of allocated text buffer
00093
00094   // the callback for all buttons:
00095   static void button_cb(Fl_Widget *w, void *d);
00096
00097   // the window callback:
00098   static void window_cb(Fl_Widget *w, void *d);
00099
00100   // resize to make text and buttons fit
00101   void resizeform();
00102
00103 public:
00104   static Fl_Box *message_icon();
00105   static void message_title(const char *title);
00106   static void message_title_default(const char *title);
00107   static void icon_label(const char *str);
00108
00110   static void message_position(const int x, const int y, const int center) {
00111     form_x_ = x;
00112     form_y_ = y;
00113     form_position_ = center ? 2 : 1;
00114   }
00115
00117   static void message_position(Fl_Widget *widget) {
00118     int xo, yo;
00119     Fl_Window *win = widget->top_window_offset(xo, yo);
00120     form_x_ = xo + widget->w() / 2;
00121     form_y_ = yo + widget->h() / 2;
00122     if (win) {
00123       form_x_ += win->x();
00124       form_y_ += win->y();
00125     }
00126     form_position_ = 2;
00127   }
00128
00130   static int message_position(int *x, int *y) {
00131     if (x)
00132       *x = form_position_ ? form_x_ : -1;
00133     if (y)
00134       *y = form_position_ ? form_y_ : -1;
00135     return form_position_;
00136   }
00137
00139   static void message_hotspot(int enable) { enable_hotspot_ = enable ? 1 : 0; }
00140
00142   static int message_hotspot() { return enable_hotspot_; }
00143
00144   int window_closed() const {
00145     return window_closed_;
00146   }
00147
00148   // member variables and methods
00149 private:
00151   Fl_Window *window_;
00152   Fl_Message_Box *message_;
00153   Fl_Box *icon_;
00154   Fl_Button *button_[3];
00155   Fl_Input *input_;

```

```

00156 int retval_;
00157 int window_closed_;
00158
00159 // static (private) variables
00160
00161 static int enable_hotspot_;
00162 static int form_x_;
00163 static int form_y_;
00164 static int form_position_;
00165
00166 public:
00167 // Constructor
00168 Fl_Message(const char *iconlabel);
00170 ~Fl_Message() { delete window_; }
00171
00172 int innards(const char *fmt, va_list ap, const char *b0, const char *b1, const char *b2);
00173
00174 const char *input_innards(const char *fmt, va_list ap, const char *defstr, uchar type, int maxchar =
-1, bool str = false);
00175 };
00176
00182 #endif // _src_Fl_Message_h_

```

13.226 Fl_Native_File_Chooser_Kdialog.H

```

00001 //
00002 // FLTK native file chooser widget : KDE version
00003 //
00004 // Copyright 2021-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 // https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 // https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef FL_KDIALOG_NATIVE_FILE_CHOOSER_H
00018 #define FL_KDIALOG_NATIVE_FILE_CHOOSER_H 1
00019
00026 #include <FL/Fl_Native_File_Chooser.H>
00027 #include "Fl_String.H"
00028
00029 class Fl_Kdialog_Native_File_Chooser_Driver : public Fl_Native_File_Chooser_FLTK_Driver {
00030 friend class Fl_Native_File_Chooser;
00031 friend class Fl_Zenity_Native_File_Chooser_Driver;
00032 struct fnfc_pipe_struct {
00033 char *all_files;
00034 int fd;
00035 };
00036 static void fnfc_fd_cb(int fd, fnfc_pipe_struct *data);
00037 char **_pathnames;
00038 int _tpathnames;
00039 char *_directory;
00040 char *_preset_file;
00041 char *_title;
00042 static bool did_find_kdialog;
00043 static bool have_looked_for_kdialog;
00044 Fl_Kdialog_Native_File_Chooser_Driver(int val);
00045 ~Fl_Kdialog_Native_File_Chooser_Driver();
00046 int count() const FL_OVERRIDE;
00047 const char *filename() const FL_OVERRIDE;
00048 const char *filename(int i) const FL_OVERRIDE;
00049 virtual void build_command(Fl_String& command);
00050 int show() FL_OVERRIDE;
00051 char *parse_filter(const char *f);
00052 const char *filter() const FL_OVERRIDE;
00053 void filter(const char *f) FL_OVERRIDE;
00054 int filters() const FL_OVERRIDE;
00055 void preset_file(const char *val) FL_OVERRIDE;
00056 const char *preset_file() const FL_OVERRIDE;
00057 void directory(const char *val) FL_OVERRIDE;
00058 const char *directory() const FL_OVERRIDE;
00059 void title(const char *val) FL_OVERRIDE;
00060 const char *title() const FL_OVERRIDE;
00061 void shell_quote(Fl_String& s);
00062 };
00063
00069 #endif // FL_KDIALOG_NATIVE_FILE_CHOOSER_H

```

13.227 FI_Native_File_Chooser_Zenity.H

```

00001 //
00002 // FLTK native file chooser widget : Zenity version
00003 //
00004 // Copyright 2021-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 #ifndef FL_ZENITY_NATIVE_FILE_CHOOSER_H
00018 #define FL_ZENITY_NATIVE_FILE_CHOOSER_H 1
00019
00026 #include "Fl_Native_File_Chooser_Kdialog.H"
00027
00028 class Fl_Zenity_Native_File_Chooser_Driver : public Fl_Kdialog_Native_File_Chooser_Driver {
00029     friend class Fl_Native_File_Chooser;
00030     static bool did_find_zenity;
00031     static bool have_looked_for_zenity;
00032     Fl_Zenity_Native_File_Chooser_Driver(int val);
00033     void append_filter(Fl_String& command);
00034     void build_command(Fl_String& command) FL_OVERRIDE;
00035 };
00036
00042 #endif // FL_ZENITY_NATIVE_FILE_CHOOSER_H

```

13.228 fl_oxy.h

```

00001 //
00002 // "Oxy" Scheme drawing routines for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2011 by Dmitriy K. aka "kdiman"
00005 // Copyright 2012-2022 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please report all bugs and problems on the following page:
00014 //
00015 //     https://www.fltk.org/str.php
00016 //
00017 //
00018 #ifndef fl_oxy_h
00019 #define fl_oxy_h
00020
00021 #include <FL/Fl.H>
00022
00023 // draw an arrow GUI element for the 'oxy' scheme
00024 //
00025 // bb   bounding box
00026 // t    arrow type
00027 // o    orientation
00028 // c    arrow color
00029
00030 extern FL_EXPORT void oxy_arrow(Fl_Rect bb,
00031                               Fl_Arrow_Type t, Fl_Orientation o,
00032                               Fl_Color col);
00033
00034 #endif // fl_oxy_h

```

13.229 FI_Paged_Device.cxx File Reference

implementation of class [Fl_Paged_Device](#).

```

#include <FL/Fl_Paged_Device.H>
#include <FL/Fl.H>
#include <FL/fl_draw.H>

```


13.229.1 Detailed Description

implementation of class [Fl_Paged_Device](#).

13.230 fl_rect.cxx File Reference

Drawing and clipping routines for rectangles.

```
#include <FL/platform.H>
#include <FL/Fl_Graphics_Driver.H>
```

13.230.1 Detailed Description

Drawing and clipping routines for rectangles.

13.231 Fl_Screen_Driver.H

```
00001 //
00002 // All screen related calls in a driver style class.
00003 //
00004 // Copyright 1998-2024 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00023 #ifndef FL_SCREEN_DRIVER_H
00024 #define FL_SCREEN_DRIVER_H
00025
00026 #include <FL/fl_types.h>
00027 #include <FL/Fl.H> // for Fl_Timeout_Handler
00028 #include <FL/Fl_Text_Editor.H>
00029
00030
00031 // TODO: add text composition?
00032 // TODO: add Fl::display
00033 // TODO: add copy/paste, drag/drop?
00034 // TODO: get key/get mouse?
00035 // TODO: system colors/colormaps
00036 // TODO: system menu?
00037 // TODO: native filechooser
00038 // TODO: native message boxes
00039 // TODO: read screen to image
00040 // TODO: application shortcuts
00041
00042 class Fl_Window;
00043 class Fl_RGB_Image;
00044 class Fl_Group;
00045 class Fl_Input;
00046 class Fl_System_Driver;
00047
00055 class Fl_Screen_Driver {
00056 protected:
00057     Fl_Screen_Driver();
00058     virtual ~Fl_Screen_Driver();
00060
00061     static const int MAX_SCREEN_S = 16;
00062
00063     int num_screens;
00064     static float fl_intersection(int x1, int y1, int w1, int h1,
00065                                 int x2, int y2, int w2, int h2);
00066
00067 public:
00068     static int keyboard_screen_scaling; // true means ctrl+/-/0/ resize windows
00069     static char bg_set;
00070     static char bg2_set;
00071     static char fg_set;
00072     static Fl_System_Driver *system_driver;
00073     // These flags are useful after calling XParseGeometry(). They indicate which of its
```

```

00074 // arguments contain meaningful data upon return.
00075 static const int fl_NoValue;
00076 static const int fl_WidthValue;
00077 static const int fl_HeightValue;
00078 static const int fl_XValue;
00079 static const int fl_YValue;
00080 static const int fl_XNegative;
00081 static const int fl_YNegative;
00082 // Next 2 are used when transient scale windows are implemented as popups
00083 static Fl_Window *transient_scale_parent;
00084 static void del_transient_window(void *);
00085 // key_table and key_table_size are used in fl_shortcut to translate key names
00086 struct Keyname {
00087     unsigned int key;
00088     const char* name;
00089 } *key_table;
00090 int key_table_size;
00091
00092 virtual float scale(int) { return 1; }
00093 virtual void scale(int /*n*/, float /*f*/) {}
00094 static Fl_Screen_Driver *newScreenDriver();
00095 // implement to process the -display argument and support the DISPLAY env var
00096 virtual void display(const char *) {}
00097 // default implementation should be enough
00098 virtual int XParseGeometry(const char* string, int* x, int* y, unsigned int* width, unsigned int*
height);
00099 // the default implementation is most probably enough
00100 virtual void own_colormap() {}
00101 // the default implementation of shortcut_add_key_name() is in src/fl_shortcut.cxx
00102 virtual const char *shortcut_add_key_name(unsigned key, char *p, char *buf, const char **);
00103 // whether a platform uses additional code in Fl_Menu::handle_part1(int e)
00104 virtual int need_menu_handle_part1_extra() {return 0;}
00105 // whether a platform uses additional code in Fl_Menu::handle(int e)
00106 virtual int need_menu_handle_part2() {return 0;}
00107 // implement functions telling whether a key is pressed
00108 virtual int event_key(int) {return 0;}
00109 virtual int get_key(int) {return 0;}
00110 virtual int visual(int flags);
00111 // --- screen configuration
00112 virtual void init() {}
00113 virtual int x() { return 0; }
00114 virtual int y() { return 0; }
00115 virtual int w() { return 800; } // default, FL_OVERRIDE in driver!
00116 virtual int h() { return 600; } // default, FL_OVERRIDE in driver!
00117 virtual int screen_count();
00118 void screen_xywh(int &X, int &Y, int &W, int &H, int mx, int my);
00119 virtual void screen_xywh(int &X, int &Y, int &W, int &H, int /*n*/) {
00120     X = 0;
00121     Y = 0;
00122     W = 800;
00123     H = 600;
00124 }
00125 void screen_xywh(int &X, int &Y, int &W, int &H, int mx, int my, int mw, int mh);
00126 virtual bool screen_boundaries_known() { return true; }
00127 virtual int screen_num(int x, int y);
00128 virtual int screen_num(int x, int y, int w, int h);
00129 virtual void screen_dpi(float &h, float &v, int n = 0) { // FL_OVERRIDE in driver!
00130     h = 72;
00131     v = 72;
00132     (void)n;
00133 }
00134 void screen_work_area(int &X, int &Y, int &W, int &H, int mx, int my);
00135 virtual void screen_work_area(int &X, int &Y, int &W, int &H, int n) {
00136     screen_xywh(X, Y, W, H, n);
00137 }
00138 // --- audible output
00139 virtual void beep(int) {}
00140 // --- global events
00141 virtual void flush() {} // must FL_OVERRIDE
00142 virtual void grab(Fl_Window *) {}
00143 // --- global colors
00144 /* the default implementation of parse_color() may be enough */
00145 virtual int parse_color(const char *p, uchar &r, uchar &g, uchar &b);
00146 virtual void get_system_colors();
00147 /* the default implementation of get_system_scheme() may be enough */
00148 virtual const char *get_system_scheme();
00149
00150 static int secret_input_character;
00151 /* Implement to indicate whether complex text input may involve marked text.
00152 When it does, has_marked_text returns non zero.
00153 */
00154 virtual int has_marked_text() const { return 0; }
00155 // implement so text-editing widgets support dead keys
00156 virtual int compose(int &del) {
00157     del = 0;
00158     return 0;
00159 }

```

```

00160 // default implementation may be enough
00161 virtual void compose_reset();
00162 // implement to support drag-n-drop. use_selection = 1 means the GUI is welcome to display
00163 // the selected text during the D&D operation
00164 virtual int dnd(int use_selection = 0) { (void)use_selection; return 0; }
00165 // null means no platform-specific key bindings for Fl_Text_Editor
00166 Fl_Text_Editor::Key_Binding *text_editor_extra_key_bindings;
00167 // default implementation may be enough
00168 virtual int text_display_can_leak() const { return 0; }
00169
00170 // if no keyboard is connected on a touch or pen device, the system on-screen keyboard is
00171 // requested
00172 virtual void request_keyboard() {}
00173 // we no longer need the on-screen keyboard; it's up to the system to hide it
00174 virtual void release_keyboard() {}
00175
00176 /* Member function read_win_rectangle() supports public functions
00177 fl_read_image() and fl_capture_window() which capture pixel data from
00178 a window (or also from an offscreen buffer with fl_read_image).
00179
00180 If 'may_capture_subwins' is true, an implementation may or may not capture
00181 also the content of subwindows embedded in 'win'. If subwindows were captured,
00182 *'did_capture_subwins' is returned set to true. If read_win_rectangle()
00183 is called with 'may_capture_subwins' set to true, 'did_capture_subwins' should
00184 be set before the call to the address of a boolean set to false.
00185 The implementation of this virtual function for the macOS platform has the
00186 capability of capturing subwindows when asked for.
00187
00188 A platform may also use its read_win_rectangle() implementation to capture
00189 window decorations (e.g., title bar). In that case, it is called by
00190 Fl_XXX_Window_Driver::capture_titlebar_and_borders().
00191
00192 win is the window to capture from, or NULL to capture from the current offscreen
00193 */
00194 virtual Fl_RGB_Image *read_win_rectangle(int /*X*/, int /*Y*/, int /*w*/, int /*h*/, Fl_Window *,
00195                                         bool may_capture_subwins = false,
00196                                         bool *did_capture_subwins = NULL) {
00197     (void)may_capture_subwins;
00198     (void)did_capture_subwins;
00199     return NULL;
00200 }
00201 static void write_image_inside(Fl_RGB_Image *to, Fl_RGB_Image *from, int to_x, int to_y);
00202 static Fl_RGB_Image *traverse_to_gl_subwindows(Fl_Group *g, int x, int y, int w, int h,
00203                                               Fl_RGB_Image *full_img);
00204 static size_t convert_crlf(char *s, size_t len);
00205 // optional platform-specific key handling for Fl_Input widget
00206 // the default implementation may be enough
00207 virtual int input_widget_handle_key(int key, unsigned mods, unsigned shift, Fl_Input *input);
00208 // implement to support Fl::get_mouse()
00209 virtual int get_mouse(int /*x*/, int /*y*/) { return 0; }
00210 // optional methods to enable/disable input methods for complex scripts
00211 virtual void enable_im() {}
00212 virtual void disable_im() {}
00213 // calls open_display_platform() and then does platform-independent work
00214 void open_display();
00215 // implement to open access to the display
00216 virtual void open_display_platform() {}
00217 // optional method to close display access
00218 virtual void close_display() {}
00219 // compute dimensions of an Fl_Offscreen
00220 virtual void offscreen_size(Fl_Offscreen, int /*width*/, int /*height*/) {}
00221
00222 void rescale_all_windows_from_screen(int screen, float f);
00223 static void transient_scale_display(float f, int nscreen);
00224 // need export to fltk_gl.so because used in glut_compatibility.cxx
00225 static FL_EXPORT int scale_handler(int event);
00226 virtual void desktop_scale_factor() {}
00227 void use_startup_scale_factor();
00228 enum APP_SCALING_CAPABILITY {
00229     NO_APP_SCALING = 0,
00230     SYSTEMWIDE_APP_SCALING,
00231     PER_SCREEN_APP_SCALING
00232 };
00233 virtual APP_SCALING_CAPABILITY rescalable() { return NO_APP_SCALING; }
00234 // supports Fl_Window::default_icons()
00235 virtual void default_icons(const Fl_RGB_Image *icons[], int count);
00236 // implement to support copy-to-clipboard
00237 virtual void copy(const char * /*stuff*/, int /*len*/, int /*clipboard*/, const char * /*type*/) {}
00238 // implement to support paste-from-clipboard
00239 virtual void paste(Fl_Widget &, int /*clipboard*/, const char * /*type*/) {}
00240 // implement to support paste-from-clipboard
00241 virtual int clipboard_contains(const char * /*type*/) {return 0;}
00242 // implement to support paste-from-clipboard
00243 virtual void clipboard_notify_change() {}
00244 // next 3 are related to Input Methods
00245 virtual void set_spot(int font, int size, int X, int Y, int W, int H, Fl_Window *win);
00246 virtual void reset_spot();

```

```

00249     virtual void set_status(int X, int Y, int W, int H);
00250 };
00251
00252 #endif // !FL_SCREEN_DRIVER_H
00253

```

13.232 Fl_String.H

```

00001 //
00002 // Basic Fl_String header for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 2021-2023 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file.  If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef _FL_Fl_String_H_
00018 #define _FL_Fl_String_H_
00019
00020 #include <FL/Fl_Export.H>
00021
00022 // See: https://en.cppreference.com/w/cpp/string/basic_string/basic_string
00023
00024 class FL_EXPORT Fl_String {
00025 private:
00026     /*
00027     *   FLTK does no small string optimization.
00028     *   If the string is empty and capacity is not set, buffer_ will be NULL.
00029     */
00030     char *buffer_;
00031     int size_;
00032     int capacity_;
00033
00034     void init_();
00035     void grow_(int n);
00036     void shrink_(int n);
00037     Fl_String &replace_(int at, int n_del, const char *src, int n_ins);
00038
00039 protected:
00040     static const char NUL;
00041
00042 public:
00043     static const int npos;
00044
00045     // ---- Assignment
00046     Fl_String();
00047     Fl_String(const Fl_String &str);
00048     Fl_String(const char *cstr);
00049     Fl_String(const char *str, int size);
00050     ~Fl_String();
00051     Fl_String& operator=(const Fl_String &str);
00052     Fl_String& operator=(const char *cstr);
00053     Fl_String &assign(const Fl_String &str);
00054     Fl_String &assign(const char *cstr);
00055     Fl_String &assign(const char *str, int size);
00056
00057     // ---- Element Access
00058     char at(int pos) const;
00059     char operator[](int n) const;
00060     char &operator[](int n);
00061     const char *data() const;
00062     char *data();
00063     const char *c_str() const;
00064
00065     // ---- Capacity
00066     bool empty() const;
00067     int size() const;
00068     void reserve(int n);
00069     int capacity() const;
00070     void shrink_to_fit();
00071
00072     // --- Operations
00073     void clear();
00074     Fl_String &insert(int at, const char *src, int n_ins=npow);
00075     Fl_String &insert(int at, const Fl_String &src);
00076     Fl_String &erase(int at, int n_del);

```

```

00114 void push_back(char c);
00115 void pop_back();
00116 Fl_String &append(const char *src, int n_ins=npos);
00117 Fl_String &append(const Fl_String &src);
00118 Fl_String &append(char c);
00119 Fl_String &operator+=(const char *src);
00120 Fl_String &operator+=(const Fl_String &src);
00121 Fl_String &operator+=(char c);
00122 int find(const Fl_String &needle, int start_pos=0) const;
00123 Fl_String &replace(int at, int n_del, const char *src, int n_ins=npos);
00124 Fl_String &replace(int at, int n_del, const Fl_String &src);
00125 Fl_String substr(int pos=0, int n=npow) const;
00126 void resize(int n);
00127
00128 // --- Non Standard
00129 int strlen() const;
00130 void debug(const char *info = 0) const;
00131 void hexdump(const char *info = 0) const;
00132 }; // class Fl_String
00133
00134 // ---- Non-member functions
00135 FL_EXPORT Fl_String operator+(const Fl_String& lhs, const Fl_String& rhs);
00136 FL_EXPORT Fl_String operator+(const Fl_String& lhs, const char* rhs);
00137 FL_EXPORT bool operator==(const Fl_String & lhs, const Fl_String & rhs);
00138 FL_EXPORT bool operator!=(const Fl_String & lhs, const Fl_String & rhs);
00139
00145 #endif // _FL_Fl_String_H_

```

13.233 Fl_Sys_Menu_Bar_Driver.H

```

00001 //
00002 // system menu bar widget for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2017 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef Fl_Sys_Menu_Bar_Driver_H
00018 #define Fl_Sys_Menu_Bar_Driver_H
00019
00020 #if !defined(FL_DOXYGEN)
00021
00022 #include <FL/Fl_Sys_Menu_Bar.H>
00023
00024 class Fl_Sys_Menu_Bar_Driver {
00025     friend class Fl_Sys_Menu_Bar;
00026 public:
00027     static Fl_Sys_Menu_Bar::window_menu_style_enum window_menu_style_;
00028     static Fl_Sys_Menu_Bar_Driver *driver_; // to be assigned with a unique object of this class or of a
00029     derived class
00029     Fl_Sys_Menu_Bar *bar;
00030     Fl_Sys_Menu_Bar_Driver();
00031     virtual ~Fl_Sys_Menu_Bar_Driver();
00032     virtual void update() {}
00033     virtual void draw() { bar->Fl_Menu_Bar::draw(); }
00034     virtual void about(Fl_Callback *, void *) {}
00035     virtual int add(const char* label, int shortcut, Fl_Callback *cb, void *user_data, int flags) {
00036         return bar->Fl_Menu_Bar::add(label, shortcut, cb, user_data, flags);
00037     }
00038     virtual int add(const char* str) { return bar->Fl_Menu_Bar::add(str); }
00039     virtual int insert(int index, const char* label, int shortcut, Fl_Callback *cb, void *user_data, int
00040     flags) {
00041         return bar->Fl_Menu_Bar::insert(index, label, shortcut, cb, user_data, flags);
00042     }
00043     virtual void menu(const Fl_Menu_Item *m) { bar->Fl_Menu_Bar::menu(m); }
00044     virtual void shortcut(int i, int s) { bar->Fl_Menu_Bar::shortcut(i, s); }
00045     virtual void setonly(Fl_Menu_Item *item) { bar->Fl_Menu_Bar::setonly(item); }
00046     virtual void clear() { bar->Fl_Menu_Bar::clear(); }
00047     virtual int clear_submenu(int index) { return bar->Fl_Menu_Bar::clear_submenu(index); }
00048     virtual void remove(int index) { bar->Fl_Menu_Bar::remove(index); }
00049     virtual void replace(int index, const char *name) { bar->Fl_Menu_Bar::replace(index, name); }
00050     virtual void mode(int i, int fl) { bar->Fl_Menu_Bar::mode(i, fl); }
00051     virtual void create_window_menu() {}
00052     static Fl_Sys_Menu_Bar::window_menu_style_enum window_menu_style() { return window_menu_style_; }
00053     static void window_menu_style(Fl_Sys_Menu_Bar::window_menu_style_enum style) { window_menu_style_ =
00054     style; }

```

```

00053 };
00054
00055 #endif // !defined(FL_DOXYGEN)
00056
00057 #endif // Fl_Sys_Menu_Bar_Driver_H

```

13.234 Fl_System_Driver.H

```

00001 //
00002 // A base class for platform specific system calls
00003 // for the Fast Light Tool Kit (FLTK).
00004 //
00005 // Copyright 2010-2022 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00028 /* Class hierarchy
00029 + Fl_System_Driver
00030 | + Fl_Posix_System_Driver
00031 | | + Fl_Unix_System_Driver
00032 | | + Fl_Darwin_System_Driver
00033 | + Fl_WinAPI_System_Driver
00034 */
00035
00036 #ifndef FL_SYSTEM_DRIVER_H
00037 #define FL_SYSTEM_DRIVER_H
00038
00039 #include <FL/Fl.H>
00040 #include <FL/Fl_Export.H>
00041 #include <FL/Fl_filename.H>
00042 #include <FL/Fl_Preferences.H>
00043 #include <stdio.h>
00044 #include <stdlib.h>
00045 #include <stdarg.h>
00046 #include <string.h>
00047 #include <time.h>
00048
00049 class Fl_File_Icon;
00050 class Fl_File_Browser;
00051 class Fl_Pixmap;
00052 class Fl_Widget;
00053 class Fl_Sys_Menu_Bar_Driver;
00054
00060 class Fl_System_Driver {
00061     friend class Fl;
00062 protected:
00063     // implement once for each platform
00064     static Fl_System_Driver *newSystemDriver();
00065     Fl_System_Driver();
00066     static bool awake_ring_empty();
00067 public:
00068     virtual ~Fl_System_Driver();
00069     static int command_key;
00070     static int control_key;
00071
00072     // implement if the system adds unwanted program argument(s)
00073     virtual int single_arg(const char *) { return 0; }
00074     // implement if the system adds unwanted program argument pair(s)
00075     virtual int arg_and_value(const char * /*name*/, const char * /*value*/) { return 0; }
00076     static void warning(const char* format, ...);
00077     // implement to set the default effect of Fl::warning()
00078     virtual void warning(const char* format, va_list args);
00079     static void error(const char* format, ...);
00080     // implement to set the default effect of Fl::error()
00081     virtual void error(const char* format, va_list args);
00082     static void fatal(const char* format, ...);
00083     // implement to set the default effect of Fl::error()
00084     virtual void fatal(const char* format, va_list args);
00085
00086     // implement these to support cross-platform file operations
00087     virtual char *utf2mbs(const char *s) {return (char*)s;}
00088     virtual char *getenv(const char*) {return NULL;}
00089     virtual int putenv(const char *) {return -1;}
00090     virtual int open(const char * /*f*/, int /*oflags*/, int /*pmode*/) {return -1;}
00091
00092     // implement these to support cross-platform string operations

```

```

00093 virtual char *strdup(const char *) {return NULL;}
00094
00095 // Note: the default implementation ignores the 'binary' argument.
00096 // Some platforms (notably Windows) may use this argument.
00097 virtual int open_ext(const char* f, int /*binary*/, int oflags, int pmode) {
00098     return this->open(f, oflags, pmode);
00099 }
00100 virtual FILE *fopen(const char* f, const char *mode);
00101 virtual int system(const char*) {return -1;}
00102 virtual int execvp(const char * /*file*/, char *const * /*argv*/) {return -1;}
00103 virtual int chmod(const char* /*f*/, int /*mode*/) {return -1;}
00104 virtual int access(const char* /*f*/, int /*mode*/) { return -1;}
00105 virtual int flstat(const char* /*f*/, struct stat *) { return -1;}
00106 virtual char *getcwd(char* /*b*/, int /*l*/) {return NULL;}
00107 virtual int chdir(const char*) {return -1;}
00108 virtual int unlink(const char*) {return -1;}
00109 virtual int mkdir(const char* /*f*/, int /*mode*/) {return -1;}
00110 virtual int rmdir(const char*) {return -1;}
00111 virtual int rename(const char* /*f*/, const char * /*n*/) {return -1;}
00112
00113 // Windows commandline argument conversion to UTF-8.
00114 // Default implementation: no-op, overridden only on Windows
00115 virtual int args_to_utf8(int argc, char ** &argv) { return argc; }
00116
00117 // the default implementation of these utf8... functions should be enough
00118 virtual unsigned utf8towlc(const char* src, unsigned srclen, wchar_t* dst, unsigned dstlen);
00119 virtual unsigned utf8fromwc(char* dst, unsigned dstlen, const wchar_t* src, unsigned srclen);
00120 virtual int utf8locale() {return 1;}
00121 virtual unsigned utf8to_mb(const char* src, unsigned srclen, char* dst, unsigned dstlen);
00122 virtual unsigned utf8from_mb(char* dst, unsigned dstlen, const char* src, unsigned srclen);
00123 // implement to shield fprintf() from locale changes in decimal point
00124 virtual int clocale_vprintf(FILE *output, const char *format, va_list args);
00125 virtual int clocale_vsnprintf(char *output, size_t output_size, const char *format, va_list args);
00126 virtual int clocale_vsscanf(const char *input, const char *format, va_list args);
00127 // implement scandir-like function
00128 virtual int filename_list(const char * /*d*/, dirent ***,
00129     int (* /*sort*/)(struct dirent **, struct dirent **),
00130     char *errmsg=NULL, int errmsg_sz=0) {
00131     (void)errmsg; (void)errmsg_sz;
00132     return -1;
00133 }
00134 // the default implementation of filename_expand() may be enough
00135 virtual int filename_expand(char *to, int tolen, const char *from);
00136 // to implement
00137 virtual const char *getpwnam(const char *) {return NULL;}
00138 // the default implementation of filename_relative() is in src/filename_absolute.cxx and may be
00139 // enough
00140 virtual int filename_relative(char *to, int tolen, const char *from, const char *base);
00141 // the default implementation of filename_absolute() is in src/filename_absolute.cxx and may be
00142 // enough
00143 virtual int filename_absolute(char *to, int tolen, const char *from, const char *base);
00144 // the default implementation of filename_isdir() is in src/filename_isdir.cxx and may be enough
00145 // the default implementation of filename_isdir_quick() is in src/filename_isdir.cxx and may be
00146 // enough
00147 virtual int filename_isdir_quick(const char* n);
00148 // the default implementation of filename_ext() is in src/filename_ext.cxx and may be enough
00149 virtual const char *filename_ext(const char *buf);
00150 // implement to support fl_filename_name()
00151 virtual const char *filename_name(const char *buf) {return buf;}
00152 // implement to support fl_open_uri()
00153 virtual int open_uri(const char * /*uri*/, char * /*msg*/, int /*msglen*/) {return 0;}
00154 // the default implementation of use_tooltip_timeout_condition() may be enough
00155 virtual int use_tooltip_timeout_condition() {return 0;}
00156 // the default implementation of use_recent_tooltip_fix() may be enough
00157 virtual int use_recent_tooltip_fix() {return 0;}
00158 // the default implementation of need_test_shortcut_extra() may be enough
00159 virtual int need_test_shortcut_extra() {return 0;}
00160 // implement to support Fl_File_Browser::load()
00161 virtual int file_browser_load_filesystem(Fl_File_Browser *, char * /*filename*/, int /*lname*/,
00162     Fl_File_Icon *) {return 0;}
00163 // the default implementation of file_browser_load_directory() should be enough
00164 virtual int file_browser_load_directory(const char *directory, char *filename, size_t name_size,
00165     dirent **pfiles, Fl_File_Sort_F *sort,
00166     char *errmsg=NULL, int errmsg_sz=0);
00167 // implement to support Fl_Preferences
00168 virtual void newUUID(char *uuidBuffer) { uuidBuffer[0] = 0; }
00169 // implement to support Fl_Preferences
00170 virtual char *preference_rootnode(Fl_Preferences *, Fl_Preferences::Root,
00171     const char * /*vendor*/,
00172     const char * /*application*/) {return NULL;}
00173 // the default implementation of preferences_need_protection_check() may be enough
00174 virtual int preferences_need_protection_check() {return 0;}
00175 // implement to support Fl_Plugin_Manager::load()
00176 virtual void *load(const char *) {return NULL;}
00177 // the default implementation is most probably enough
00178 virtual void png_extra_rgba_processing(unsigned char * /*array*/, int /*w*/, int /*h*/) {}

```

```

00176 // the default implementation is most probably enough
00177 virtual const char *next_dir_sep(const char *start) { return strchr(start, '/');}
00178 // implement to support threading
00179 virtual void awake(void*) {}
00180 virtual int lock() {return 1;}
00181 virtual void unlock() {}
00182 virtual void* thread_message() {return NULL;}
00183 // implement to support Fl_File_Icon
00184 virtual int file_type(const char *filename);
00185 // implement to return the user's home directory name
00186 virtual const char *home_directory_name() { return ""; }
00187 // the default implementation is most probably enough
00188 virtual const char *filesystems_label() { return "File Systems"; }
00189 // return TRUE means \ same as / in file names
00190 virtual int backslash_as_slash() {return 0;}
00191 // return TRUE means : indicates a drive letter in file names
00192 virtual int colon_is_drive() {return 0;}
00193 // return TRUE means that files whose name begins with dot are hidden
00194 virtual int dot_file_hidden() {return 0;}
00195 // return TRUE when file names are case insensitive
00196 virtual int case_insensitive_filenames() {return 0;}
00197 // the implementations of local_to_latin1() and latin1_to_local() are in fl_encoding_latin1.cxx
00198 virtual const char *local_to_latin1(const char *t, int n);
00199 virtual const char *latin1_to_local(const char *t, int n);
00200 // the implementations of local_to_mac_roman() and mac_roman_to_local() are in
fl_encoding_mac_roman.cxx
00201 virtual const char *local_to_mac_roman(const char *t, int n);
00202 virtual const char *mac_roman_to_local(const char *t, int n);
00203 // the default implementations of tree_openpixmap() and tree_closepixmap() are
00204 // in Fl_Tree_Prefs.cxx and can be enough
00205 virtual Fl_Pixmap *tree_openpixmap();
00206 virtual Fl_Pixmap *tree_closepixmap();
00207 static const char *const tree_open_xpm[]; // used by tree_openpixmap()
00208 static const char *const tree_close_xpm[]; // used by tree_closepixmap()
00209 // the default implementation of tree_connector_style() is in Fl_Tree_Prefs.cxx and can be enough
00210 virtual int tree_connector_style();
00211 virtual void add_fd(int fd, int when, Fl_FD_Handler cb, void* = 0);
00212 virtual void add_fd(int fd, Fl_FD_Handler cb, void* = 0);
00213 virtual void remove_fd(int, int when);
00214 virtual void remove_fd(int);
00215 // the default implementation of open_callback() may be enough
00216 virtual void open_callback(void (*) (const char *));
00217 // The default implementation may be enough.
00218 virtual void gettime(time_t *sec, int *usec);
00219 // The default implementation of the next 4 functions may be enough.
00220 virtual const char *shift_name() { return "Shift"; }
00221 virtual const char *meta_name() { return "Meta"; }
00222 virtual const char *alt_name() { return "Alt"; }
00223 virtual const char *control_name() { return "Ctrl"; }
00224 virtual Fl_Sys_Menu_Bar_Driver *sys_menu_bar_driver() { return NULL; }
00225 virtual void lock_ring() {}
00226 virtual void unlock_ring() {}
00227 virtual double wait(double); // must FL_OVERRIDE
00228 virtual int ready() { return 0; } // must FL_OVERRIDE
00229 virtual int close_fd(int) {return -1;} // to close a file descriptor
00230 };
00231
00232 #endif // FL_SYSTEM_DRIVER_H
00233

```

13.235 Fl_Timeout.cxx File Reference

```

#include "Fl_Timeout.h"
#include "Fl_System_Driver.H"
#include <stdio.h>
#include <math.h>

```

13.236 Fl_Timeout.h File Reference

Fl_Timeout handling.

```

#include <FL/Fl.H>

```


Classes

- class [Fl_Timeout](#)

The internal class [Fl_Timeout](#) handles all timeout related functions.

Macros

- `#define FL_TIMEOUT_DEBUG 0`

13.236.1 Detailed Description

[Fl_Timeout](#) handling.

This file contains implementations of:

- [Fl::add_timeout\(\)](#)
- [Fl::repeat_timeout\(\)](#)
- [Fl::has_timeout\(\)](#)
- [Fl::remove_timeout\(\)](#)

and related methods of class [Fl_Timeout](#).

13.237 Fl_Timeout.h

[Go to the documentation of this file.](#)

```

00001 //
00002 // Header for timeout support functions for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Author: Albrecht Schlosser
00005 // Copyright 2021-2022 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00018 #ifndef _src_Fl_Timeout_h_
00019 #define _src_Fl_Timeout_h_
00020
00021 #include <FL/Fl.H>
00022
00023 #define FL_TIMEOUT_DEBUG 0          // 1 = include debugging features, 0 = no
00024
00054 class Fl_Timeout {
00055
00056 protected:
00057
00058     Fl_Timeout *next;                // ** Link to next timeout
00059     Fl_Timeout_Handler callback;    // the user's callback
00060     void *data;                     // the user's callback data
00061     double time;                    // delay until timeout
00062     int skip;                        // skip "new" (inserted) timers (issue #450)
00063
00064     // constructor
00065     Fl_Timeout() {
00066         next = 0;
00067         callback = 0;
00068         data = 0;
00069         time = 0;
00070         skip = 0;
00071     }
00072
00073     // destructor
00074     ~Fl_Timeout() {}
00075
00076     // get a new timer entry from the pool or allocate a new one
00077     static Fl_Timeout *get(double time, Fl_Timeout_Handler cb, void *data);
00078

```

```

00079 // insert this timer into the active timer queue, sorted by expiration time
00080 void insert();
00081
00082 // remove this timer from the active timer queue and
00083 // add it to the "current" timer stack
00084 void make_current();
00085
00086 // remove this timer from the current timer stack and
00087 // add it to the list of free timers
00088 void release();
00089
00091 double delay() {
00092     return time;
00093 }
00094
00096 void delay(double t) {
00097     time = t;
00098 }
00099
00100 public:
00101 // Returns whether the given timeout is active.
00102 static int has_timeout(Fl_Timeout_Handler cb, void *data);
00103
00104 // Add or remove timeouts
00105
00106 static void add_timeout(double time, Fl_Timeout_Handler cb, void *data);
00107 static void repeat_timeout(double time, Fl_Timeout_Handler cb, void *data);
00108 static void remove_timeout(Fl_Timeout_Handler cb, void *data);
00109
00110 // Elapse timeouts, i.e. calculate new delay time of all timers.
00111 // This does not call the timer callbacks.
00112 static void elapse_timeouts();
00113
00114 // Elapse timeouts and call timer callbacks.
00115 static void do_timeouts();
00116
00117 // Return the delay in seconds until the next timer expires.
00118 static double time_to_wait(double ttw);
00119
00120 #if FL_TIMEOUT_DEBUG
00121 // Write some statistics to stdout
00122 static void debug(int level = 1);
00123 #endif
00124
00125 protected:
00126
00127 static Fl_Timeout *current();
00128
00138 static Fl_Timeout *first_timeout;
00139
00144 static Fl_Timeout *free_timeout;
00145
00162 static Fl_Timeout *current_timeout; // list of "current" timeouts
00163
00164 }; // class Fl_Timeout
00165
00166 #endif // _src_Fl_Timeout_h_

```

13.238 fl_vertex.cxx File Reference

Portable drawing code for drawing arbitrary shapes with simple 2D transformations.

```

#include <FL/Fl_Graphics_Driver.H>
#include <FL/Fl.H>
#include <FL/math.h>
#include <stdlib.h>

```

13.238.1 Detailed Description

Portable drawing code for drawing arbitrary shapes with simple 2D transformations.

13.239 Fl_Window_Driver.H

```

00001 //
00002 // A base class for platform specific window handling code
00003 // for the Fast Light Tool Kit (FLTK).
00004 //

```

```

00005 // Copyright 2010-2024 by Bill Spitzak and others.
00006 //
00007 // This library is free software. Distribution and use rights are outlined in
00008 // the file "COPYING" which should have been included with this file. If this
00009 // file is missing or damaged, see the license at:
00010 //
00011 //     https://www.fltk.org/COPYING.php
00012 //
00013 // Please see the following page on how to report bugs and issues:
00014 //
00015 //     https://www.fltk.org/bugs.php
00016 //
00017
00028 #ifndef FL_WINDOW_DRIVER_H
00029 #define FL_WINDOW_DRIVER_H
00030
00031 #include <FL/Fl_Export.H>
00032 #include <FL/Fl_Window.H>
00033 #include <FL/Fl_Overlay_Window.H>
00034
00035 #include <stdlib.h>
00036
00037 class Fl_X;
00038 class Fl_Image;
00039 class Fl_RGB_Image;
00040 class Fl_Image_Surface;
00041
00052 class Fl_Window_Driver
00053 {
00054     friend class Fl_Window;
00055 private:
00056     static bool is_a_rescale_; // true when a top-level window is being rescaled
00057
00058 protected:
00059     Fl_Window *pWindow;
00060     int screen_num_; // number of screen where window is mapped
00061 public:
00062     Fl_Window_Driver(Fl_Window *);
00063     virtual ~Fl_Window_Driver();
00064     static Fl_Window_Driver *newWindowDriver(Fl_Window *);
00065     static fl_uintptr_t xid(const Fl_Window *win);
00066     static Fl_Window *find(fl_uintptr_t xid);
00067     int wait_for_expose_value;
00068     Fl_Image_Surface *other_xid; // offscreen bitmap (overlay and double-buffered windows)
00069     int screen_num();
00070     void screen_num(int n) { screen_num_ = n; }
00071
00072
00073 // --- frequently used accessors to public window data
00074 int x() const { return pWindow->x(); }
00075 int y() const { return pWindow->y(); }
00076 int w() const { return pWindow->w(); }
00077 int h() const { return pWindow->h(); }
00078 int border() const { return pWindow->border(); }
00079 int visible() const { return pWindow->visible(); }
00080 int visible_r() const { return pWindow->visible_r(); }
00081 int shown() const { return pWindow->shown(); }
00082 Fl_Group *parent() const { return pWindow->parent(); }
00083
00084 // --- accessors to private window data
00085 int minw();
00086 int minh();
00087 int maxw();
00088 int maxh();
00089 int dw();
00090 int dh();
00091 int aspect();
00092 unsigned char size_range_set();
00093 int is_resizable() { return pWindow->is_resizable(); }
00094 void is_a_rescale(bool b) { is_a_rescale_ = b; }
00095 int fullscreen_screen_top();
00096 int fullscreen_screen_bottom();
00097 int fullscreen_screen_left();
00098 int fullscreen_screen_right();
00099 int* no_fullscreen_x() { return &pWindow->no_fullscreen_x; }
00100 int* no_fullscreen_y() { return &pWindow->no_fullscreen_y; }
00101 int* no_fullscreen_w() { return &pWindow->no_fullscreen_w; }
00102 int* no_fullscreen_h() { return &pWindow->no_fullscreen_h; }
00103 int force_position();
00104 void force_position(int c);
00105 void x(int X);
00106 void y(int Y);
00107 void current(Fl_Window *c);
00108 char show_iconic() { return Fl_Window::show_next_window_iconic(); }
00109 void show_iconic(char c) { Fl_Window::show_next_window_iconic(c); }
00110 void flx(Fl_X *x) { pWindow->flx_ = x; }
00111 Fl_Cursor cursor_default() { return pWindow->cursor_default; }

```

```

00121 void destroy_double_buffer();
00122 Fl_Window *overlay() {
00123     return pWindow->as_overlay_window() ? pWindow->as_overlay_window()->overlay_ : NULL;
00124 }
00125
00127 void overlay(Fl_Window *o) {
00128     if (pWindow->as_overlay_window()) pWindow->as_overlay_window()->overlay_ = o;
00129 }
00130
00131 void resize_after_scale_change(int ns, float old_f, float new_f);
00132 void set_popup_window() { pWindow->set_flag(Fl_Window::POPUP); }
00133 bool popup_window() const {return pWindow->Flags() & Fl_Window::POPUP;}
00134
00135 // --- window data
00136 virtual int decorated_w() { return w(); } // default, should be overridden by driver
00137 virtual int decorated_h() { return h(); }
00138 virtual const Fl_Image* shape() { return NULL; }
00139
00140 // --- window management
00141 virtual void take_focus();
00142 virtual void flush(); // the default implementation may be enough
00143 virtual void flush_double();
00144 virtual void flush_overlay();
00146 virtual void draw_begin();
00148 virtual void draw_end();
00149 void draw();
00150 virtual void make_current();
00151 virtual void label(const char *name, const char *mininame);
00152
00153 virtual void makeWindow() {}
00154 virtual void wait_for_expose();
00155 virtual void show();
00156 virtual void resize(int /*X*/, int /*Y*/, int /*W*/, int /*H*/) {}
00157 virtual void hide() {}
00158 int hide_common();
00159 virtual void map() {}
00160 virtual void unmap() {}
00161 virtual void fullscreen_on() {}
00162 virtual void fullscreen_off(int /*X*/, int /*Y*/, int /*W*/, int /*H*/) {}
00163 virtual void maximize();
00164 virtual void un_maximize();
00165 virtual bool maximize_needs_hide() { return false; }
00166 void is_maximized(bool b) { pWindow->is_maximized_(b); }
00167 virtual void use_border();
00168 virtual void size_range();
00169 virtual void iconize() {}
00170 virtual void decoration_sizes(int *top, int *left, int *right, int *bottom) {
00171     *top = *left = *right = *bottom = 0;
00172 }
00173 virtual void show_with_args_begin() {}
00174 virtual void show_with_args_end(int /*argc*/, char ** /*argv*/) {}
00175 virtual int can_do_overlay();
00176 virtual void redraw_overlay();
00177
00178 // --- window cursor stuff
00179 virtual int set_cursor(Fl_Cursor);
00180 virtual int set_cursor(const Fl_RGB_Image*, int, int);
00181
00182 // --- window shape stuff
00183 void shape_pixmap(Fl_Image* pixmap); // platform-independent, support function
00184 virtual void shape(const Fl_Image*) {}
00185 virtual void shape_alpha(Fl_Image*, int /*offset*/) {}
00186
00187 // --- window icon stuff
00188 virtual void icons(const Fl_RGB_Image* /*icons*/[], int /*count*/) {}
00189 virtual const void *icon() const {return NULL;}
00190 virtual void icon(const void *) {}
00191 virtual void free_icons() {}
00192
00193 // --- window printing/drawing helper
00194 virtual void capture_titlebar_and_borders(Fl_RGB_Image*& top, Fl_RGB_Image*& left,
00195     Fl_RGB_Image*& bottom, Fl_RGB_Image*& right);
00196 virtual int scroll(int /*src_x*/, int /*src_y*/, int /*src_w*/, int /*src_h*/,
00197     int /*dest_x*/, int /*dest_y*/,
00198     void (*) (void*, int,int,int,int), void*) { return 0; }
00199 static inline Fl_Window_Driver* driver(const Fl_Window *win) {return win->pWindowDriver;}
00200
00201 // --- support for menu windows
00202 // The default implementation of next 2 virtual members is enough if the
00203 // position of a window in a screen is known. Next static members may be useful
00204 // when that's not the case, as with Wayland.
00205 virtual void reposition_menu_window(int x, int y);
00206 virtual void menu_window_area(int &X, int &Y, int &W, int &H, int nscreen = -1);
00207 static Fl_Window *menu_parent(int *display_height = NULL);
00208 static Fl_Window *menu_leftorigin(Fl_Window*);
00209 static Fl_Window *menu_title(Fl_Window*);
00210 static int menu_itemheight(Fl_Window*);
00211 static int menu_bartitle(Fl_Window*);

```

```

00212     static int menu_selected(Fl_Window*);
00213     static int *menu_offset_y(Fl_Window*);
00214     static bool is_floating_title(Fl_Window *);
00215     static void scroll_to_selected_item(Fl_Window *);
00216
00217     virtual fl_uintptr_t os_id() { return 0; }
00218 };
00219
00220 #endif // FL_WINDOW_DRIVER_H
00221

```

13.240 fl_write_png.cxx File Reference

PNG image support functions.

```

#include <config.h>
#include <FL/Fl_PNG_Image.H>
#include <FL/Fl_RGB_Image.H>
#include <FL/fl_string_functions.h>
#include <FL/fl_utf8.h>
#include <stdio.h>
#include <time.h>

```

Functions

- `int fl_write_png` (const char *filename, const char *pixels, int w, int h, int d, int ld)
Write raw image data to a PNG image file.
- `int fl_write_png` (const char *filename, const unsigned char *pixels, int w, int h, int d, int ld)
Write raw image data to a PNG image file.
- `int fl_write_png` (const char *filename, `Fl_RGB_Image` *img)
Write an RGB(A) image to a PNG image file.

13.240.1 Detailed Description

PNG image support functions.

13.240.2 Function Documentation

13.240.2.1 fl_write_png() [1/3]

```

int fl_write_png (
    const char * filename,
    const char * pixels,
    int w,
    int h,
    int d,
    int ld )

```

Write raw image data to a PNG image file.

This is a very basic and restricted function to create a PNG image file from raw image data, e.g. a screenshot.

The image data must be aligned w/o gaps after each row (ld = 0 or ld = w * d) or ld must be the total length of each row, i.e. w * d + gapsize. If ld == 0 then ld = w * d is assumed.

The total data size must be (w * d + gapsize) * h = ld' * h where ld' = w * d if ld == 0.

For further restrictions and return values please see `fl_write_png(const char *filename, Fl_RGB_Image *img)`.

Parameters

in	<i>filename</i>	Output filename, extension should be '.png'
in	<i>pixels</i>	Image data
in	<i>w</i>	Image data width
in	<i>h</i>	Image data height

Parameters

in	<i>d</i>	Image depth: 1 = GRAY, 2 = GRAY + alpha, 3 = RGB, 4 = RGBA
in	<i>ld</i>	Line delta: default (0) = w * d

Returns

success (0) or error code, see ...

See also

[fl_write_png\(const char *filename, Fl_RGB_Image *img\)](#)

13.240.2.2 fl_write_png() [2/3]

```
int fl_write_png (
    const char * filename,
    const unsigned char * pixels,
    int w,
    int h,
    int d,
    int ld )
```

Write raw image data to a PNG image file.

See also

[fl_write_png\(const char *filename, const char *pixels, int w, int h, int d, int ld\)](#)

13.240.2.3 fl_write_png() [3/3]

```
int fl_write_png (
    const char * filename,
    Fl_RGB_Image * img )
```

Write an RGB(A) image to a PNG image file.

This is a very basic and restricted function to create a PNG image file from an RGB image ([Fl_RGB_Image](#)).

The image data must be aligned w/o gaps, i.e. `ld()` **MUST** be zero or equal to `data_w() * data_h()`.

The image file is always written with the original image size `data_w()` and `data_h()`, even if the image has been scaled.

Image depth 1 (gray), 2 (gray + alpha channel), 3 (RGB) and 4 (RGBA) are supported.

Note

Currently there is no error handling except for errors when opening the file. This may be changed in the future.

Parameters

in	<i>filename</i>	Output filename, extension should be '.png'
in	<i>img</i>	RGB image to be written

Returns

success (0) or error code: negative values are errors

Return values

0	success, file has been written
---	--------------------------------

Return values

-1	png or zlib library not available
-2	file open error

See also

`fl_write_png(const char *, int, int, int, const unsigned char *)`

13.241 Fl_XColor.H

```

00001 //
00002 // X-specific color definitions for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #include <config.h>
00018 #include <FL/Enumerations.H>
00019
00020 // one of these for each color in fltk's "colormap":
00021 // if overlays are enabled, another one for the overlay
00022 struct Fl_XColor {
00023     unsigned char r,g,b; // actual color used by X
00024     unsigned char mapped; // true when XAllocColor done
00025     unsigned long pixel; // the X pixel to use
00026 };
00027 extern Fl_XColor fl_xmap[/*overlay*/][256];
00028
00029 // mask & shifts to produce xcolor for truecolor visuals:
00030 extern unsigned char fl_redmask, fl_greenmask, fl_bluemask;
00031 extern int fl_redshift, fl_greenshift, fl_blueshift, fl_extrashift;

```

13.242 flstring.h

```

00001 /*
00002 * Common string header file for the Fast Light Tool Kit (FLTK).
00003 * Internal use only (see "important note" below).
00004 *
00005 * Copyright 1998-2020 by Bill Spitzak and others.
00006 *
00007 * This library is free software. Distribution and use rights are outlined in
00008 * the file "COPYING" which should have been included with this file. If this
00009 * file is missing or damaged, see the license at:
00010 *
00011 *     https://www.fltk.org/COPYING.php
00012 *
00013 * Please see the following page on how to report bugs and issues:
00014 *
00015 *     https://www.fltk.org/bugs.php
00016 */
00017
00018 /*
00019 * Important note: this header file includes '<config.h>' !
00020 *
00021 * This header MUST NOT be included in public headers (i.e. in 'FL/') and
00022 * SHOULD NOT be included in test and demo programs (i.e. in 'test/' or
00023 * 'examples/') because it includes '<config.h>'.
00024 */
00025
00026 #ifndef flstring_h
00027 # define flstring_h
00028
00029 # include <FL/Fl_Export.H>
00030 # include <config.h>
00031 # include <stdio.h>
00032 # include <stdarg.h>
00033 # include <string.h>

```

```

00034 #  ifdef HAVE_STRINGS_H
00035 #      include <strings.h>
00036 #  endif /* HAVE_STRINGS_H */
00037 #  include <ctype.h>
00038
00039 /*
00040  * Apparently Unixware defines "index" to strchr (!) rather than
00041  * providing a proper entry point or not providing the (obsolete)
00042  * BSD function.  Make sure index is not defined...
00043  */
00044
00045 #  ifdef index
00046 #      undef index
00047 #  endif /* index */
00048
00049 /*
00050  * Visual C++ 2005 incorrectly displays a warning about the use of
00051  * POSIX APIs on Windows, which is supposed to be POSIX compliant...
00052  * Some of these functions are also defined in ISO C99...
00053  */
00054
00055 #  if defined(_WIN32) && !defined(__CYGWIN__) && !defined(__MINGW32__)
00056 #      define strcasecmp(s,t)    _stricmp((s), (t))
00057 #      define strncasecmp(s,t,n) _strnicmp((s), (t), (n))
00058 #  endif /* _WIN32 && ... */
00059
00060 #  ifdef __cplusplus
00061 extern "C" {
00062 #  endif /* __cplusplus */
00063
00064 FL_EXPORT extern int fl_snprintf(char *, size_t, const char *, ...);
00065 #  ifndef HAVE_SNPRINTF
00066 #      define snprintf fl_snprintf
00067 #  endif /* !HAVE_SNPRINTF */
00068
00069 FL_EXPORT extern int fl_vsnprintf(char *, size_t, const char *, va_list ap);
00070 #  ifndef HAVE_VSNPRINTF
00071 #      define vsnprintf fl_vsnprintf
00072 #  endif /* !HAVE_VSNPRINTF */
00073
00074 /*
00075  * strcpy() and strcat() are some really useful BSD string functions
00076  * that work the way strncpy() and strncat() *should* have worked.
00077  */
00078
00079 FL_EXPORT extern size_t fl_strlcat(char *, const char *, size_t);
00080 #  ifndef HAVE_STRLCAT
00081 #      define strlcat fl_strlcat
00082 #  endif /* !HAVE_STRLCAT */
00083
00084 FL_EXPORT extern size_t fl_strlcpy(char *, const char *, size_t);
00085 #  ifndef HAVE_STRLCPY
00086 #      define strlcpy fl_strlcpy
00087 #  endif /* !HAVE_STRLCPY */
00088
00089 /*
00090  * Locale independent ASCII string compare function,
00091  * does not introduce locale issues as with strcasecmp()
00092  */
00093 FL_EXPORT extern int fl_ascii_strcasecmp(const char *s, const char *t);
00094
00095 #  ifdef __cplusplus
00096 }
00097 #  endif /* __cplusplus */
00098
00099 #endif /* !flstring_h */

```

13.243 freeglut_teapot_data.h

```

00001 /*
00002  * freeglut_teapot_data.h
00003  *
00004  * The freeglut library teapot data include file.
00005  *
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```



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00021 * CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
00022 */
00023
00024 #ifndef FREEGLUT_TEAPOT_DATA_H
00025 #define FREEGLUT_TEAPOT_DATA_H
00026
00027 /*
00028 * Original teapot code copyright follows:
00029 */
00030
00031 /*
00032 * (c) Copyright 1993, Silicon Graphics, Inc.
00033 *
00034 * ALL RIGHTS RESERVED
00035 *
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00037 * for any purpose and without fee is hereby granted, provided
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00068 * Graphics, Inc., 2011 N. Shoreline Blvd., Mountain View, CA
00069 * 94039-7311.
00070 *
00071 * OpenGL(TM) is a trademark of Silicon Graphics, Inc.
00072 */
00073
00074 /*
00075 * Rim, body, lid, and bottom data must be reflected in x and y;
00076 * handle and spout data across the y axis only.
00077 */
00078 static int patchdata[][16] =
00079 {
00080     { 102, 103, 104, 105, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 }, /* rim */
00081     { 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 }, /* body */
00082     { 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40 },
00083     { 96, 96, 96, 96, 97, 98, 99, 100, 101, 101, 101, 101, 0, 1, 2, 3 }, /* lid */
00084     { 0, 1, 2, 3, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117 },
00085     { 118, 118, 118, 118, 124, 122, 119, 121, 123, 126, 125, 120, 40, 39, 38, 37 }, /* bottom */
00086     { 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56 }, /* handle */
00087     { 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 28, 65, 66, 67 },
00088     { 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83 }, /* spout */
00089     { 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95 }
00090 };
00091
00092 static double cpdata[][3] =
00093 {
00094     {0.2, 0, 2.7}, {0.2, -0.112, 2.7}, {0.112, -0.2, 2.7}, {0,
00095     -0.2, 2.7}, {1.3375, 0, 2.53125}, {1.3375, -0.749, 2.53125},
00096     {0.749, -1.3375, 2.53125}, {0, -1.3375, 2.53125}, {1.4375,
00097     0, 2.53125}, {1.4375, -0.805, 2.53125}, {0.805, -1.4375,
00098     2.53125}, {0, -1.4375, 2.53125}, {1.5, 0, 2.4}, {1.5, -0.84,
00099     2.4}, {0.84, -1.5, 2.4}, {0, -1.5, 2.4}, {1.75, 0, 1.875},
00100     {1.75, -0.98, 1.875}, {0.98, -1.75, 1.875}, {0, -1.75,
00101     1.875}, {2, 0, 1.35}, {2, -1.12, 1.35}, {1.12, -2, 1.35},
00102     {0, -2, 1.35}, {2, 0, 0.9}, {2, -1.12, 0.9}, {1.12, -2,
00103     0.9}, {0, -2, 0.9}, {-2, 0, 0.9}, {2, 0, 0.45}, {2, -1.12,

```

```

00104    0.45}, {1.12, -2, 0.45}, {0, -2, 0.45}, {1.5, 0, 0.225},
00105    {1.5, -0.84, 0.225}, {0.84, -1.5, 0.225}, {0, -1.5, 0.225},
00106    {1.5, 0, 0.15}, {1.5, -0.84, 0.15}, {0.84, -1.5, 0.15}, {0,
00107    -1.5, 0.15}, {-1.6, 0, 2.025}, {-1.6, -0.3, 2.025}, {-1.5,
00108    -0.3, 2.25}, {-1.5, 0, 2.25}, {-2.3, 0, 2.025}, {-2.3, -0.3,
00109    2.025}, {-2.5, -0.3, 2.25}, {-2.5, 0, 2.25}, {-2.7, 0,
00110    2.025}, {-2.7, -0.3, 2.025}, {-3, -0.3, 2.25}, {-3, 0,
00111    2.25}, {-2.7, 0, 1.8}, {-2.7, -0.3, 1.8}, {-3, -0.3, 1.8},
00112    {-3, 0, 1.8}, {-2.7, 0, 1.575}, {-2.7, -0.3, 1.575}, {-3,
00113    -0.3, 1.35}, {-3, 0, 1.35}, {-2.5, 0, 1.125}, {-2.5, -0.3,
00114    1.125}, {-2.65, -0.3, 0.9375}, {-2.65, 0, 0.9375}, {-2,
00115    -0.3, 0.9}, {-1.9, -0.3, 0.6}, {-1.9, 0, 0.6}, {1.7, 0,
00116    1.425}, {1.7, -0.66, 1.425}, {1.7, -0.66, 0.6}, {1.7, 0,
00117    0.6}, {2.6, 0, 1.425}, {2.6, -0.66, 1.425}, {3.1, -0.66,
00118    0.825}, {3.1, 0, 0.825}, {2.3, 0, 2.1}, {2.3, -0.25, 2.1},
00119    {2.4, -0.25, 2.025}, {2.4, 0, 2.025}, {2.7, 0, 2.4}, {2.7,
00120    -0.25, 2.4}, {3.3, -0.25, 2.4}, {3.3, 0, 2.4}, {2.8, 0,
00121    2.475}, {2.8, -0.25, 2.475}, {3.525, -0.25, 2.49375},
00122    {3.525, 0, 2.49375}, {2.9, 0, 2.475}, {2.9, -0.15, 2.475},
00123    {3.45, -0.15, 2.5125}, {3.45, 0, 2.5125}, {2.8, 0, 2.4},
00124    {2.8, -0.15, 2.4}, {3.2, -0.15, 2.4}, {3.2, 0, 2.4}, {0, 0,
00125    3.15}, {0.8, 0, 3.15}, {0.8, -0.45, 3.15}, {0.45, -0.8,
00126    3.15}, {0, -0.8, 3.15}, {0, 0, 2.85}, {1.4, 0, 2.4}, {1.4,
00127    -0.784, 2.4}, {0.784, -1.4, 2.4}, {0, -1.4, 2.4}, {0.4, 0,
00128    2.55}, {0.4, -0.224, 2.55}, {0.224, -0.4, 2.55}, {0, -0.4,
00129    2.55}, {1.3, 0, 2.55}, {1.3, -0.728, 2.55}, {0.728, -1.3,
00130    2.55}, {0, -1.3, 2.55}, {1.3, 0, 2.4}, {1.3, -0.728, 2.4},
00131    {0.728, -1.3, 2.4}, {0, -1.3, 2.4}, {0, 0, 0}, {1.425,
00132    -0.798, 0}, {1.5, 0, 0.075}, {1.425, 0, 0}, {0.798, -1.425,
00133    0}, {0, -1.5, 0.075}, {0, -1.425, 0}, {1.5, -0.84, 0.075},
00134    {0.84, -1.5, 0.075}
00135 };
00136
00137 static double tex[2][2][2] =
00138 {
00139     { {0.0, 0.0}, {1.0, 0.0} },
00140     { {0.0, 1.0}, {1.0, 1.0} }
00141 };
00142
00143
00144 #endif /* FREEGLUT_TEAPOT_DATA_H */
00145

```

13.244 gtk-shell-client-protocol.h

```

00001 /* Generated by wayland-scanner 1.21.0 */
00002
00003 #ifndef GTK_CLIENT_PROTOCOL_H
00004 #define GTK_CLIENT_PROTOCOL_H
00005
00006 #include <stdint.h>
00007 #include <stddef.h>
00008 #include "wayland-client.h"
00009
00010 #ifdef __cplusplus
00011 extern "C" {
00012 #endif
00013
00020 struct gtk_shell1;
00021 struct gtk_surfacel;
00022 struct wl_seat;
00023 struct wl_surface;
00024
00025 #ifndef GTK_SHELL1_INTERFACE
00026 #define GTK_SHELL1_INTERFACE
00042 extern const struct wl_interface gtk_shell1_interface;
00043 #endif
00044 #ifndef GTK_SURFACEL_INTERFACE
00045 #define GTK_SURFACEL_INTERFACE
00054 extern const struct wl_interface gtk_surfacel_interface;
00055 #endif
00056
00057 #ifndef GTK_SHELL1_CAPABILITY_ENUM
00058 #define GTK_SHELL1_CAPABILITY_ENUM
00059 enum gtk_shell1_capability {
00060     GTK_SHELL1_CAPABILITY_GLOBAL_APP_MENU = 1,
00061     GTK_SHELL1_CAPABILITY_GLOBAL_MENU_BAR = 2,
00062     GTK_SHELL1_CAPABILITY_DESKTOP_ICONS = 3,
00063 };
00064 #endif /* GTK_SHELL1_CAPABILITY_ENUM */
00065
00070 struct gtk_shell1_listener {
00073     void (*capabilities)(void *data,
00074                         struct gtk_shell1 *gtk_shell1,
00075                         uint32_t capabilities);

```

```

00076 };
00077
00081 static inline int
00082 gtk_shell1_add_listener(struct gtk_shell1 *gtk_shell1,
00083                       const struct gtk_shell1_listener *listener, void *data)
00084 {
00085     return wl_proxy_add_listener((struct wl_proxy *) gtk_shell1,
00086                                 (void (**)(void)) listener, data);
00087 }
00088
00089 #define GTK_SHELL1_GET_GTK_SURFACE 0
00090 #define GTK_SHELL1_SET_STARTUP_ID 1
00091 #define GTK_SHELL1_SYSTEM_BELL 2
00092 #define GTK_SHELL1_NOTIFY_LAUNCH 3
00093
00097 #define GTK_SHELL1_CAPABILITIES_SINCE_VERSION 1
00098
00102 #define GTK_SHELL1_GET_GTK_SURFACE_SINCE_VERSION 1
00106 #define GTK_SHELL1_SET_STARTUP_ID_SINCE_VERSION 1
00110 #define GTK_SHELL1_SYSTEM_BELL_SINCE_VERSION 1
00114 #define GTK_SHELL1_NOTIFY_LAUNCH_SINCE_VERSION 3
00115
00117 static inline void
00118 gtk_shell1_set_user_data(struct gtk_shell1 *gtk_shell1, void *user_data)
00119 {
00120     wl_proxy_set_user_data((struct wl_proxy *) gtk_shell1, user_data);
00121 }
00122
00124 static inline void *
00125 gtk_shell1_get_user_data(struct gtk_shell1 *gtk_shell1)
00126 {
00127     return wl_proxy_get_user_data((struct wl_proxy *) gtk_shell1);
00128 }
00129
00130 static inline uint32_t
00131 gtk_shell1_get_version(struct gtk_shell1 *gtk_shell1)
00132 {
00133     return wl_proxy_get_version((struct wl_proxy *) gtk_shell1);
00134 }
00135
00137 static inline void
00138 gtk_shell1_destroy(struct gtk_shell1 *gtk_shell1)
00139 {
00140     wl_proxy_destroy((struct wl_proxy *) gtk_shell1);
00141 }
00142
00146 static inline struct gtk_surfacel *
00147 gtk_shell1_get_gtk_surface(struct gtk_shell1 *gtk_shell1, struct wl_surface *surface)
00148 {
00149     struct wl_proxy *gtk_surface;
00150
00151     gtk_surface = wl_proxy_marshal_flags((struct wl_proxy *) gtk_shell1,
00152                                         GTK_SHELL1_GET_GTK_SURFACE, &gtk_surfacel_interface,
00153                                         wl_proxy_get_version((struct wl_proxy *) gtk_shell1), 0, NULL, surface);
00154     return (struct gtk_surfacel *) gtk_surface;
00155 }
00156
00160 static inline void
00161 gtk_shell1_set_startup_id(struct gtk_shell1 *gtk_shell1, const char *startup_id)
00162 {
00163     wl_proxy_marshal_flags((struct wl_proxy *) gtk_shell1,
00164                             GTK_SHELL1_SET_STARTUP_ID, NULL, wl_proxy_get_version((struct wl_proxy *)
00165                             gtk_shell1), 0, startup_id);
00166 }
00166
00170 static inline void
00171 gtk_shell1_system_bell(struct gtk_shell1 *gtk_shell1, struct gtk_surfacel *surface)
00172 {
00173     wl_proxy_marshal_flags((struct wl_proxy *) gtk_shell1,
00174                             GTK_SHELL1_SYSTEM_BELL, NULL, wl_proxy_get_version((struct wl_proxy *)
00175                             gtk_shell1), 0, surface);
00176 }
00176
00180 static inline void
00181 gtk_shell1_notify_launch(struct gtk_shell1 *gtk_shell1, const char *startup_id)
00182 {
00183     wl_proxy_marshal_flags((struct wl_proxy *) gtk_shell1,
00184                             GTK_SHELL1_NOTIFY_LAUNCH, NULL, wl_proxy_get_version((struct wl_proxy *)
00185                             gtk_shell1), 0, startup_id);
00186 }
00186
00187 #ifndef GTK_SURFACEL_STATE_ENUM
00188 #define GTK_SURFACEL_STATE_ENUM
00189 enum gtk_surfacel_state {
00190     GTK_SURFACEL_STATE_TILED = 1,
00194     GTK_SURFACEL_STATE_TILED_TOP = 2,

```

```

00198     GTK_SURFACE1_STATE_TILED_RIGHT = 3,
00202     GTK_SURFACE1_STATE_TILED_BOTTOM = 4,
00206     GTK_SURFACE1_STATE_TILED_LEFT = 5,
00207 };
00211 #define GTK_SURFACE1_STATE_TILED_TOP_SINCE_VERSION 2
00215 #define GTK_SURFACE1_STATE_TILED_RIGHT_SINCE_VERSION 2
00219 #define GTK_SURFACE1_STATE_TILED_BOTTOM_SINCE_VERSION 2
00223 #define GTK_SURFACE1_STATE_TILED_LEFT_SINCE_VERSION 2
00224 #endif /* GTK_SURFACE1_STATE_ENUM */
00225
00226 #ifndef GTK_SURFACE1_EDGE_CONSTRAINT_ENUM
00227 #define GTK_SURFACE1_EDGE_CONSTRAINT_ENUM
00228 enum gtk_surface1_edge_constraint {
00229     GTK_SURFACE1_EDGE_CONSTRAINT_RESIZABLE_TOP = 1,
00230     GTK_SURFACE1_EDGE_CONSTRAINT_RESIZABLE_RIGHT = 2,
00231     GTK_SURFACE1_EDGE_CONSTRAINT_RESIZABLE_BOTTOM = 3,
00232     GTK_SURFACE1_EDGE_CONSTRAINT_RESIZABLE_LEFT = 4,
00233 };
00234 #endif /* GTK_SURFACE1_EDGE_CONSTRAINT_ENUM */
00235
00236 #ifndef GTK_SURFACE1_GESTURE_ENUM
00237 #define GTK_SURFACE1_GESTURE_ENUM
00238 enum gtk_surface1_gesture {
00239     GTK_SURFACE1_GESTURE_DOUBLE_CLICK = 1,
00240     GTK_SURFACE1_GESTURE_RIGHT_CLICK = 2,
00241     GTK_SURFACE1_GESTURE_MIDDLE_CLICK = 3,
00242 };
00243 #endif /* GTK_SURFACE1_GESTURE_ENUM */
00244
00245 #ifndef GTK_SURFACE1_ERROR_ENUM
00246 #define GTK_SURFACE1_ERROR_ENUM
00247 enum gtk_surface1_error {
00248     GTK_SURFACE1_ERROR_INVALID_GESTURE = 0,
00249 };
00250 #endif /* GTK_SURFACE1_ERROR_ENUM */
00251
00252 struct gtk_surface1_listener {
00253     void (*configure)(void *data,
00254                     struct gtk_surface1 *gtk_surface1,
00255                     struct wl_array *states);
00256     void (*configure_edges)(void *data,
00257                             struct gtk_surface1 *gtk_surface1,
00258                             struct wl_array *constraints);
00259 };
00260
00261 static inline int
00262 gtk_surface1_add_listener(struct gtk_surface1 *gtk_surface1,
00263                          const struct gtk_surface1_listener *listener, void *data)
00264 {
00265     return wl_proxy_add_listener((struct wl_proxy *) gtk_surface1,
00266                                 (void (**)(void)) listener, data);
00267 }
00268
00269 #define GTK_SURFACE1_SET_DBUS_PROPERTIES 0
00270 #define GTK_SURFACE1_SET_MODAL 1
00271 #define GTK_SURFACE1_UNSET_MODAL 2
00272 #define GTK_SURFACE1_PRESENT 3
00273 #define GTK_SURFACE1_REQUEST_FOCUS 4
00274 #define GTK_SURFACE1_RELEASE 5
00275 #define GTK_SURFACE1_TITLEBAR_GESTURE 6
00276
00277 #define GTK_SURFACE1_CONFIGURE_SINCE_VERSION 1
00278 #define GTK_SURFACE1_CONFIGURE_EDGES_SINCE_VERSION 2
00279
00280 #define GTK_SURFACE1_SET_DBUS_PROPERTIES_SINCE_VERSION 1
00281 #define GTK_SURFACE1_SET_MODAL_SINCE_VERSION 1
00282 #define GTK_SURFACE1_UNSET_MODAL_SINCE_VERSION 1
00283 #define GTK_SURFACE1_PRESENT_SINCE_VERSION 1
00284 #define GTK_SURFACE1_REQUEST_FOCUS_SINCE_VERSION 3
00285 #define GTK_SURFACE1_RELEASE_SINCE_VERSION 4
00286 #define GTK_SURFACE1_TITLEBAR_GESTURE_SINCE_VERSION 5
00287
00288 static inline void
00289 gtk_surface1_set_user_data(struct gtk_surface1 *gtk_surface1, void *user_data)
00290 {
00291     wl_proxy_set_user_data((struct wl_proxy *) gtk_surface1, user_data);
00292 }
00293
00294 static inline void *
00295 gtk_surface1_get_user_data(struct gtk_surface1 *gtk_surface1)
00296 {
00297     return wl_proxy_get_user_data((struct wl_proxy *) gtk_surface1);
00298 }
00299
00300 static inline uint32_t
00301 gtk_surface1_get_version(struct gtk_surface1 *gtk_surface1)
00302 {

```

```

00344         return wl_proxy_get_version((struct wl_proxy *) gtk_surfacel);
00345     }
00346
00348     static inline void
00349     gtk_surfacel_destroy(struct gtk_surfacel *gtk_surfacel)
00350     {
00351         wl_proxy_destroy((struct wl_proxy *) gtk_surfacel);
00352     }
00353
00357     static inline void
00358     gtk_surfacel_set_dbus_properties(struct gtk_surfacel *gtk_surfacel, const char *application_id, const
00359     char *app_menu_path, const char *menubar_path, const char *window_object_path, const char
00360     *application_object_path, const char *unique_bus_name)
00361     {
00362         wl_proxy_marshal_flags((struct wl_proxy *) gtk_surfacel,
00363         GTK_SURFACEL_SET_DBUS_PROPERTIES, NULL, wl_proxy_get_version((struct wl_proxy
00364         *) gtk_surfacel), 0, application_id, app_menu_path, menubar_path, window_object_path,
00365         application_object_path, unique_bus_name);
00366     }
00367
00367     static inline void
00368     gtk_surfacel_set_modal(struct gtk_surfacel *gtk_surfacel)
00369     {
00370         wl_proxy_marshal_flags((struct wl_proxy *) gtk_surfacel,
00371         GTK_SURFACEL_SET_MODAL, NULL, wl_proxy_get_version((struct wl_proxy *)
00372         gtk_surfacel), 0);
00373     }
00374
00377     static inline void
00378     gtk_surfacel_unset_modal(struct gtk_surfacel *gtk_surfacel)
00379     {
00380         wl_proxy_marshal_flags((struct wl_proxy *) gtk_surfacel,
00381         GTK_SURFACEL_UNSET_MODAL, NULL, wl_proxy_get_version((struct wl_proxy *)
00382         gtk_surfacel), 0);
00383     }
00384
00387     static inline void
00388     gtk_surfacel_present(struct gtk_surfacel *gtk_surfacel, uint32_t time)
00389     {
00390         wl_proxy_marshal_flags((struct wl_proxy *) gtk_surfacel,
00391         GTK_SURFACEL_PRESENT, NULL, wl_proxy_get_version((struct wl_proxy *)
00392         gtk_surfacel), 0, time);
00393     }
00394
00397     static inline void
00398     gtk_surfacel_request_focus(struct gtk_surfacel *gtk_surfacel, const char *startup_id)
00399     {
00400         wl_proxy_marshal_flags((struct wl_proxy *) gtk_surfacel,
00401         GTK_SURFACEL_REQUEST_FOCUS, NULL, wl_proxy_get_version((struct wl_proxy *)
00402         gtk_surfacel), 0, startup_id);
00403     }
00404
00407     static inline void
00408     gtk_surfacel_release(struct gtk_surfacel *gtk_surfacel)
00409     {
00410         wl_proxy_marshal_flags((struct wl_proxy *) gtk_surfacel,
00411         GTK_SURFACEL_RELEASE, NULL, wl_proxy_get_version((struct wl_proxy *)
00412         gtk_surfacel), WL_MARSHAL_FLAG_DESTROY);
00413     }
00414
00417     static inline void
00418     gtk_surfacel_titlebar_gesture(struct gtk_surfacel *gtk_surfacel, uint32_t serial, struct wl_seat
00419     *seat, uint32_t gesture)
00420     {
00421         wl_proxy_marshal_flags((struct wl_proxy *) gtk_surfacel,
00422         GTK_SURFACEL_TITLEBAR_GESTURE, NULL, wl_proxy_get_version((struct wl_proxy *)
00423         gtk_surfacel), 0, serial, seat, gesture);
00424     }
00425
00424     #ifndef __cplusplus
00425     }
00426     #endif
00427
00428     #endif

```

13.245 mediumarrow.h

```

00001     #define mediumarrow_width 16
00002     #define mediumarrow_height 16
00003     static const unsigned char mediumarrow_bits[] = {
00004         0x40, 0x00, 0x60, 0x00, 0x70, 0x00, 0x78, 0x00, 0xfc, 0x3f, 0x78, 0x00,
00005         0x70, 0x00, 0x60, 0x02, 0x40, 0x06, 0x00, 0x0e, 0x00, 0x1e, 0xfc, 0x3f,
00006         0x00, 0x1e, 0x00, 0x0e, 0x00, 0x06, 0x00, 0x02};

```

13.246 numeric sort.c File Reference

```
#include <ctype.h>
#include <stdlib.h>
#include <string.h>
#include <FL/platform_types.h>
#include <FL/filename.H>
#include <FL/fl_utf8.h>
```

Functions

- `int fl_casenumersort` (struct dirent **A, struct dirent **B)
Compares directory entries alphanumerically (case-insensitive).
- `int fl_numersort` (struct dirent **A, struct dirent **B)
Compares directory entries alphanumerically (case-sensitive).

13.246.1 Function Documentation

13.246.1.1 fl_casenumersort()

```
int fl_casenumersort (
    struct dirent ** A,
    struct dirent ** B )
```

Compares directory entries alphanumerically (case-insensitive).

Note

This comparison is UTF-8 aware.

See also

[fl_numersort\(\)](#)

13.246.1.2 fl_numersort()

```
int fl_numersort (
    struct dirent ** A,
    struct dirent ** B )
```

Compares directory entries alphanumerically (case-sensitive).

Numbers are compared without sign, i.e. "-" is not taken as a sign of following numerical values. The following list of files would be in ascending order (examples are ASCII and numbers only for simplicity):

1. 1zzz.txt
2. 2xxx.txt
3. 19uuu.txt
4. 100aaa.txt
5. file1z.txt
6. file5a.txt
7. file5z.txt
8. file30z.txt
9. file200a.txt
10. temp+5.txt ('+' is lexically lower than '-')

11. temp-5.txt ('-' is not a sign)
12. temp-100.txt (100 is bigger than 5, no sign)

Parameters

in	<i>A</i>	first directory entry
in	<i>B</i>	second directory entry

Returns

comparison result (-1, 0, or +1)

Return values

-1	$A < B$
0	$A == B$
+1	$A > B$

Note

This comparison is UTF-8 aware.

See also

[fl_casenumERICsort\(\)](#)

13.247 print_button.h

```

00001 //
00002 // Header for "Print Window" functions for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2022 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:
00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016
00017 #ifndef _SRC_FL_PRINT_BUTTON_H_
00018 #define _SRC_FL_PRINT_BUTTON_H_
00019
00020 #include <FL/Fl_Window.H>
00021
00022 // These are all internal functions, do not FL_EXPORT these functions!
00023 // These functions are mplemented in src/print_button.cxx
00024
00025 // Create and initialize the "Print/copy front window" dialog window
00026
00027 int fl_create_print_window();
00028
00029 // Print a window or copy its contents to the clipboard.
00030
00031 int fl_print_or_copy_window(Fl_Window *win, bool grab_decoration, int mode);
00032
00033 #endif // _SRC_FL_PRINT_BUTTON_H_

```

13.248 print_panel.h

```

00001 //
00002 // Print panel for the Fast Light Tool Kit (FLTK).
00003 //
00004 // Copyright 1998-2010 by Bill Spitzak and others.
00005 //
00006 // This library is free software. Distribution and use rights are outlined in
00007 // the file "COPYING" which should have been included with this file. If this
00008 // file is missing or damaged, see the license at:

```



```

00009 //
00010 //     https://www.fltk.org/COPYING.php
00011 //
00012 // Please see the following page on how to report bugs and issues:
00013 //
00014 //     https://www.fltk.org/bugs.php
00015 //
00016 //
00017 //
00018 // This is a temporary file. It is only for development and will
00019 // probably be removed later.
00020 //
00021 //
00022 #ifndef print_panel_h
00023 #define print_panel_h
00024 #include <FL/Fl.H>
00025 #include <FL/Fl_Double_Window.H>
00026 #include <FL/Fl_Group.H>
00027 #include <FL/Fl_Choice.H>
00028 #include <FL/Fl_Button.H>
00029 #include <FL/Fl_Box.H>
00030 #include <FL/Fl_Round_Button.H>
00031 #include <FL/Fl_Input.H>
00032 #include <FL/Fl_Spinner.H>
00033 #include <FL/Fl_Check_Button.H>
00034 #include <FL/Fl_Return_Button.H>
00035 #include <FL/Fl_Progress.H>
00036 enum printing_style {SystemV, BSD};
00037 static Fl_Double_Window* make_print_panel();
00038 static void print_cb(Fl_Return_Button *, void *);
00039 static printing_style print_load();
00040 static void print_update_status();
00041 #endif

```

13.249 slowarrow.h

```

00001 #define slowarrow_width 16
00002 #define slowarrow_height 16
00003 static const unsigned char slowarrow_bits[] = {
00004     0x40, 0x00, 0x40, 0x00, 0x60, 0x00, 0x60, 0x00, 0xf0, 0x0f, 0x60, 0x00,
00005     0x60, 0x00, 0x40, 0x02, 0x40, 0x02, 0x00, 0x06, 0x00, 0x06, 0xf0, 0x0f,
00006     0x00, 0x06, 0x00, 0x06, 0x00, 0x02, 0x00, 0x02};

```

13.250 utf8_internal.h

```

00001 /*
00002  * Internal UTF-8 header file for the Fast Light Tool Kit (FLTK).
00003  *
00004  * Copyright 1998-2016 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  *     https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *
00014  *     https://www.fltk.org/bugs.php
00015  */
00016
00017 /*
00018  -----
00019  Note to editors:
00020  -----
00021
00022  This file may only contain common, platform-independent function
00023  declarations used internally in FLTK. It may be #included everywhere
00024  in source files in the library, but not in public header files.
00025  */
00026
00027 #ifndef _SRC__FL_UTF8_H
00028 #define _SRC__FL_UTF8_H
00029
00030 # ifdef __cplusplus
00031 extern "C" {
00032 # endif
00033
00034 unsigned short
00035 XUtf8IsNonSpacing(
00036     unsigned int ucs);
00037

```

```

00038 unsigned short
00039 XUtf8IsRightToLeft(
00040     unsigned int ucs);
00041
00042
00043 int
00044 XUtf8ToLower(
00045     int ucs);
00046
00047 int
00048 XUtf8ToUpper(
00049     int ucs);
00050
00051
00052 # ifdef __cplusplus
00053 }
00054 # endif
00055
00056 #endif /* _SRC__FL_UTF8_H */

```

13.251 vsnprintf.c File Reference

Portable vsnprintf() implementation.

```

#include <stdio.h>
#include "flstring.h"

```

Functions

- int **fl_sprintf** (char *str, size_t size, const char *fmt,...)
- int **fl_vsnprintf** (char *buffer, size_t bufsize, const char *format, va_list ap)
FLTK's platform independent wrapper for the vsnprintf() C library function.

13.251.1 Detailed Description

Portable vsnprintf() implementation.

13.251.2 Function Documentation

13.251.2.1 fl_vsnprintf()

```

int fl_vsnprintf (
    char * buffer,
    size_t bufsize,
    const char * format,
    va_list ap )

```

FLTK's platform independent wrapper for the vsnprintf() C library function.

This function guarantees:

- access to vsnprintf(), even on systems that don't have it (FLTK's own built-in code is used)
- Guarantees NUL termination. Even if string expands larger than the buffer, a terminating NUL is included, unlike some implementations of vsnprintf(), notably Microsoft Visual Studio (pre-2015), which can leave the string unterminated when truncated.

If the build environment for FLTK has vsnprintf(), [fl_vsnprintf\(\)](#) is just a wrapper around the compiler's provided function. Otherwise, if the function is NOT available, FLTK's own built-in version is provided.

The FLTK built in provides these style options:

- %[-+#']
- * – padding width
- .* – precision width
- Data types: h, l, ll, L

- Floating point formats: E, G, e, f, g
- Integer formats: B, X, b, d, i, o, u, x
- Pointer format: p
- String/char: c, s, n

13.252 Xutf8.h

```

00001 /*
00002  * Author: Jean-Marc Lienher ( http://oksid.ch )
00003  * Copyright 2000-2010 by O'ksi'D.
00004  *
00005  * This library is free software. Distribution and use rights are outlined in
00006  * the file "COPYING" which should have been included with this file. If this
00007  * file is missing or damaged, see the license at:
00008  *
00009  *   https://www.fltk.org/COPYING.php
00010  *
00011  * Please see the following page on how to report bugs and issues:
00012  *
00013  *   https://www.fltk.org/bugs.php
00014  */
00015
00016 #if ! ( defined(_Xutf8_h) || defined(FL_DOXYGEN) )
00017 #define _Xutf8_h
00018
00019 # ifdef __cplusplus
00020 extern "C" {
00021 # endif
00022
00023 #include <X11/X.h>
00024 #include <X11/Xlib.h>
00025 #include <X11/Xlocale.h>
00026 #include <X11/Xutil.h>
00027 #include <FL/Fl_Export.H>
00028
00029 typedef struct {
00030     int nb_font;
00031     char **font_name_list;
00032     int *encodings;
00033     XFontStruct **fonts;
00034     Font fid;
00035     int ascent;
00036     int descent;
00037     int *ranges;
00038 } XUtf8FontStruct;
00039
00040 XUtf8FontStruct *
00041 XCreateUtf8FontStruct (
00042     Display          *dpy,
00043     const char      *base_font_name_list);
00044
00045 void
00046 XUtf8DrawString(
00047     Display          *display,
00048     Drawable         d,
00049     XUtf8FontStruct *font_set,
00050     GC               gc,
00051     int              x,
00052     int              y,
00053     const char      *string,
00054     int              num_bytes);
00055
00056 void
00057 XUtf8_measure_extents(
00058     Display          *display,
00059     Drawable         d,
00060     XUtf8FontStruct *font_set,
00061     GC               gc,
00062     int              *xx,
00063     int              *yy,
00064     int              *ww,
00065     int              *hh,
00066     const char      *string,
00067     int              num_bytes);
00068
00069 void
00070 XUtf8DrawRtlString(
00071     Display          *display,
00072     Drawable         d,
00073     XUtf8FontStruct *font_set,

```

```

00074         GC                gc,
00075         int                x,
00076         int                y,
00077         const char        *string,
00078         int                num_bytes);
00079
00080 void
00081 XUtf8DrawImageString(
00082     Display *display,
00083     Drawable d,
00084     XUtf8FontStruct *font_set,
00085     GC gc,
00086     int x,
00087     int y,
00088     const char *string,
00089     int num_bytes);
00090
00091 int
00092 XUtf8TextWidth(
00093     XUtf8FontStruct *font_set,
00094     const char *string,
00095     int num_bytes);
00096 int
00097 XUtf8UcsWidth(
00098     XUtf8FontStruct *font_set,
00099     unsigned int ucs);
00100
00101 FL_EXPORT int
00102 fl_XGetUtf8FontAndGlyph(
00103     XUtf8FontStruct *font_set,
00104     unsigned int ucs,
00105     XFontStruct **fnt,
00106     unsigned short *id);
00107
00108 void
00109 XFreeUtf8FontStruct(
00110     Display *dpy,
00111     XUtf8FontStruct *font_set);
00112
00113 int
00114 int
00115 XConvertUtf8ToUcs(
00116     const unsigned char *buf,
00117     int len,
00118     unsigned int *ucs);
00119
00120 int
00121 XConvertUcsToUtf8(
00122     unsigned int ucs,
00123     char *buf);
00124
00125 int
00126 XUtf8CharByteLen(
00127     const unsigned char *buf,
00128     int len);
00129
00130 int
00131 XCountUtf8Char(
00132     const unsigned char *buf,
00133     int len);
00134
00135 int
00136 XFastConvertUtf8ToUcs(
00137     const unsigned char *buf,
00138     int len,
00139     unsigned int *ucs);
00140
00141 long
00142 XKeysymToUcs(
00143     KeySym keysym);
00144
00145 #ifdef X_HAVE_UTF8_STRING
00146 #define XUtf8LookupString Xutf8LookupString
00147 #else
00148 int
00149 XUtf8LookupString(
00150     XIC ic,
00151     XKeyPressedEvent* event,
00152     char* buffer_return,
00153     int bytes_buffer,
00154     KeySym* keysym,
00155     Status* status_return);
00156 #endif
00157
00158 # ifdef __cplusplus
00159 }
00160 # endif

```

```
00161
00162 #endif
```

13.253 case.h

```
00001 /* spacing */
00002
00003 static const unsigned short ucs_table_0041[] = {
00004 /* U+0041 */ 0x0061,
00005 /* U+0042 */ 0x0062,
00006 /* U+0043 */ 0x0063,
00007 /* U+0044 */ 0x0064,
00008 /* U+0045 */ 0x0065,
00009 /* U+0046 */ 0x0066,
00010 /* U+0047 */ 0x0067,
00011 /* U+0048 */ 0x0068,
00012 /* U+0049 */ 0x0069,
00013 /* U+004A */ 0x006A,
00014 /* U+004B */ 0x006B,
00015 /* U+004C */ 0x006C,
00016 /* U+004D */ 0x006D,
00017 /* U+004E */ 0x006E,
00018 /* U+004F */ 0x006F,
00019 /* U+0050 */ 0x0070,
00020 /* U+0051 */ 0x0071,
00021 /* U+0052 */ 0x0072,
00022 /* U+0053 */ 0x0073,
00023 /* U+0054 */ 0x0074,
00024 /* U+0055 */ 0x0075,
00025 /* U+0056 */ 0x0076,
00026 /* U+0057 */ 0x0077,
00027 /* U+0058 */ 0x0078,
00028 /* U+0059 */ 0x0079,
00029 /* U+005A */ 0x007A,
00030 0x00,
00031 0x00,
00032 0x00,
00033 0x00,
00034 0x00,
00035 0x00,
00036 0x00,
00037 0x00,
00038 0x00,
00039 0x00,
00040 0x00,
00041 0x00,
00042 0x00,
00043 0x00,
00044 0x00,
00045 0x00,
00046 0x00,
00047 0x00,
00048 0x00,
00049 0x00,
00050 0x00,
00051 0x00,
00052 0x00,
00053 0x00,
00054 0x00,
00055 0x00,
00056 0x00,
00057 0x00,
00058 0x00,
00059 0x00,
00060 0x00,
00061 0x00,
00062 0x00,
00063 0x00,
00064 0x00,
00065 0x00,
00066 0x00,
00067 0x00,
00068 0x00,
00069 0x00,
00070 0x00,
00071 0x00,
00072 0x00,
00073 0x00,
00074 0x00,
00075 0x00,
00076 0x00,
00077 0x00,
00078 0x00,
00079 0x00,
00080 0x00,
```

```
00081 0x00,
00082 0x00,
00083 0x00,
00084 0x00,
00085 0x00,
00086 0x00,
00087 0x00,
00088 0x00,
00089 0x00,
00090 0x00,
00091 0x00,
00092 0x00,
00093 0x00,
00094 0x00,
00095 0x00,
00096 0x00,
00097 0x00,
00098 0x00,
00099 0x00,
00100 0x00,
00101 0x00,
00102 0x00,
00103 0x00,
00104 0x00,
00105 0x00,
00106 0x00,
00107 0x00,
00108 0x00,
00109 0x00,
00110 0x00,
00111 0x00,
00112 0x00,
00113 0x00,
00114 0x00,
00115 0x00,
00116 0x00,
00117 0x00,
00118 0x00,
00119 0x00,
00120 0x00,
00121 0x00,
00122 0x00,
00123 0x00,
00124 0x00,
00125 0x00,
00126 0x00,
00127 0x00,
00128 0x00,
00129 0x00,
00130 0x00,
00131 /* U+00C0 */ 0x00E0,
00132 /* U+00C1 */ 0x00E1,
00133 /* U+00C2 */ 0x00E2,
00134 /* U+00C3 */ 0x00E3,
00135 /* U+00C4 */ 0x00E4,
00136 /* U+00C5 */ 0x00E5,
00137 /* U+00C6 */ 0x00E6,
00138 /* U+00C7 */ 0x00E7,
00139 /* U+00C8 */ 0x00E8,
00140 /* U+00C9 */ 0x00E9,
00141 /* U+00CA */ 0x00EA,
00142 /* U+00CB */ 0x00EB,
00143 /* U+00CC */ 0x00EC,
00144 /* U+00CD */ 0x00ED,
00145 /* U+00CE */ 0x00EE,
00146 /* U+00CF */ 0x00EF,
00147 /* U+00D0 */ 0x00F0,
00148 /* U+00D1 */ 0x00F1,
00149 /* U+00D2 */ 0x00F2,
00150 /* U+00D3 */ 0x00F3,
00151 /* U+00D4 */ 0x00F4,
00152 /* U+00D5 */ 0x00F5,
00153 /* U+00D6 */ 0x00F6,
00154 0x00,
00155 /* U+00D8 */ 0x00F8,
00156 /* U+00D9 */ 0x00F9,
00157 /* U+00DA */ 0x00FA,
00158 /* U+00DB */ 0x00FB,
00159 /* U+00DC */ 0x00FC,
00160 /* U+00DD */ 0x00FD,
00161 /* U+00DE */ 0x00FE,
00162 0x00,
00163 0x00,
00164 0x00,
00165 0x00,
00166 0x00,
00167 0x00,
```

```
00168 0x00,
00169 0x00,
00170 0x00,
00171 0x00,
00172 0x00,
00173 0x00,
00174 0x00,
00175 0x00,
00176 0x00,
00177 0x00,
00178 0x00,
00179 0x00,
00180 0x00,
00181 0x00,
00182 0x00,
00183 0x00,
00184 0x00,
00185 0x00,
00186 0x00,
00187 0x00,
00188 0x00,
00189 0x00,
00190 0x00,
00191 0x00,
00192 0x00,
00193 0x00,
00194 0x00,
00195 /* U+0100 */ 0x0101,
00196 0x00,
00197 /* U+0102 */ 0x0103,
00198 0x00,
00199 /* U+0104 */ 0x0105,
00200 0x00,
00201 /* U+0106 */ 0x0107,
00202 0x00,
00203 /* U+0108 */ 0x0109,
00204 0x00,
00205 /* U+010A */ 0x010B,
00206 0x00,
00207 /* U+010C */ 0x010D,
00208 0x00,
00209 /* U+010E */ 0x010F,
00210 0x00,
00211 /* U+0110 */ 0x0111,
00212 0x00,
00213 /* U+0112 */ 0x0113,
00214 0x00,
00215 /* U+0114 */ 0x0115,
00216 0x00,
00217 /* U+0116 */ 0x0117,
00218 0x00,
00219 /* U+0118 */ 0x0119,
00220 0x00,
00221 /* U+011A */ 0x011B,
00222 0x00,
00223 /* U+011C */ 0x011D,
00224 0x00,
00225 /* U+011E */ 0x011F,
00226 0x00,
00227 /* U+0120 */ 0x0121,
00228 0x00,
00229 /* U+0122 */ 0x0123,
00230 0x00,
00231 /* U+0124 */ 0x0125,
00232 0x00,
00233 /* U+0126 */ 0x0127,
00234 0x00,
00235 /* U+0128 */ 0x0129,
00236 0x00,
00237 /* U+012A */ 0x012B,
00238 0x00,
00239 /* U+012C */ 0x012D,
00240 0x00,
00241 /* U+012E */ 0x012F,
00242 0x00,
00243 /* U+0130 */ 0x0,
00244 0x00,
00245 /* U+0132 */ 0x0133,
00246 0x00,
00247 /* U+0134 */ 0x0135,
00248 0x00,
00249 /* U+0136 */ 0x0137,
00250 0x00,
00251 0x00,
00252 /* U+0139 */ 0x013A,
00253 0x00,
00254 /* U+013B */ 0x013C,
```

```
00255 0x00,
00256 /* U+013D */ 0x013E,
00257 0x00,
00258 /* U+013F */ 0x0140,
00259 0x00,
00260 /* U+0141 */ 0x0142,
00261 0x00,
00262 /* U+0143 */ 0x0144,
00263 0x00,
00264 /* U+0145 */ 0x0146,
00265 0x00,
00266 /* U+0147 */ 0x0148,
00267 0x00,
00268 0x00,
00269 /* U+014A */ 0x014B,
00270 0x00,
00271 /* U+014C */ 0x014D,
00272 0x00,
00273 /* U+014E */ 0x014F,
00274 0x00,
00275 /* U+0150 */ 0x0151,
00276 0x00,
00277 /* U+0152 */ 0x0153,
00278 0x00,
00279 /* U+0154 */ 0x0155,
00280 0x00,
00281 /* U+0156 */ 0x0157,
00282 0x00,
00283 /* U+0158 */ 0x0159,
00284 0x00,
00285 /* U+015A */ 0x015B,
00286 0x00,
00287 /* U+015C */ 0x015D,
00288 0x00,
00289 /* U+015E */ 0x015F,
00290 0x00,
00291 /* U+0160 */ 0x0161,
00292 0x00,
00293 /* U+0162 */ 0x0163,
00294 0x00,
00295 /* U+0164 */ 0x0165,
00296 0x00,
00297 /* U+0166 */ 0x0167,
00298 0x00,
00299 /* U+0168 */ 0x0169,
00300 0x00,
00301 /* U+016A */ 0x016B,
00302 0x00,
00303 /* U+016C */ 0x016D,
00304 0x00,
00305 /* U+016E */ 0x016F,
00306 0x00,
00307 /* U+0170 */ 0x0171,
00308 0x00,
00309 /* U+0172 */ 0x0173,
00310 0x00,
00311 /* U+0174 */ 0x0175,
00312 0x00,
00313 /* U+0176 */ 0x0177,
00314 0x00,
00315 /* U+0178 */ 0x00FF,
00316 /* U+0179 */ 0x017A,
00317 0x00,
00318 /* U+017B */ 0x017C,
00319 0x00,
00320 /* U+017D */ 0x017E,
00321 0x00,
00322 0x00,
00323 0x00,
00324 /* U+0181 */ 0x0253,
00325 /* U+0182 */ 0x0183,
00326 0x00,
00327 /* U+0184 */ 0x0185,
00328 0x00,
00329 /* U+0186 */ 0x0254,
00330 /* U+0187 */ 0x0188,
00331 0x00,
00332 /* U+0189 */ 0x0,
00333 /* U+018A */ 0x0257,
00334 /* U+018B */ 0x018C,
00335 0x00,
00336 0x00,
00337 /* U+018E */ 0x0258,
00338 /* U+018F */ 0x0259,
00339 /* U+0190 */ 0x025B,
00340 /* U+0191 */ 0x0192,
00341 0x00,
```



```
00342 /* U+0193 */ 0x0260,
00343 /* U+0194 */ 0x0263,
00344 0x00,
00345 /* U+0196 */ 0x0269,
00346 /* U+0197 */ 0x0268,
00347 /* U+0198 */ 0x0199,
00348 0x00,
00349 0x00,
00350 0x00,
00351 /* U+019C */ 0x026F,
00352 /* U+019D */ 0x0272,
00353 0x00,
00354 /* U+019F */ 0x0,
00355 /* U+01A0 */ 0x01A1,
00356 0x00,
00357 /* U+01A2 */ 0x01A3,
00358 0x00,
00359 /* U+01A4 */ 0x01A5,
00360 0x00,
00361 0x00,
00362 /* U+01A7 */ 0x01A8,
00363 0x00,
00364 /* U+01A9 */ 0x0283,
00365 0x00,
00366 0x00,
00367 /* U+01AC */ 0x01AD,
00368 0x00,
00369 /* U+01AE */ 0x0288,
00370 /* U+01AF */ 0x01B0,
00371 0x00,
00372 /* U+01B1 */ 0x028A,
00373 /* U+01B2 */ 0x028B,
00374 /* U+01B3 */ 0x01B4,
00375 0x00,
00376 /* U+01B5 */ 0x01B6,
00377 0x00,
00378 /* U+01B7 */ 0x0292,
00379 /* U+01B8 */ 0x01B9,
00380 0x00,
00381 0x00,
00382 0x00,
00383 /* U+01BC */ 0x01BD,
00384 0x00,
00385 0x00,
00386 0x00,
00387 0x00,
00388 0x00,
00389 0x00,
00390 0x00,
00391 /* U+01C4 */ 0x01C6,
00392 /* U+01C5 */ 0x0,
00393 0x00,
00394 /* U+01C7 */ 0x01C9,
00395 /* U+01C8 */ 0x0,
00396 0x00,
00397 /* U+01CA */ 0x01CC,
00398 /* U+01CB */ 0x0,
00399 0x00,
00400 /* U+01CD */ 0x01CE,
00401 0x00,
00402 /* U+01CF */ 0x01D0,
00403 0x00,
00404 /* U+01D1 */ 0x01D2,
00405 0x00,
00406 /* U+01D3 */ 0x01D4,
00407 0x00,
00408 /* U+01D5 */ 0x01D6,
00409 0x00,
00410 /* U+01D7 */ 0x01D8,
00411 0x00,
00412 /* U+01D9 */ 0x01DA,
00413 0x00,
00414 /* U+01DB */ 0x01DC,
00415 0x00,
00416 0x00,
00417 /* U+01DE */ 0x01DF,
00418 0x00,
00419 /* U+01E0 */ 0x01E1,
00420 0x00,
00421 /* U+01E2 */ 0x01E3,
00422 0x00,
00423 /* U+01E4 */ 0x01E5,
00424 0x00,
00425 /* U+01E6 */ 0x01E7,
00426 0x00,
00427 /* U+01E8 */ 0x01E9,
00428 0x00,
```

```
00429 /* U+01EA */ 0x01EB,
00430 0x00,
00431 /* U+01EC */ 0x01ED,
00432 0x00,
00433 /* U+01EE */ 0x01EF,
00434 0x00,
00435 0x00,
00436 /* U+01F1 */ 0x01F3,
00437 /* U+01F2 */ 0x0,
00438 0x00,
00439 /* U+01F4 */ 0x01F5,
00440 0x00,
00441 0x00,
00442 0x00,
00443 0x00,
00444 0x00,
00445 /* U+01FA */ 0x01FB,
00446 0x00,
00447 /* U+01FC */ 0x01FD,
00448 0x00,
00449 /* U+01FE */ 0x01FF,
00450 0x00,
00451 /* U+0200 */ 0x0201,
00452 0x00,
00453 /* U+0202 */ 0x0203,
00454 0x00,
00455 /* U+0204 */ 0x0205,
00456 0x00,
00457 /* U+0206 */ 0x0207,
00458 0x00,
00459 /* U+0208 */ 0x0209,
00460 0x00,
00461 /* U+020A */ 0x020B,
00462 0x00,
00463 /* U+020C */ 0x020D,
00464 0x00,
00465 /* U+020E */ 0x020F,
00466 0x00,
00467 /* U+0210 */ 0x0211,
00468 0x00,
00469 /* U+0212 */ 0x0213,
00470 0x00,
00471 /* U+0214 */ 0x0215,
00472 0x00,
00473 /* U+0216 */ 0x0217,
00474 0x00,
00475 0x00,
00476 0x00,
00477 0x00,
00478 0x00,
00479 0x00,
00480 0x00,
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00508 0x00,
00509 0x00,
00510 0x00,
00511 0x00,
00512 0x00,
00513 0x00,
00514 0x00,
00515 0x00,
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00516 0x00,
00517 0x00,
00518 0x00,
00519 0x00,
00520 0x00,
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00522 0x00,
00523 0x00,
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00542 0x00,
00543 0x00,
00544 0x00,
00545 0x00,
00546 0x00,
00547 0x00,
00548 0x00,
00549 /* U+0262 */ 0x0,
00550 0x00,
00551 0x00,
00552 0x00,
00553 0x00,
00554 0x00,
00555 0x00,
00556 0x00,
00557 /* U+026A */ 0x0,
00558 0x00,
00559 0x00,
00560 0x00,
00561 0x00,
00562 0x00,
00563 0x00,
00564 0x00,
00565 0x00,
00566 0x00,
00567 /* U+0274 */ 0x0,
00568 0x00,
00569 /* U+0276 */ 0x0,
00570 0x00,
00571 0x00,
00572 0x00,
00573 0x00,
00574 0x00,
00575 0x00,
00576 0x00,
00577 0x00,
00578 0x00,
00579 /* U+0280 */ 0x0,
00580 /* U+0281 */ 0x0,
00581 0x00,
00582 0x00,
00583 0x00,
00584 0x00,
00585 0x00,
00586 0x00,
00587 0x00,
00588 0x00,
00589 0x00,
00590 0x00,
00591 0x00,
00592 0x00,
00593 0x00,
00594 /* U+028F */ 0x0,
00595 0x00,
00596 0x00,
00597 0x00,
00598 0x00,
00599 0x00,
00600 0x00,
00601 0x00,
00602 0x00,
```

```
00603 0x00,
00604 /* U+0299 */ 0x0,
00605 0x00,
00606 /* U+029B */ 0x0,
00607 /* U+029C */ 0x0,
00608 0x00,
00609 0x00,
00610 /* U+029F */ 0x0,
00611 0x00,
00612 0x00,
00613 0x00,
00614 0x00,
00615 0x00,
00616 0x00,
00617 0x00,
00618 0x00,
00619 0x00,
00620 0x00,
00621 0x00,
00622 0x00,
00623 0x00,
00624 0x00,
00625 0x00,
00626 0x00,
00627 0x00,
00628 0x00,
00629 0x00,
00630 0x00,
00631 0x00,
00632 0x00,
00633 /* U+02B6 */ 0x0,
00634 };
00635
00636 static const unsigned short ucs_table_0386[] = {
00637 /* U+0386 */ 0x03AC,
00638 0x00,
00639 /* U+0388 */ 0x03AD,
00640 /* U+0389 */ 0x03AE,
00641 /* U+038A */ 0x03AF,
00642 0x00,
00643 /* U+038C */ 0x03CC,
00644 0x00,
00645 /* U+038E */ 0x03CD,
00646 /* U+038F */ 0x03CE,
00647 0x00,
00648 /* U+0391 */ 0x03B1,
00649 /* U+0392 */ 0x03B2,
00650 /* U+0393 */ 0x03B3,
00651 /* U+0394 */ 0x03B4,
00652 /* U+0395 */ 0x03B5,
00653 /* U+0396 */ 0x03B6,
00654 /* U+0397 */ 0x03B7,
00655 /* U+0398 */ 0x03B8,
00656 /* U+0399 */ 0x03B9,
00657 /* U+039A */ 0x03BA,
00658 /* U+039B */ 0x03BB,
00659 /* U+039C */ 0x03BC,
00660 /* U+039D */ 0x03BD,
00661 /* U+039E */ 0x03BE,
00662 /* U+039F */ 0x03BF,
00663 /* U+03A0 */ 0x03C0,
00664 /* U+03A1 */ 0x03C1,
00665 0x00,
00666 /* U+03A3 */ 0x03C3,
00667 /* U+03A4 */ 0x03C4,
00668 /* U+03A5 */ 0x03C5,
00669 /* U+03A6 */ 0x03C6,
00670 /* U+03A7 */ 0x03C7,
00671 /* U+03A8 */ 0x03C8,
00672 /* U+03A9 */ 0x03C9,
00673 /* U+03AA */ 0x03CA,
00674 /* U+03AB */ 0x03CB,
00675 0x00,
00676 0x00,
00677 0x00,
00678 0x00,
00679 0x00,
00680 0x00,
00681 0x00,
00682 0x00,
00683 0x00,
00684 0x00,
00685 0x00,
00686 0x00,
00687 0x00,
00688 0x00,
00689 0x00,
```

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00690 0x00,
00691 0x00,
00692 0x00,
00693 0x00,
00694 0x00,
00695 0x00,
00696 0x00,
00697 0x00,
00698 0x00,
00699 0x00,
00700 0x00,
00701 0x00,
00702 0x00,
00703 0x00,
00704 0x00,
00705 0x00,
00706 0x00,
00707 0x00,
00708 0x00,
00709 0x00,
00710 0x00,
00711 0x00,
00712 0x00,
00713 /* U+03D2 */ 0x03D2,
00714 /* U+03D3 */ 0x03D3,
00715 /* U+03D4 */ 0x03D4,
00716 0x00,
00717 0x00,
00718 0x00,
00719 0x00,
00720 0x00,
00721 /* U+03DA */ 0x03DA,
00722 0x00,
00723 /* U+03DC */ 0x03DC,
00724 0x00,
00725 /* U+03DE */ 0x03DE,
00726 0x00,
00727 /* U+03E0 */ 0x03E0,
00728 0x00,
00729 /* U+03E2 */ 0x03E3,
00730 0x00,
00731 /* U+03E4 */ 0x03E5,
00732 0x00,
00733 /* U+03E6 */ 0x03E7,
00734 0x00,
00735 /* U+03E8 */ 0x03E9,
00736 0x00,
00737 /* U+03EA */ 0x03EB,
00738 0x00,
00739 /* U+03EC */ 0x03ED,
00740 0x00,
00741 /* U+03EE */ 0x03EF,
00742 0x00,
00743 0x00,
00744 0x00,
00745 0x00,
00746 0x00,
00747 0x00,
00748 0x00,
00749 0x00,
00750 0x00,
00751 0x00,
00752 0x00,
00753 0x00,
00754 0x00,
00755 0x00,
00756 0x00,
00757 0x00,
00758 0x00,
00759 0x00,
00760 /* U+0401 */ 0x0451,
00761 /* U+0402 */ 0x0452,
00762 /* U+0403 */ 0x0453,
00763 /* U+0404 */ 0x0454,
00764 /* U+0405 */ 0x0455,
00765 /* U+0406 */ 0x0456,
00766 /* U+0407 */ 0x0457,
00767 /* U+0408 */ 0x0458,
00768 /* U+0409 */ 0x0459,
00769 /* U+040A */ 0x045A,
00770 /* U+040B */ 0x045B,
00771 /* U+040C */ 0x045C,
00772 0x00,
00773 /* U+040E */ 0x045E,
00774 /* U+040F */ 0x045F,
00775 /* U+0410 */ 0x0430,
00776 /* U+0411 */ 0x0431,
```

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00777 /* U+0412 */ 0x0432,
00778 /* U+0413 */ 0x0433,
00779 /* U+0414 */ 0x0434,
00780 /* U+0415 */ 0x0435,
00781 /* U+0416 */ 0x0436,
00782 /* U+0417 */ 0x0437,
00783 /* U+0418 */ 0x0438,
00784 /* U+0419 */ 0x0439,
00785 /* U+041A */ 0x043A,
00786 /* U+041B */ 0x043B,
00787 /* U+041C */ 0x043C,
00788 /* U+041D */ 0x043D,
00789 /* U+041E */ 0x043E,
00790 /* U+041F */ 0x043F,
00791 /* U+0420 */ 0x0440,
00792 /* U+0421 */ 0x0441,
00793 /* U+0422 */ 0x0442,
00794 /* U+0423 */ 0x0443,
00795 /* U+0424 */ 0x0444,
00796 /* U+0425 */ 0x0445,
00797 /* U+0426 */ 0x0446,
00798 /* U+0427 */ 0x0447,
00799 /* U+0428 */ 0x0448,
00800 /* U+0429 */ 0x0449,
00801 /* U+042A */ 0x044A,
00802 /* U+042B */ 0x044B,
00803 /* U+042C */ 0x044C,
00804 /* U+042D */ 0x044D,
00805 /* U+042E */ 0x044E,
00806 /* U+042F */ 0x044F,
00807 0x00,
00808 0x00,
00809 0x00,
00810 0x00,
00811 0x00,
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00848 0x00,
00849 0x00,
00850 0x00,
00851 0x00,
00852 0x00,
00853 0x00,
00854 0x00,
00855 /* U+0460 */ 0x0461,
00856 0x00,
00857 /* U+0462 */ 0x0463,
00858 0x00,
00859 /* U+0464 */ 0x0465,
00860 0x00,
00861 /* U+0466 */ 0x0467,
00862 0x00,
00863 /* U+0468 */ 0x0469,
```

```
00864 0x00,
00865 /* U+046A */ 0x046B,
00866 0x00,
00867 /* U+046C */ 0x046D,
00868 0x00,
00869 /* U+046E */ 0x046F,
00870 0x00,
00871 /* U+0470 */ 0x0471,
00872 0x00,
00873 /* U+0472 */ 0x0473,
00874 0x00,
00875 /* U+0474 */ 0x0475,
00876 0x00,
00877 /* U+0476 */ 0x0477,
00878 0x00,
00879 /* U+0478 */ 0x0479,
00880 0x00,
00881 /* U+047A */ 0x047B,
00882 0x00,
00883 /* U+047C */ 0x047D,
00884 0x00,
00885 /* U+047E */ 0x047F,
00886 0x00,
00887 /* U+0480 */ 0x0481,
00888 0x00,
00889 0x00,
00890 0x00,
00891 0x00,
00892 0x00,
00893 0x00,
00894 0x00,
00895 0x00,
00896 0x00,
00897 0x00,
00898 0x00,
00899 0x00,
00900 0x00,
00901 0x00,
00902 0x00,
00903 /* U+0490 */ 0x0491,
00904 0x00,
00905 /* U+0492 */ 0x0493,
00906 0x00,
00907 /* U+0494 */ 0x0495,
00908 0x00,
00909 /* U+0496 */ 0x0497,
00910 0x00,
00911 /* U+0498 */ 0x0499,
00912 0x00,
00913 /* U+049A */ 0x049B,
00914 0x00,
00915 /* U+049C */ 0x049D,
00916 0x00,
00917 /* U+049E */ 0x049F,
00918 0x00,
00919 /* U+04A0 */ 0x04A1,
00920 0x00,
00921 /* U+04A2 */ 0x04A3,
00922 0x00,
00923 /* U+04A4 */ 0x04A5,
00924 0x00,
00925 /* U+04A6 */ 0x04A7,
00926 0x00,
00927 /* U+04A8 */ 0x04A9,
00928 0x00,
00929 /* U+04AA */ 0x04AB,
00930 0x00,
00931 /* U+04AC */ 0x04AD,
00932 0x00,
00933 /* U+04AE */ 0x04AF,
00934 0x00,
00935 /* U+04B0 */ 0x04B1,
00936 0x00,
00937 /* U+04B2 */ 0x04B3,
00938 0x00,
00939 /* U+04B4 */ 0x04B5,
00940 0x00,
00941 /* U+04B6 */ 0x04B7,
00942 0x00,
00943 /* U+04B8 */ 0x04B9,
00944 0x00,
00945 /* U+04BA */ 0x04BB,
00946 0x00,
00947 /* U+04BC */ 0x04BD,
00948 0x00,
00949 /* U+04BE */ 0x04BF,
00950 0x00,
```

```
00951 0x00,
00952 /* U+04C1 */ 0x04C2,
00953 0x00,
00954 /* U+04C3 */ 0x04C4,
00955 0x00,
00956 0x00,
00957 0x00,
00958 /* U+04C7 */ 0x04C8,
00959 0x00,
00960 0x00,
00961 0x00,
00962 /* U+04CB */ 0x04CC,
00963 0x00,
00964 0x00,
00965 0x00,
00966 0x00,
00967 /* U+04D0 */ 0x04D1,
00968 0x00,
00969 /* U+04D2 */ 0x04D3,
00970 0x00,
00971 /* U+04D4 */ 0x04D5,
00972 0x00,
00973 /* U+04D6 */ 0x04D7,
00974 0x00,
00975 /* U+04D8 */ 0x04D9,
00976 0x00,
00977 /* U+04DA */ 0x04DB,
00978 0x00,
00979 /* U+04DC */ 0x04DD,
00980 0x00,
00981 /* U+04DE */ 0x04DF,
00982 0x00,
00983 /* U+04E0 */ 0x04E1,
00984 0x00,
00985 /* U+04E2 */ 0x04E3,
00986 0x00,
00987 /* U+04E4 */ 0x04E5,
00988 0x00,
00989 /* U+04E6 */ 0x04E7,
00990 0x00,
00991 /* U+04E8 */ 0x04E9,
00992 0x00,
00993 /* U+04EA */ 0x04EB,
00994 0x00,
00995 0x00,
00996 0x00,
00997 /* U+04EE */ 0x04EF,
00998 0x00,
00999 /* U+04F0 */ 0x04F1,
01000 0x00,
01001 /* U+04F2 */ 0x04F3,
01002 0x00,
01003 /* U+04F4 */ 0x04F5,
01004 0x00,
01005 0x00,
01006 0x00,
01007 /* U+04F8 */ 0x04F9,
01008 0x00,
01009 0x00,
01010 0x00,
01011 0x00,
01012 0x00,
01013 0x00,
01014 0x00,
01015 0x00,
01016 0x00,
01017 0x00,
01018 0x00,
01019 0x00,
01020 0x00,
01021 0x00,
01022 0x00,
01023 0x00,
01024 0x00,
01025 0x00,
01026 0x00,
01027 0x00,
01028 0x00,
01029 0x00,
01030 0x00,
01031 0x00,
01032 0x00,
01033 0x00,
01034 0x00,
01035 0x00,
01036 0x00,
01037 0x00,
```



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01038 0x00,
01039 0x00,
01040 0x00,
01041 0x00,
01042 0x00,
01043 0x00,
01044 0x00,
01045 0x00,
01046 0x00,
01047 0x00,
01048 0x00,
01049 0x00,
01050 0x00,
01051 0x00,
01052 0x00,
01053 0x00,
01054 0x00,
01055 0x00,
01056 0x00,
01057 0x00,
01058 0x00,
01059 0x00,
01060 0x00,
01061 0x00,
01062 0x00,
01063 0x00,
01064 /* U+0531 */ 0x0561,
01065 /* U+0532 */ 0x0562,
01066 /* U+0533 */ 0x0563,
01067 /* U+0534 */ 0x0564,
01068 /* U+0535 */ 0x0565,
01069 /* U+0536 */ 0x0566,
01070 /* U+0537 */ 0x0567,
01071 /* U+0538 */ 0x0568,
01072 /* U+0539 */ 0x0569,
01073 /* U+053A */ 0x056A,
01074 /* U+053B */ 0x056B,
01075 /* U+053C */ 0x056C,
01076 /* U+053D */ 0x056D,
01077 /* U+053E */ 0x056E,
01078 /* U+053F */ 0x056F,
01079 /* U+0540 */ 0x0570,
01080 /* U+0541 */ 0x0571,
01081 /* U+0542 */ 0x0572,
01082 /* U+0543 */ 0x0573,
01083 /* U+0544 */ 0x0574,
01084 /* U+0545 */ 0x0575,
01085 /* U+0546 */ 0x0576,
01086 /* U+0547 */ 0x0577,
01087 /* U+0548 */ 0x0578,
01088 /* U+0549 */ 0x0579,
01089 /* U+054A */ 0x057A,
01090 /* U+054B */ 0x057B,
01091 /* U+054C */ 0x057C,
01092 /* U+054D */ 0x057D,
01093 /* U+054E */ 0x057E,
01094 /* U+054F */ 0x057F,
01095 /* U+0550 */ 0x0580,
01096 /* U+0551 */ 0x0581,
01097 /* U+0552 */ 0x0582,
01098 /* U+0553 */ 0x0583,
01099 /* U+0554 */ 0x0584,
01100 /* U+0555 */ 0x0585,
01101 /* U+0556 */ 0x0586,
01102 };
01103
01104 static const unsigned short ucs_table_10A0[] = {
01105 /* U+10A0 */ 0x10D0,
01106 /* U+10A1 */ 0x10D1,
01107 /* U+10A2 */ 0x10D2,
01108 /* U+10A3 */ 0x10D3,
01109 /* U+10A4 */ 0x10D4,
01110 /* U+10A5 */ 0x10D5,
01111 /* U+10A6 */ 0x10D6,
01112 /* U+10A7 */ 0x10D7,
01113 /* U+10A8 */ 0x10D8,
01114 /* U+10A9 */ 0x10D9,
01115 /* U+10AA */ 0x10DA,
01116 /* U+10AB */ 0x10DB,
01117 /* U+10AC */ 0x10DC,
01118 /* U+10AD */ 0x10DD,
01119 /* U+10AE */ 0x10DE,
01120 /* U+10AF */ 0x10DF,
01121 /* U+10B0 */ 0x10E0,
01122 /* U+10B1 */ 0x10E1,
01123 /* U+10B2 */ 0x10E2,
01124 /* U+10B3 */ 0x10E3,
```

```
01125 /* U+10B4 */ 0x10E4,
01126 /* U+10B5 */ 0x10E5,
01127 /* U+10B6 */ 0x10E6,
01128 /* U+10B7 */ 0x10E7,
01129 /* U+10B8 */ 0x10E8,
01130 /* U+10B9 */ 0x10E9,
01131 /* U+10BA */ 0x10EA,
01132 /* U+10BB */ 0x10EB,
01133 /* U+10BC */ 0x10EC,
01134 /* U+10BD */ 0x10ED,
01135 /* U+10BE */ 0x10EE,
01136 /* U+10BF */ 0x10EF,
01137 /* U+10C0 */ 0x10F0,
01138 /* U+10C1 */ 0x10F1,
01139 /* U+10C2 */ 0x10F2,
01140 /* U+10C3 */ 0x10F3,
01141 /* U+10C4 */ 0x10F4,
01142 /* U+10C5 */ 0x10F5,
01143 };
01144
01145 static const unsigned short ucs_table_1E00[] = {
01146 /* U+1E00 */ 0x1E01,
01147 0x00,
01148 /* U+1E02 */ 0x1E03,
01149 0x00,
01150 /* U+1E04 */ 0x1E05,
01151 0x00,
01152 /* U+1E06 */ 0x1E07,
01153 0x00,
01154 /* U+1E08 */ 0x1E09,
01155 0x00,
01156 /* U+1E0A */ 0x1E0B,
01157 0x00,
01158 /* U+1E0C */ 0x1E0D,
01159 0x00,
01160 /* U+1E0E */ 0x1E0F,
01161 0x00,
01162 /* U+1E10 */ 0x1E11,
01163 0x00,
01164 /* U+1E12 */ 0x1E13,
01165 0x00,
01166 /* U+1E14 */ 0x1E15,
01167 0x00,
01168 /* U+1E16 */ 0x1E17,
01169 0x00,
01170 /* U+1E18 */ 0x1E19,
01171 0x00,
01172 /* U+1E1A */ 0x1E1B,
01173 0x00,
01174 /* U+1E1C */ 0x1E1D,
01175 0x00,
01176 /* U+1E1E */ 0x1E1F,
01177 0x00,
01178 /* U+1E20 */ 0x1E21,
01179 0x00,
01180 /* U+1E22 */ 0x1E23,
01181 0x00,
01182 /* U+1E24 */ 0x1E25,
01183 0x00,
01184 /* U+1E26 */ 0x1E27,
01185 0x00,
01186 /* U+1E28 */ 0x1E29,
01187 0x00,
01188 /* U+1E2A */ 0x1E2B,
01189 0x00,
01190 /* U+1E2C */ 0x1E2D,
01191 0x00,
01192 /* U+1E2E */ 0x1E2F,
01193 0x00,
01194 /* U+1E30 */ 0x1E31,
01195 0x00,
01196 /* U+1E32 */ 0x1E33,
01197 0x00,
01198 /* U+1E34 */ 0x1E35,
01199 0x00,
01200 /* U+1E36 */ 0x1E37,
01201 0x00,
01202 /* U+1E38 */ 0x1E39,
01203 0x00,
01204 /* U+1E3A */ 0x1E3B,
01205 0x00,
01206 /* U+1E3C */ 0x1E3D,
01207 0x00,
01208 /* U+1E3E */ 0x1E3F,
01209 0x00,
01210 /* U+1E40 */ 0x1E41,
01211 0x00,
```

```
01212 /* U+1E42 */ 0x1E43,
01213 0x00,
01214 /* U+1E44 */ 0x1E45,
01215 0x00,
01216 /* U+1E46 */ 0x1E47,
01217 0x00,
01218 /* U+1E48 */ 0x1E49,
01219 0x00,
01220 /* U+1E4A */ 0x1E4B,
01221 0x00,
01222 /* U+1E4C */ 0x1E4D,
01223 0x00,
01224 /* U+1E4E */ 0x1E4F,
01225 0x00,
01226 /* U+1E50 */ 0x1E51,
01227 0x00,
01228 /* U+1E52 */ 0x1E53,
01229 0x00,
01230 /* U+1E54 */ 0x1E55,
01231 0x00,
01232 /* U+1E56 */ 0x1E57,
01233 0x00,
01234 /* U+1E58 */ 0x1E59,
01235 0x00,
01236 /* U+1E5A */ 0x1E5B,
01237 0x00,
01238 /* U+1E5C */ 0x1E5D,
01239 0x00,
01240 /* U+1E5E */ 0x1E5F,
01241 0x00,
01242 /* U+1E60 */ 0x1E61,
01243 0x00,
01244 /* U+1E62 */ 0x1E63,
01245 0x00,
01246 /* U+1E64 */ 0x1E65,
01247 0x00,
01248 /* U+1E66 */ 0x1E67,
01249 0x00,
01250 /* U+1E68 */ 0x1E69,
01251 0x00,
01252 /* U+1E6A */ 0x1E6B,
01253 0x00,
01254 /* U+1E6C */ 0x1E6D,
01255 0x00,
01256 /* U+1E6E */ 0x1E6F,
01257 0x00,
01258 /* U+1E70 */ 0x1E71,
01259 0x00,
01260 /* U+1E72 */ 0x1E73,
01261 0x00,
01262 /* U+1E74 */ 0x1E75,
01263 0x00,
01264 /* U+1E76 */ 0x1E77,
01265 0x00,
01266 /* U+1E78 */ 0x1E79,
01267 0x00,
01268 /* U+1E7A */ 0x1E7B,
01269 0x00,
01270 /* U+1E7C */ 0x1E7D,
01271 0x00,
01272 /* U+1E7E */ 0x1E7F,
01273 0x00,
01274 /* U+1E80 */ 0x1E81,
01275 0x00,
01276 /* U+1E82 */ 0x1E83,
01277 0x00,
01278 /* U+1E84 */ 0x1E85,
01279 0x00,
01280 /* U+1E86 */ 0x1E87,
01281 0x00,
01282 /* U+1E88 */ 0x1E89,
01283 0x00,
01284 /* U+1E8A */ 0x1E8B,
01285 0x00,
01286 /* U+1E8C */ 0x1E8D,
01287 0x00,
01288 /* U+1E8E */ 0x1E8F,
01289 0x00,
01290 /* U+1E90 */ 0x1E91,
01291 0x00,
01292 /* U+1E92 */ 0x1E93,
01293 0x00,
01294 /* U+1E94 */ 0x1E95,
01295 0x00,
01296 0x00,
01297 0x00,
01298 0x00,
```

```
01299 0x00,
01300 0x00,
01301 0x00,
01302 0x00,
01303 0x00,
01304 0x00,
01305 0x00,
01306 /* U+1EA0 */ 0x1EA1,
01307 0x00,
01308 /* U+1EA2 */ 0x1EA3,
01309 0x00,
01310 /* U+1EA4 */ 0x1EA5,
01311 0x00,
01312 /* U+1EA6 */ 0x1EA7,
01313 0x00,
01314 /* U+1EA8 */ 0x1EA9,
01315 0x00,
01316 /* U+1EAA */ 0x1EAB,
01317 0x00,
01318 /* U+1EAC */ 0x1EAD,
01319 0x00,
01320 /* U+1EAE */ 0x1EAF,
01321 0x00,
01322 /* U+1EB0 */ 0x1EB1,
01323 0x00,
01324 /* U+1EB2 */ 0x1EB3,
01325 0x00,
01326 /* U+1EB4 */ 0x1EB5,
01327 0x00,
01328 /* U+1EB6 */ 0x1EB7,
01329 0x00,
01330 /* U+1EB8 */ 0x1EB9,
01331 0x00,
01332 /* U+1EBA */ 0x1EBB,
01333 0x00,
01334 /* U+1EBC */ 0x1EBD,
01335 0x00,
01336 /* U+1EBE */ 0x1EBF,
01337 0x00,
01338 /* U+1EC0 */ 0x1EC1,
01339 0x00,
01340 /* U+1EC2 */ 0x1EC3,
01341 0x00,
01342 /* U+1EC4 */ 0x1EC5,
01343 0x00,
01344 /* U+1EC6 */ 0x1EC7,
01345 0x00,
01346 /* U+1EC8 */ 0x1EC9,
01347 0x00,
01348 /* U+1ECA */ 0x1ECB,
01349 0x00,
01350 /* U+1ECC */ 0x1ECD,
01351 0x00,
01352 /* U+1ECE */ 0x1ECF,
01353 0x00,
01354 /* U+1ED0 */ 0x1ED1,
01355 0x00,
01356 /* U+1ED2 */ 0x1ED3,
01357 0x00,
01358 /* U+1ED4 */ 0x1ED5,
01359 0x00,
01360 /* U+1ED6 */ 0x1ED7,
01361 0x00,
01362 /* U+1ED8 */ 0x1ED9,
01363 0x00,
01364 /* U+1EDA */ 0x1EDB,
01365 0x00,
01366 /* U+1EDC */ 0x1EDD,
01367 0x00,
01368 /* U+1EDE */ 0x1EDF,
01369 0x00,
01370 /* U+1EE0 */ 0x1EE1,
01371 0x00,
01372 /* U+1EE2 */ 0x1EE3,
01373 0x00,
01374 /* U+1EE4 */ 0x1EE5,
01375 0x00,
01376 /* U+1EE6 */ 0x1EE7,
01377 0x00,
01378 /* U+1EE8 */ 0x1EE9,
01379 0x00,
01380 /* U+1EEA */ 0x1EEB,
01381 0x00,
01382 /* U+1EEC */ 0x1EED,
01383 0x00,
01384 /* U+1EEE */ 0x1EEF,
01385 0x00,
```

```
01386 /* U+1EF0 */ 0x1EF1,
01387 0x00,
01388 /* U+1EF2 */ 0x1EF3,
01389 0x00,
01390 /* U+1EF4 */ 0x1EF5,
01391 0x00,
01392 /* U+1EF6 */ 0x1EF7,
01393 0x00,
01394 /* U+1EF8 */ 0x1EF9,
01395 0x00,
01396 0x00,
01397 0x00,
01398 0x00,
01399 0x00,
01400 0x00,
01401 0x00,
01402 0x00,
01403 0x00,
01404 0x00,
01405 0x00,
01406 0x00,
01407 0x00,
01408 0x00,
01409 0x00,
01410 /* U+1F08 */ 0x1F00,
01411 /* U+1F09 */ 0x1F01,
01412 /* U+1F0A */ 0x1F02,
01413 /* U+1F0B */ 0x1F03,
01414 /* U+1F0C */ 0x1F04,
01415 /* U+1F0D */ 0x1F05,
01416 /* U+1F0E */ 0x1F06,
01417 /* U+1F0F */ 0x1F07,
01418 0x00,
01419 0x00,
01420 0x00,
01421 0x00,
01422 0x00,
01423 0x00,
01424 0x00,
01425 0x00,
01426 /* U+1F18 */ 0x1F10,
01427 /* U+1F19 */ 0x1F11,
01428 /* U+1F1A */ 0x1F12,
01429 /* U+1F1B */ 0x1F13,
01430 /* U+1F1C */ 0x1F14,
01431 /* U+1F1D */ 0x1F15,
01432 0x00,
01433 0x00,
01434 0x00,
01435 0x00,
01436 0x00,
01437 0x00,
01438 0x00,
01439 0x00,
01440 0x00,
01441 0x00,
01442 /* U+1F28 */ 0x1F20,
01443 /* U+1F29 */ 0x1F21,
01444 /* U+1F2A */ 0x1F22,
01445 /* U+1F2B */ 0x1F23,
01446 /* U+1F2C */ 0x1F24,
01447 /* U+1F2D */ 0x1F25,
01448 /* U+1F2E */ 0x1F26,
01449 /* U+1F2F */ 0x1F27,
01450 0x00,
01451 0x00,
01452 0x00,
01453 0x00,
01454 0x00,
01455 0x00,
01456 0x00,
01457 0x00,
01458 /* U+1F38 */ 0x1F30,
01459 /* U+1F39 */ 0x1F31,
01460 /* U+1F3A */ 0x1F32,
01461 /* U+1F3B */ 0x1F33,
01462 /* U+1F3C */ 0x1F34,
01463 /* U+1F3D */ 0x1F35,
01464 /* U+1F3E */ 0x1F36,
01465 /* U+1F3F */ 0x1F37,
01466 0x00,
01467 0x00,
01468 0x00,
01469 0x00,
01470 0x00,
01471 0x00,
01472 0x00,
```

```
01473 0x00,
01474 /* U+1F48 */ 0x1F40,
01475 /* U+1F49 */ 0x1F41,
01476 /* U+1F4A */ 0x1F42,
01477 /* U+1F4B */ 0x1F43,
01478 /* U+1F4C */ 0x1F44,
01479 /* U+1F4D */ 0x1F45,
01480 0x00,
01481 0x00,
01482 0x00,
01483 0x00,
01484 0x00,
01485 0x00,
01486 0x00,
01487 0x00,
01488 0x00,
01489 0x00,
01490 0x00,
01491 /* U+1F59 */ 0x1F51,
01492 0x00,
01493 /* U+1F5B */ 0x1F53,
01494 0x00,
01495 /* U+1F5D */ 0x1F55,
01496 0x00,
01497 /* U+1F5F */ 0x1F57,
01498 0x00,
01499 0x00,
01500 0x00,
01501 0x00,
01502 0x00,
01503 0x00,
01504 0x00,
01505 0x00,
01506 /* U+1F68 */ 0x1F60,
01507 /* U+1F69 */ 0x1F61,
01508 /* U+1F6A */ 0x1F62,
01509 /* U+1F6B */ 0x1F63,
01510 /* U+1F6C */ 0x1F64,
01511 /* U+1F6D */ 0x1F65,
01512 /* U+1F6E */ 0x1F66,
01513 /* U+1F6F */ 0x1F67,
01514 0x00,
01515 0x00,
01516 0x00,
01517 0x00,
01518 0x00,
01519 0x00,
01520 0x00,
01521 0x00,
01522 0x00,
01523 0x00,
01524 0x00,
01525 0x00,
01526 0x00,
01527 0x00,
01528 0x00,
01529 0x00,
01530 0x00,
01531 0x00,
01532 0x00,
01533 0x00,
01534 0x00,
01535 0x00,
01536 0x00,
01537 0x00,
01538 /* U+1F88 */ 0x0,
01539 /* U+1F89 */ 0x0,
01540 /* U+1F8A */ 0x0,
01541 /* U+1F8B */ 0x0,
01542 /* U+1F8C */ 0x0,
01543 /* U+1F8D */ 0x0,
01544 /* U+1F8E */ 0x0,
01545 /* U+1F8F */ 0x0,
01546 0x00,
01547 0x00,
01548 0x00,
01549 0x00,
01550 0x00,
01551 0x00,
01552 0x00,
01553 0x00,
01554 /* U+1F98 */ 0x0,
01555 /* U+1F99 */ 0x0,
01556 /* U+1F9A */ 0x0,
01557 /* U+1F9B */ 0x0,
01558 /* U+1F9C */ 0x0,
01559 /* U+1F9D */ 0x0,
```

```
01560 /* U+1F9E */ 0x0,
01561 /* U+1F9F */ 0x0,
01562 0x00,
01563 0x00,
01564 0x00,
01565 0x00,
01566 0x00,
01567 0x00,
01568 0x00,
01569 0x00,
01570 /* U+1FA8 */ 0x0,
01571 /* U+1FA9 */ 0x0,
01572 /* U+1FAA */ 0x0,
01573 /* U+1FAB */ 0x0,
01574 /* U+1FAC */ 0x0,
01575 /* U+1FAD */ 0x0,
01576 /* U+1FAE */ 0x0,
01577 /* U+1FAF */ 0x0,
01578 0x00,
01579 0x00,
01580 0x00,
01581 0x00,
01582 0x00,
01583 0x00,
01584 0x00,
01585 0x00,
01586 /* U+1FB8 */ 0x1FB0,
01587 /* U+1FB9 */ 0x1FB1,
01588 /* U+1FBA */ 0x1F70,
01589 /* U+1FBB */ 0x1F71,
01590 /* U+1FBC */ 0x0,
01591 0x00,
01592 0x00,
01593 0x00,
01594 0x00,
01595 0x00,
01596 0x00,
01597 0x00,
01598 0x00,
01599 0x00,
01600 0x00,
01601 0x00,
01602 /* U+1FC8 */ 0x1F72,
01603 /* U+1FC9 */ 0x1F73,
01604 /* U+1FCA */ 0x1F74,
01605 /* U+1FCB */ 0x1F75,
01606 /* U+1FCC */ 0x0,
01607 0x00,
01608 0x00,
01609 0x00,
01610 0x00,
01611 0x00,
01612 0x00,
01613 0x00,
01614 0x00,
01615 0x00,
01616 0x00,
01617 0x00,
01618 /* U+1FD8 */ 0x1FD0,
01619 /* U+1FD9 */ 0x1FD1,
01620 /* U+1FDA */ 0x1F76,
01621 /* U+1FDB */ 0x1F77,
01622 0x00,
01623 0x00,
01624 0x00,
01625 0x00,
01626 0x00,
01627 0x00,
01628 0x00,
01629 0x00,
01630 0x00,
01631 0x00,
01632 0x00,
01633 0x00,
01634 /* U+1FE8 */ 0x1FE0,
01635 /* U+1FE9 */ 0x1FE1,
01636 /* U+1FEA */ 0x1F7A,
01637 /* U+1FEB */ 0x1F7B,
01638 /* U+1FEC */ 0x1FE5,
01639 0x00,
01640 0x00,
01641 0x00,
01642 0x00,
01643 0x00,
01644 0x00,
01645 0x00,
01646 0x00,
```

```
01647 0x00,
01648 0x00,
01649 0x00,
01650 /* U+1FF8 */ 0x1F78,
01651 /* U+1FF9 */ 0x1F79,
01652 /* U+1FFA */ 0x1F7C,
01653 /* U+1FFB */ 0x1F7D,
01654 /* U+1FFC */ 0x0,
01655 };
01656
01657 static const unsigned short ucs_table_2102[] = {
01658 /* U+2102 */ 0x0,
01659 0x00,
01660 0x00,
01661 0x00,
01662 0x00,
01663 0x00,
01664 0x00,
01665 0x00,
01666 0x00,
01667 /* U+210B */ 0x0,
01668 /* U+210C */ 0x0,
01669 /* U+210D */ 0x0,
01670 0x00,
01671 0x00,
01672 /* U+2110 */ 0x0,
01673 /* U+2111 */ 0x0,
01674 /* U+2112 */ 0x2113,
01675 0x00,
01676 0x00,
01677 /* U+2115 */ 0x0,
01678 0x00,
01679 0x00,
01680 /* U+2118 */ 0x0,
01681 /* U+2119 */ 0x0,
01682 /* U+211A */ 0x0,
01683 /* U+211B */ 0x0,
01684 /* U+211C */ 0x0,
01685 /* U+211D */ 0x0,
01686 0x00,
01687 0x00,
01688 0x00,
01689 0x00,
01690 0x00,
01691 0x00,
01692 /* U+2124 */ 0x0,
01693 0x00,
01694 0x00,
01695 0x00,
01696 /* U+2128 */ 0x0,
01697 0x00,
01698 0x00,
01699 0x00,
01700 /* U+212C */ 0x0,
01701 /* U+212D */ 0x0,
01702 0x00,
01703 0x00,
01704 /* U+2130 */ 0x212F,
01705 /* U+2131 */ 0x0,
01706 /* U+2132 */ 0x0,
01707 /* U+2133 */ 0x0,
01708 };
01709
01710 static const unsigned short ucs_table_24B6[] = {
01711 /* U+24B6 */ 0x24D0,
01712 /* U+24B7 */ 0x24D1,
01713 /* U+24B8 */ 0x24D2,
01714 /* U+24B9 */ 0x24D3,
01715 /* U+24BA */ 0x24D4,
01716 /* U+24BB */ 0x24D5,
01717 /* U+24BC */ 0x24D6,
01718 /* U+24BD */ 0x24D7,
01719 /* U+24BE */ 0x24D8,
01720 /* U+24BF */ 0x24D9,
01721 /* U+24C0 */ 0x24DA,
01722 /* U+24C1 */ 0x24DB,
01723 /* U+24C2 */ 0x24DC,
01724 /* U+24C3 */ 0x24DD,
01725 /* U+24C4 */ 0x24DE,
01726 /* U+24C5 */ 0x24DF,
01727 /* U+24C6 */ 0x24E0,
01728 /* U+24C7 */ 0x24E1,
01729 /* U+24C8 */ 0x24E2,
01730 /* U+24C9 */ 0x24E3,
01731 /* U+24CA */ 0x24E4,
01732 /* U+24CB */ 0x24E5,
01733 /* U+24CC */ 0x24E6,
```



```
01734 /* U+24CD */ 0x24E7,
01735 /* U+24CE */ 0x24E8,
01736 /* U+24CF */ 0x24E9,
01737 };
01738
01739 static const unsigned short ucs_table_33CE[] = {
01740 /* U+33CE */ 0x0,
01741 };
01742
01743 static const unsigned short ucs_table_FF21[] = {
01744 /* U+FF21 */ 0xFF41,
01745 /* U+FF22 */ 0xFF42,
01746 /* U+FF23 */ 0xFF43,
01747 /* U+FF24 */ 0xFF44,
01748 /* U+FF25 */ 0xFF45,
01749 /* U+FF26 */ 0xFF46,
01750 /* U+FF27 */ 0xFF47,
01751 /* U+FF28 */ 0xFF48,
01752 /* U+FF29 */ 0xFF49,
01753 /* U+FF2A */ 0xFF4A,
01754 /* U+FF2B */ 0xFF4B,
01755 /* U+FF2C */ 0xFF4C,
01756 /* U+FF2D */ 0xFF4D,
01757 /* U+FF2E */ 0xFF4E,
01758 /* U+FF2F */ 0xFF4F,
01759 /* U+FF30 */ 0xFF50,
01760 /* U+FF31 */ 0xFF51,
01761 /* U+FF32 */ 0xFF52,
01762 /* U+FF33 */ 0xFF53,
01763 /* U+FF34 */ 0xFF54,
01764 /* U+FF35 */ 0xFF55,
01765 /* U+FF36 */ 0xFF56,
01766 /* U+FF37 */ 0xFF57,
01767 /* U+FF38 */ 0xFF58,
01768 /* U+FF39 */ 0xFF59,
01769 /* U+FF3A */ 0xFF5A,
01770 };
```

13.254 dingbats_.h

```
00001 /* dingbats */
00002
00003 static const char unicode_to_dingbats_lb_0020[] = {
00004 /* U+0020 */ 0x20,
00005 0x00,
00006 0x00,
00007 0x00,
00008 0x00,
00009 0x00,
00010 0x00,
00011 0x00,
00012 0x00,
00013 0x00,
00014 0x00,
00015 0x00,
00016 0x00,
00017 0x00,
00018 0x00,
00019 0x00,
00020 0x00,
00021 0x00,
00022 0x00,
00023 0x00,
00024 0x00,
00025 0x00,
00026 0x00,
00027 0x00,
00028 0x00,
00029 0x00,
00030 0x00,
00031 0x00,
00032 0x00,
00033 0x00,
00034 0x00,
00035 0x00,
00036 0x00,
00037 0x00,
00038 0x00,
00039 0x00,
00040 0x00,
00041 0x00,
00042 0x00,
00043 0x00,
00044 0x00,
00045 0x00,
```

```
00046 0x00,  
00047 0x00,  
00048 0x00,  
00049 0x00,  
00050 0x00,  
00051 0x00,  
00052 0x00,  
00053 0x00,  
00054 0x00,  
00055 0x00,  
00056 0x00,  
00057 0x00,  
00058 0x00,  
00059 0x00,  
00060 0x00,  
00061 0x00,  
00062 0x00,  
00063 0x00,  
00064 0x00,  
00065 0x00,  
00066 0x00,  
00067 0x00,  
00068 0x00,  
00069 0x00,  
00070 0x00,  
00071 0x00,  
00072 0x00,  
00073 0x00,  
00074 0x00,  
00075 0x00,  
00076 0x00,  
00077 0x00,  
00078 0x00,  
00079 0x00,  
00080 0x00,  
00081 0x00,  
00082 0x00,  
00083 0x00,  
00084 0x00,  
00085 0x00,  
00086 0x00,  
00087 0x00,  
00088 0x00,  
00089 0x00,  
00090 0x00,  
00091 0x00,  
00092 0x00,  
00093 0x00,  
00094 0x00,  
00095 0x00,  
00096 0x00,  
00097 0x00,  
00098 0x00,  
00099 0x00,  
00100 0x00,  
00101 0x00,  
00102 0x00,  
00103 0x00,  
00104 0x00,  
00105 0x00,  
00106 0x00,  
00107 0x00,  
00108 0x00,  
00109 0x00,  
00110 0x00,  
00111 0x00,  
00112 0x00,  
00113 0x00,  
00114 0x00,  
00115 0x00,  
00116 0x00,  
00117 0x00,  
00118 0x00,  
00119 0x00,  
00120 0x00,  
00121 0x00,  
00122 0x00,  
00123 0x00,  
00124 0x00,  
00125 0x00,  
00126 0x00,  
00127 0x00,  
00128 0x00,  
00129 0x00,  
00130 0x00,  
00131 0x00,  
00132 /* U+00A0 */ 0x20,
```

```
00133 };
00134
00135 static const char unicode_to_dingbats_lb_2192[] = {
00136 /* U+2192 */ (char)0xD5,
00137 0x00,
00138 /* U+2194 */ (char)0xD6,
00139 /* U+2195 */ (char)0xD7,
00140 };
00141
00142 static const char unicode_to_dingbats_lb_2460[] = {
00143 /* U+2460 */ (char)0xAC,
00144 /* U+2461 */ (char)0xAD,
00145 /* U+2462 */ (char)0xAE,
00146 /* U+2463 */ (char)0xAF,
00147 /* U+2464 */ (char)0xB0,
00148 /* U+2465 */ (char)0xB1,
00149 /* U+2466 */ (char)0xB2,
00150 /* U+2467 */ (char)0xB3,
00151 /* U+2468 */ (char)0xB4,
00152 /* U+2469 */ (char)0xB5,
00153 };
00154
00155 static const char unicode_to_dingbats_lb_25A0[] = {
00156 /* U+25A0 */ 0x6E,
00157 0x00,
00158 0x00,
00159 0x00,
00160 0x00,
00161 0x00,
00162 0x00,
00163 0x00,
00164 0x00,
00165 0x00,
00166 0x00,
00167 0x00,
00168 0x00,
00169 0x00,
00170 0x00,
00171 0x00,
00172 0x00,
00173 0x00,
00174 /* U+25B2 */ 0x73,
00175 0x00,
00176 0x00,
00177 0x00,
00178 0x00,
00179 0x00,
00180 0x00,
00181 0x00,
00182 0x00,
00183 0x00,
00184 /* U+25BC */ 0x74,
00185 0x00,
00186 0x00,
00187 0x00,
00188 0x00,
00189 0x00,
00190 0x00,
00191 0x00,
00192 0x00,
00193 0x00,
00194 /* U+25C6 */ 0x75,
00195 0x00,
00196 0x00,
00197 0x00,
00198 0x00,
00199 0x00,
00200 0x00,
00201 0x00,
00202 0x00,
00203 /* U+25CF */ 0x6C,
00204 0x00,
00205 0x00,
00206 0x00,
00207 0x00,
00208 0x00,
00209 0x00,
00210 0x00,
00211 /* U+25D7 */ 0x77,
00212 0x00,
00213 0x00,
00214 0x00,
00215 0x00,
00216 0x00,
00217 0x00,
00218 0x00,
00219 0x00,
```

```
00220 0x00,
00221 0x00,
00222 0x00,
00223 0x00,
00224 0x00,
00225 0x00,
00226 0x00,
00227 0x00,
00228 0x00,
00229 0x00,
00230 0x00,
00231 0x00,
00232 0x00,
00233 0x00,
00234 0x00,
00235 0x00,
00236 0x00,
00237 0x00,
00238 0x00,
00239 0x00,
00240 0x00,
00241 0x00,
00242 0x00,
00243 0x00,
00244 0x00,
00245 0x00,
00246 0x00,
00247 0x00,
00248 0x00,
00249 0x00,
00250 0x00,
00251 0x00,
00252 0x00,
00253 0x00,
00254 0x00,
00255 0x00,
00256 0x00,
00257 /* U+2605 */ 0x48,
00258 0x00,
00259 0x00,
00260 0x00,
00261 0x00,
00262 0x00,
00263 0x00,
00264 0x00,
00265 0x00,
00266 /* U+260E */ 0x25,
00267 0x00,
00268 0x00,
00269 0x00,
00270 0x00,
00271 0x00,
00272 0x00,
00273 0x00,
00274 0x00,
00275 0x00,
00276 0x00,
00277 0x00,
00278 0x00,
00279 /* U+261B */ 0x2A,
00280 0x00,
00281 0x00,
00282 /* U+261E */ 0x2B,
00283 0x00,
00284 0x00,
00285 0x00,
00286 0x00,
00287 0x00,
00288 0x00,
00289 0x00,
00290 0x00,
00291 0x00,
00292 0x00,
00293 0x00,
00294 0x00,
00295 0x00,
00296 0x00,
00297 0x00,
00298 0x00,
00299 0x00,
00300 0x00,
00301 0x00,
00302 0x00,
00303 0x00,
00304 0x00,
00305 0x00,
00306 0x00,
```

```
00307 0x00,
00308 0x00,
00309 0x00,
00310 0x00,
00311 0x00,
00312 0x00,
00313 0x00,
00314 0x00,
00315 0x00,
00316 0x00,
00317 0x00,
00318 0x00,
00319 0x00,
00320 0x00,
00321 0x00,
00322 0x00,
00323 0x00,
00324 0x00,
00325 0x00,
00326 0x00,
00327 0x00,
00328 0x00,
00329 0x00,
00330 0x00,
00331 0x00,
00332 0x00,
00333 0x00,
00334 0x00,
00335 0x00,
00336 0x00,
00337 0x00,
00338 0x00,
00339 0x00,
00340 0x00,
00341 0x00,
00342 0x00,
00343 0x00,
00344 0x00,
00345 0x00,
00346 0x00,
00347 0x00,
00348 /* U+2660 */ (char) 0xAB,
00349 0x00,
00350 0x00,
00351 /* U+2663 */ (char) 0xA8,
00352 0x00,
00353 /* U+2665 */ (char) 0xAA,
00354 /* U+2666 */ (char) 0xA9,
00355 };
00356
00357 static const char unicode_to_dingbats_lb_2701[] = {
00358 /* U+2701 */ 0x21,
00359 /* U+2702 */ 0x22,
00360 /* U+2703 */ 0x23,
00361 /* U+2704 */ 0x24,
00362 0x00,
00363 /* U+2706 */ 0x26,
00364 /* U+2707 */ 0x27,
00365 /* U+2708 */ 0x28,
00366 /* U+2709 */ 0x29,
00367 0x00,
00368 0x00,
00369 /* U+270C */ 0x2C,
00370 /* U+270D */ 0x2D,
00371 /* U+270E */ 0x2E,
00372 /* U+270F */ 0x2F,
00373 /* U+2710 */ 0x30,
00374 /* U+2711 */ 0x31,
00375 /* U+2712 */ 0x32,
00376 /* U+2713 */ 0x33,
00377 /* U+2714 */ 0x34,
00378 /* U+2715 */ 0x35,
00379 /* U+2716 */ 0x36,
00380 /* U+2717 */ 0x37,
00381 /* U+2718 */ 0x38,
00382 /* U+2719 */ 0x39,
00383 /* U+271A */ 0x3A,
00384 /* U+271B */ 0x3B,
00385 /* U+271C */ 0x3C,
00386 /* U+271D */ 0x3D,
00387 /* U+271E */ 0x3E,
00388 /* U+271F */ 0x3F,
00389 /* U+2720 */ 0x40,
00390 /* U+2721 */ 0x41,
00391 /* U+2722 */ 0x42,
00392 /* U+2723 */ 0x43,
00393 /* U+2724 */ 0x44,
```

```
00394 /* U+2725 */ 0x45,
00395 /* U+2726 */ 0x46,
00396 /* U+2727 */ 0x47,
00397 0x00,
00398 /* U+2729 */ 0x49,
00399 /* U+272A */ 0x4A,
00400 /* U+272B */ 0x4B,
00401 /* U+272C */ 0x4C,
00402 /* U+272D */ 0x4D,
00403 /* U+272E */ 0x4E,
00404 /* U+272F */ 0x4F,
00405 /* U+2730 */ 0x50,
00406 /* U+2731 */ 0x51,
00407 /* U+2732 */ 0x52,
00408 /* U+2733 */ 0x53,
00409 /* U+2734 */ 0x54,
00410 /* U+2735 */ 0x55,
00411 /* U+2736 */ 0x56,
00412 /* U+2737 */ 0x57,
00413 /* U+2738 */ 0x58,
00414 /* U+2739 */ 0x59,
00415 /* U+273A */ 0x5A,
00416 /* U+273B */ 0x5B,
00417 /* U+273C */ 0x5C,
00418 /* U+273D */ 0x5D,
00419 /* U+273E */ 0x5E,
00420 /* U+273F */ 0x5F,
00421 /* U+2740 */ 0x60,
00422 /* U+2741 */ 0x61,
00423 /* U+2742 */ 0x62,
00424 /* U+2743 */ 0x63,
00425 /* U+2744 */ 0x64,
00426 /* U+2745 */ 0x65,
00427 /* U+2746 */ 0x66,
00428 /* U+2747 */ 0x67,
00429 /* U+2748 */ 0x68,
00430 /* U+2749 */ 0x69,
00431 /* U+274A */ 0x6A,
00432 /* U+274B */ 0x6B,
00433 0x00,
00434 /* U+274D */ 0x6D,
00435 0x00,
00436 /* U+274F */ 0x6F,
00437 /* U+2750 */ 0x70,
00438 /* U+2751 */ 0x71,
00439 /* U+2752 */ 0x72,
00440 0x00,
00441 0x00,
00442 0x00,
00443 /* U+2756 */ 0x76,
00444 0x00,
00445 /* U+2758 */ 0x78,
00446 /* U+2759 */ 0x79,
00447 /* U+275A */ 0x7A,
00448 /* U+275B */ 0x7B,
00449 /* U+275C */ 0x7C,
00450 /* U+275D */ 0x7D,
00451 /* U+275E */ 0x7E,
00452 0x00,
00453 0x00,
00454 /* U+2761 */ (char) 0xA1,
00455 /* U+2762 */ (char) 0xA2,
00456 /* U+2763 */ (char) 0xA3,
00457 /* U+2764 */ (char) 0xA4,
00458 /* U+2765 */ (char) 0xA5,
00459 /* U+2766 */ (char) 0xA6,
00460 /* U+2767 */ (char) 0xA7,
00461 0x00,
00462 0x00,
00463 0x00,
00464 0x00,
00465 0x00,
00466 0x00,
00467 0x00,
00468 0x00,
00469 0x00,
00470 0x00,
00471 0x00,
00472 0x00,
00473 0x00,
00474 0x00,
00475 /* U+2776 */ (char) 0xB6,
00476 /* U+2777 */ (char) 0xB7,
00477 /* U+2778 */ (char) 0xB8,
00478 /* U+2779 */ (char) 0xB9,
00479 /* U+277A */ (char) 0xBA,
00480 /* U+277B */ (char) 0xBB,
```

```
00481 /* U+277C */ (char) 0xBC,
00482 /* U+277D */ (char) 0xBD,
00483 /* U+277E */ (char) 0xBE,
00484 /* U+277F */ (char) 0xBF,
00485 /* U+2780 */ (char) 0xC0,
00486 /* U+2781 */ (char) 0xC1,
00487 /* U+2782 */ (char) 0xC2,
00488 /* U+2783 */ (char) 0xC3,
00489 /* U+2784 */ (char) 0xC4,
00490 /* U+2785 */ (char) 0xC5,
00491 /* U+2786 */ (char) 0xC6,
00492 /* U+2787 */ (char) 0xC7,
00493 /* U+2788 */ (char) 0xC8,
00494 /* U+2789 */ (char) 0xC9,
00495 /* U+278A */ (char) 0xCA,
00496 /* U+278B */ (char) 0xCB,
00497 /* U+278C */ (char) 0xCC,
00498 /* U+278D */ (char) 0xCD,
00499 /* U+278E */ (char) 0xCE,
00500 /* U+278F */ (char) 0xCF,
00501 /* U+2790 */ (char) 0xD0,
00502 /* U+2791 */ (char) 0xD1,
00503 /* U+2792 */ (char) 0xD2,
00504 /* U+2793 */ (char) 0xD3,
00505 /* U+2794 */ (char) 0xD4,
00506 0x00,
00507 0x00,
00508 0x00,
00509 /* U+2798 */ (char) 0xD8,
00510 /* U+2799 */ (char) 0xD9,
00511 /* U+279A */ (char) 0xDA,
00512 /* U+279B */ (char) 0xDB,
00513 /* U+279C */ (char) 0xDC,
00514 /* U+279D */ (char) 0xDD,
00515 /* U+279E */ (char) 0xDE,
00516 /* U+279F */ (char) 0xDF,
00517 /* U+27A0 */ (char) 0xE0,
00518 /* U+27A1 */ (char) 0xE1,
00519 /* U+27A2 */ (char) 0xE2,
00520 /* U+27A3 */ (char) 0xE3,
00521 /* U+27A4 */ (char) 0xE4,
00522 /* U+27A5 */ (char) 0xE5,
00523 /* U+27A6 */ (char) 0xE6,
00524 /* U+27A7 */ (char) 0xE7,
00525 /* U+27A8 */ (char) 0xE8,
00526 /* U+27A9 */ (char) 0xE9,
00527 /* U+27AA */ (char) 0xEA,
00528 /* U+27AB */ (char) 0xEB,
00529 /* U+27AC */ (char) 0xEC,
00530 /* U+27AD */ (char) 0xED,
00531 /* U+27AE */ (char) 0xEE,
00532 /* U+27AF */ (char) 0xEF,
00533 0x00,
00534 /* U+27B1 */ (char) 0xF1,
00535 /* U+27B2 */ (char) 0xF2,
00536 /* U+27B3 */ (char) 0xF3,
00537 /* U+27B4 */ (char) 0xF4,
00538 /* U+27B5 */ (char) 0xF5,
00539 /* U+27B6 */ (char) 0xF6,
00540 /* U+27B7 */ (char) 0xF7,
00541 /* U+27B8 */ (char) 0xF8,
00542 /* U+27B9 */ (char) 0xF9,
00543 /* U+27BA */ (char) 0xFA,
00544 /* U+27BB */ (char) 0xFB,
00545 /* U+27BC */ (char) 0xFC,
00546 /* U+27BD */ (char) 0xFD,
00547 /* U+27BE */ (char) 0xFE,
00548 };
00549
00550 static const char unicode_to_dingbats_lb_F8D7[] = {
00551 /* U+F8D7 */ (char) 0x80,
00552 /* U+F8D8 */ (char) 0x81,
00553 /* U+F8D9 */ (char) 0x82,
00554 /* U+F8DA */ (char) 0x83,
00555 /* U+F8DB */ (char) 0x84,
00556 /* U+F8DC */ (char) 0x85,
00557 /* U+F8DD */ (char) 0x86,
00558 /* U+F8DE */ (char) 0x87,
00559 /* U+F8DF */ (char) 0x88,
00560 /* U+F8E0 */ (char) 0x89,
00561 /* U+F8E1 */ (char) 0x8A,
00562 /* U+F8E2 */ (char) 0x8B,
00563 /* U+F8E3 */ (char) 0x8C,
00564 /* U+F8E4 */ (char) 0x8D,
00565 };
```

13.255 spacing.h

```
00001 /* spacing */
00002
00003 static const unsigned short ucs_table_0300[] = {
00004 /* U+0300 */ 0x0060,
00005 /* U+0301 */ 0x00B4,
00006 /* U+0302 */ 0x005E,
00007 /* U+0303 */ 0x02DC,
00008 /* U+0304 */ 0x00AF,
00009 /* U+0305 */ 0x203E,
00010 /* U+0306 */ 0x02D8,
00011 /* U+0307 */ 0x02D9,
00012 /* U+0308 */ 0x00A8,
00013 /* U+0309 */ 0x0309,
00014 /* U+030A */ 0x02DA,
00015 /* U+030B */ 0x02DD,
00016 /* U+030C */ 0x030C,
00017 /* U+030D */ 0x030D,
00018 /* U+030E */ 0x030E,
00019 /* U+030F */ 0x030F,
00020 /* U+0310 */ 0x0310,
00021 /* U+0311 */ 0x0311,
00022 /* U+0312 */ 0x0312,
00023 /* U+0313 */ 0x1FBD,
00024 /* U+0314 */ 0x1FFE,
00025 /* U+0315 */ 0x0315,
00026 /* U+0316 */ 0x0316,
00027 /* U+0317 */ 0x0317,
00028 /* U+0318 */ 0x0318,
00029 /* U+0319 */ 0x0319,
00030 /* U+031A */ 0x031A,
00031 /* U+031B */ 0x031B,
00032 /* U+031C */ 0x031C,
00033 /* U+031D */ 0x031D,
00034 /* U+031E */ 0x031E,
00035 /* U+031F */ 0x031F,
00036 /* U+0320 */ 0x0320,
00037 /* U+0321 */ 0x0321,
00038 /* U+0322 */ 0x0322,
00039 /* U+0323 */ 0x0323,
00040 /* U+0324 */ 0x0324,
00041 /* U+0325 */ 0x0325,
00042 /* U+0326 */ 0x0326,
00043 /* U+0327 */ 0x00B8,
00044 /* U+0328 */ 0x02DB,
00045 /* U+0329 */ 0x0329,
00046 /* U+032A */ 0x032A,
00047 /* U+032B */ 0x032B,
00048 /* U+032C */ 0x032C,
00049 /* U+032D */ 0x032D,
00050 /* U+032E */ 0x032E,
00051 /* U+032F */ 0x032F,
00052 /* U+0330 */ 0x0330,
00053 /* U+0331 */ 0x0331,
00054 /* U+0332 */ 0x005F,
00055 /* U+0333 */ 0x2017,
00056 /* U+0334 */ 0x0334,
00057 /* U+0335 */ 0x0335,
00058 /* U+0336 */ 0x0336,
00059 /* U+0337 */ 0x0337,
00060 /* U+0338 */ 0x0338,
00061 /* U+0339 */ 0x0339,
00062 /* U+033A */ 0x033A,
00063 /* U+033B */ 0x033B,
00064 /* U+033C */ 0x033C,
00065 /* U+033D */ 0x033D,
00066 /* U+033E */ 0x033E,
00067 /* U+033F */ 0x033F,
00068 /* U+0340 */ 0x0340,
00069 /* U+0341 */ 0x0341,
00070 /* U+0342 */ 0x1FC0,
00071 /* U+0343 */ 0x0343,
00072 /* U+0344 */ 0x0344,
00073 /* U+0345 */ 0x037A,
00074 0x00,
00075 0x00,
00076 0x00,
00077 0x00,
00078 0x00,
00079 0x00,
00080 0x00,
00081 0x00,
00082 0x00,
00083 0x00,
00084 0x00,
00085 0x00,
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00086 0x00,
00087 0x00,
00088 0x00,
00089 0x00,
00090 0x00,
00091 0x00,
00092 0x00,
00093 0x00,
00094 0x00,
00095 0x00,
00096 0x00,
00097 0x00,
00098 0x00,
00099 0x00,
00100 /* U+0360 */ 0x0360,
00101 /* U+0361 */ 0x0361,
00102 };
00103
00104 static const unsigned short ucs_table_0483[] = {
00105 /* U+0483 */ 0x0483,
00106 /* U+0484 */ 0x0484,
00107 /* U+0485 */ 0x0485,
00108 /* U+0486 */ 0x0486,
00109 };
00110
00111 static const unsigned short ucs_table_0591[] = {
00112 /* U+0591 */ 0x0591,
00113 /* U+0592 */ 0x0592,
00114 /* U+0593 */ 0x0593,
00115 /* U+0594 */ 0x0594,
00116 /* U+0595 */ 0x0595,
00117 /* U+0596 */ 0x0596,
00118 /* U+0597 */ 0x0597,
00119 /* U+0598 */ 0x0598,
00120 /* U+0599 */ 0x0599,
00121 /* U+059A */ 0x059A,
00122 /* U+059B */ 0x059B,
00123 /* U+059C */ 0x059C,
00124 /* U+059D */ 0x059D,
00125 /* U+059E */ 0x059E,
00126 /* U+059F */ 0x059F,
00127 /* U+05A0 */ 0x05A0,
00128 /* U+05A1 */ 0x05A1,
00129 0x00,
00130 /* U+05A3 */ 0x05A3,
00131 /* U+05A4 */ 0x05A4,
00132 /* U+05A5 */ 0x05A5,
00133 /* U+05A6 */ 0x05A6,
00134 /* U+05A7 */ 0x05A7,
00135 /* U+05A8 */ 0x05A8,
00136 /* U+05A9 */ 0x05A9,
00137 /* U+05AA */ 0x05AA,
00138 /* U+05AB */ 0x05AB,
00139 /* U+05AC */ 0x05AC,
00140 /* U+05AD */ 0x05AD,
00141 /* U+05AE */ 0x05AE,
00142 /* U+05AF */ 0x05AF,
00143 /* U+05B0 */ 0x05B0,
00144 /* U+05B1 */ 0x05B1,
00145 /* U+05B2 */ 0x05B2,
00146 /* U+05B3 */ 0x05B3,
00147 /* U+05B4 */ 0x05B4,
00148 /* U+05B5 */ 0x05B5,
00149 /* U+05B6 */ 0x05B6,
00150 /* U+05B7 */ 0x05B7,
00151 /* U+05B8 */ 0x05B8,
00152 /* U+05B9 */ 0x05B9,
00153 0x00,
00154 /* U+05BB */ 0x05BB,
00155 /* U+05BC */ 0x05BC,
00156 /* U+05BD */ 0x05BD,
00157 0x00,
00158 /* U+05BF */ 0x05BF,
00159 0x00,
00160 /* U+05C1 */ 0x05C1,
00161 /* U+05C2 */ 0x05C2,
00162 0x00,
00163 /* U+05C4 */ 0x05C4,
00164 };
00165
00166 static const unsigned short ucs_table_064B[] = {
00167 /* U+064B */ 0xFE70,
00168 /* U+064C */ 0xFE72,
00169 /* U+064D */ 0xFE74,
00170 /* U+064E */ 0xFE76,
00171 /* U+064F */ 0xFE78,
00172 /* U+0650 */ 0xFE7A,
```

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00173 /* U+0651 */ 0xFE7C,  
00174 /* U+0652 */ 0xFE7E,  
00175 0x00,  
00176 0x00,  
00177 0x00,  
00178 0x00,  
00179 0x00,  
00180 0x00,  
00181 0x00,  
00182 0x00,  
00183 0x00,  
00184 0x00,  
00185 0x00,  
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00191 0x00,  
00192 0x00,  
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00196 0x00,  
00197 0x00,  
00198 0x00,  
00199 0x00,  
00200 0x00,  
00201 0x00,  
00202 0x00,  
00203 0x00,  
00204 /* U+0670 */ 0x0670,  
00205 0x00,  
00206 0x00,  
00207 0x00,  
00208 0x00,  
00209 0x00,  
00210 0x00,  
00211 0x00,  
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00255 0x00,  
00256 0x00,  
00257 0x00,  
00258 0x00,  
00259 0x00,
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00260 0x00,
00261 0x00,
00262 0x00,
00263 0x00,
00264 0x00,
00265 0x00,
00266 0x00,
00267 0x00,
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00297 0x00,
00298 0x00,
00299 0x00,
00300 0x00,
00301 0x00,
00302 0x00,
00303 0x00,
00304 0x00,
00305 0x00,
00306 /* U+06D6 */ 0x06D6,
00307 /* U+06D7 */ 0x06D7,
00308 /* U+06D8 */ 0x06D8,
00309 /* U+06D9 */ 0x06D9,
00310 /* U+06DA */ 0x06DA,
00311 /* U+06DB */ 0x06DB,
00312 /* U+06DC */ 0x06DC,
00313 0x00,
00314 0x00,
00315 /* U+06DF */ 0x06DF,
00316 /* U+06E0 */ 0x06E0,
00317 /* U+06E1 */ 0x06E1,
00318 /* U+06E2 */ 0x06E2,
00319 /* U+06E3 */ 0x06E3,
00320 /* U+06E4 */ 0x06E4,
00321 0x00,
00322 0x00,
00323 /* U+06E7 */ 0x06E7,
00324 /* U+06E8 */ 0x06E8,
00325 0x00,
00326 /* U+06EA */ 0x06EA,
00327 /* U+06EB */ 0x06EB,
00328 /* U+06EC */ 0x06EC,
00329 /* U+06ED */ 0x06ED,
00330 };
00331
00332 static const unsigned short ucs_table_0901[] = {
00333 /* U+0901 */ 0x0901,
00334 /* U+0902 */ 0x0902,
00335 0x00,
00336 0x00,
00337 0x00,
00338 0x00,
00339 0x00,
00340 0x00,
00341 0x00,
00342 0x00,
00343 0x00,
00344 0x00,
00345 0x00,
00346 0x00,
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00347 0x00,
00348 0x00,
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00350 0x00,
00351 0x00,
00352 0x00,
00353 0x00,
00354 0x00,
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00357 0x00,
00358 0x00,
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00364 0x00,
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00385 0x00,
00386 0x00,
00387 0x00,
00388 0x00,
00389 0x00,
00390 0x00,
00391 0x00,
00392 /* U+093C */ 0x093C,
00393 0x00,
00394 0x00,
00395 0x00,
00396 0x00,
00397 /* U+0941 */ 0x0941,
00398 /* U+0942 */ 0x0942,
00399 /* U+0943 */ 0x0943,
00400 /* U+0944 */ 0x0944,
00401 /* U+0945 */ 0x0945,
00402 /* U+0946 */ 0x0946,
00403 /* U+0947 */ 0x0947,
00404 /* U+0948 */ 0x0948,
00405 0x00,
00406 0x00,
00407 0x00,
00408 0x00,
00409 /* U+094D */ 0x094D,
00410 0x00,
00411 0x00,
00412 0x00,
00413 /* U+0951 */ 0x0951,
00414 /* U+0952 */ 0x0952,
00415 /* U+0953 */ 0x0953,
00416 /* U+0954 */ 0x0954,
00417 0x00,
00418 0x00,
00419 0x00,
00420 0x00,
00421 0x00,
00422 0x00,
00423 0x00,
00424 0x00,
00425 0x00,
00426 0x00,
00427 0x00,
00428 0x00,
00429 0x00,
00430 /* U+0962 */ 0x0962,
00431 /* U+0963 */ 0x0963,
00432 0x00,
00433 0x00,
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00434 0x00,
00435 0x00,
00436 0x00,
00437 0x00,
00438 0x00,
00439 0x00,
00440 0x00,
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00454 0x00,
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00456 0x00,
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00458 0x00,
00459 0x00,
00460 0x00,
00461 /* U+0981 */ 0x0981,
00462 0x00,
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00512 0x00,
00513 0x00,
00514 0x00,
00515 0x00,
00516 0x00,
00517 0x00,
00518 0x00,
00519 0x00,
00520 /* U+09BC */ 0x09BC,
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```
00521 0x00,
00522 0x00,
00523 0x00,
00524 0x00,
00525 /* U+09C1 */ 0x09C1,
00526 /* U+09C2 */ 0x09C2,
00527 /* U+09C3 */ 0x09C3,
00528 /* U+09C4 */ 0x09C4,
00529 0x00,
00530 0x00,
00531 0x00,
00532 0x00,
00533 0x00,
00534 0x00,
00535 0x00,
00536 0x00,
00537 /* U+09CD */ 0x09CD,
00538 0x00,
00539 0x00,
00540 0x00,
00541 0x00,
00542 0x00,
00543 0x00,
00544 0x00,
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00550 0x00,
00551 0x00,
00552 0x00,
00553 0x00,
00554 0x00,
00555 0x00,
00556 0x00,
00557 0x00,
00558 /* U+09E2 */ 0x09E2,
00559 /* U+09E3 */ 0x09E3,
00560 0x00,
00561 0x00,
00562 0x00,
00563 0x00,
00564 0x00,
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00583 0x00,
00584 0x00,
00585 0x00,
00586 0x00,
00587 0x00,
00588 0x00,
00589 0x00,
00590 /* U+0A02 */ 0x0A02,
00591 0x00,
00592 0x00,
00593 0x00,
00594 0x00,
00595 0x00,
00596 0x00,
00597 0x00,
00598 0x00,
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00606 0x00,
00607 0x00,
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00612 0x00,
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00640 0x00,
00641 0x00,
00642 0x00,
00643 0x00,
00644 0x00,
00645 0x00,
00646 0x00,
00647 0x00,
00648 /* U+0A3C */ 0x0A3C,
00649 0x00,
00650 0x00,
00651 0x00,
00652 0x00,
00653 /* U+0A41 */ 0x0A41,
00654 /* U+0A42 */ 0x0A42,
00655 0x00,
00656 0x00,
00657 0x00,
00658 0x00,
00659 /* U+0A47 */ 0x0A47,
00660 /* U+0A48 */ 0x0A48,
00661 0x00,
00662 0x00,
00663 /* U+0A4B */ 0x0A4B,
00664 /* U+0A4C */ 0x0A4C,
00665 /* U+0A4D */ 0x0A4D,
00666 0x00,
00667 0x00,
00668 0x00,
00669 0x00,
00670 0x00,
00671 0x00,
00672 0x00,
00673 0x00,
00674 0x00,
00675 0x00,
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00687 0x00,
00688 0x00,
00689 0x00,
00690 0x00,
00691 0x00,
00692 0x00,
00693 0x00,
00694 0x00,
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00695 0x00,
00696 0x00,
00697 0x00,
00698 0x00,
00699 0x00,
00700 /* U+0A70 */ 0x0A70,
00701 /* U+0A71 */ 0x0A71,
00702 0x00,
00703 0x00,
00704 0x00,
00705 0x00,
00706 0x00,
00707 0x00,
00708 0x00,
00709 0x00,
00710 0x00,
00711 0x00,
00712 0x00,
00713 0x00,
00714 0x00,
00715 0x00,
00716 0x00,
00717 /* U+0A81 */ 0x0A81,
00718 /* U+0A82 */ 0x0A82,
00719 0x00,
00720 0x00,
00721 0x00,
00722 0x00,
00723 0x00,
00724 0x00,
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00769 0x00,
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00772 0x00,
00773 0x00,
00774 0x00,
00775 0x00,
00776 /* U+0ABC */ 0x0ABC,
00777 0x00,
00778 0x00,
00779 0x00,
00780 0x00,
00781 /* U+0AC1 */ 0x0AC1,
```



```
00782 /* U+0AC2 */ 0x0AC2,
00783 /* U+0AC3 */ 0x0AC3,
00784 /* U+0AC4 */ 0x0AC4,
00785 /* U+0AC5 */ 0x0AC5,
00786 0x00,
00787 /* U+0AC7 */ 0x0AC7,
00788 /* U+0AC8 */ 0x0AC8,
00789 0x00,
00790 0x00,
00791 0x00,
00792 0x00,
00793 /* U+0ACD */ 0x0ACD,
00794 0x00,
00795 0x00,
00796 0x00,
00797 0x00,
00798 0x00,
00799 0x00,
00800 0x00,
00801 0x00,
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00838 0x00,
00839 0x00,
00840 0x00,
00841 0x00,
00842 0x00,
00843 0x00,
00844 0x00,
00845 /* U+0B01 */ 0x0B01,
00846 0x00,
00847 0x00,
00848 0x00,
00849 0x00,
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00851 0x00,
00852 0x00,
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00868 0x00,
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00901 0x00,
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00903 0x00,
00904 /* U+0B3C */ 0x0B3C,
00905 0x00,
00906 0x00,
00907 /* U+0B3F */ 0x0B3F,
00908 0x00,
00909 /* U+0B41 */ 0x0B41,
00910 /* U+0B42 */ 0x0B42,
00911 /* U+0B43 */ 0x0B43,
00912 0x00,
00913 0x00,
00914 0x00,
00915 0x00,
00916 0x00,
00917 0x00,
00918 0x00,
00919 0x00,
00920 0x00,
00921 /* U+0B4D */ 0x0B4D,
00922 0x00,
00923 0x00,
00924 0x00,
00925 0x00,
00926 0x00,
00927 0x00,
00928 0x00,
00929 0x00,
00930 /* U+0B56 */ 0x0B56,
00931 0x00,
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00933 0x00,
00934 0x00,
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00936 0x00,
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00971 0x00,
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00973 0x00,
00974 /* U+0B82 */ 0x0B82,
00975 0x00,
00976 0x00,
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01031 0x00,
01032 0x00,
01033 0x00,
01034 0x00,
01035 0x00,
01036 /* U+0BC0 */ 0x0BC0,
01037 0x00,
01038 0x00,
01039 0x00,
01040 0x00,
01041 0x00,
01042 0x00,
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01047 0x00,  
01048 0x00,  
01049 /* U+0BCD */ 0x0BCD,  
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01155 0x00,
01156 0x00,
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01158 0x00,
01159 0x00,
01160 0x00,
01161 0x00,
01162 /* U+0C3E */ 0x0C3E,
01163 /* U+0C3F */ 0x0C3F,
01164 /* U+0C40 */ 0x0C40,
01165 0x00,
01166 0x00,
01167 0x00,
01168 0x00,
01169 0x00,
01170 /* U+0C46 */ 0x0C46,
01171 /* U+0C47 */ 0x0C47,
01172 /* U+0C48 */ 0x0C48,
01173 0x00,
01174 /* U+0C4A */ 0x0C4A,
01175 /* U+0C4B */ 0x0C4B,
01176 /* U+0C4C */ 0x0C4C,
01177 /* U+0C4D */ 0x0C4D,
01178 0x00,
01179 0x00,
01180 0x00,
01181 0x00,
01182 0x00,
01183 0x00,
01184 0x00,
01185 /* U+0C55 */ 0x0C55,
01186 /* U+0C56 */ 0x0C56,
01187 0x00,
01188 0x00,
01189 0x00,
01190 0x00,
01191 0x00,
01192 0x00,
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01284 0x00,
01285 0x00,
01286 0x00,
01287 0x00,
01288 0x00,
01289 0x00,
01290 0x00,
01291 /* U+0CBF */ 0x0CBF,
01292 0x00,
01293 0x00,
01294 0x00,
01295 0x00,
01296 0x00,
01297 0x00,
01298 /* U+0CC6 */ 0x0CC6,
01299 0x00,
01300 0x00,
01301 0x00,
01302 0x00,
01303 0x00,
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01304 /* U+0CCC */ 0x0CCC,  
01305 /* U+0CCD */ 0x0CCD,  
01306 0x00,  
01307 0x00,  
01308 0x00,  
01309 0x00,  
01310 0x00,  
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01413 0x00,
01414 0x00,
01415 0x00,
01416 0x00,
01417 0x00,
01418 0x00,
01419 0x00,
01420 0x00,
01421 /* U+0D41 */ 0x0D41,
01422 /* U+0D42 */ 0x0D42,
01423 /* U+0D43 */ 0x0D43,
01424 0x00,
01425 0x00,
01426 0x00,
01427 0x00,
01428 0x00,
01429 0x00,
01430 0x00,
01431 0x00,
01432 0x00,
01433 /* U+0D4D */ 0x0D4D,
01434 };
01435
01436 static const unsigned short ucs_table_0E31[] = {
01437 /* U+0E31 */ 0x0E31,
01438 0x00,
01439 0x00,
01440 /* U+0E34 */ 0x0E34,
01441 /* U+0E35 */ 0x0E35,
01442 /* U+0E36 */ 0x0E36,
01443 /* U+0E37 */ 0x0E37,
01444 /* U+0E38 */ 0x0E38,
01445 /* U+0E39 */ 0x0E39,
01446 /* U+0E3A */ 0x0E3A,
01447 0x00,
01448 0x00,
01449 0x00,
01450 0x00,
01451 0x00,
01452 0x00,
01453 0x00,
01454 0x00,
01455 0x00,
01456 0x00,
01457 0x00,
01458 0x00,
01459 /* U+0E47 */ 0x0E47,
01460 /* U+0E48 */ 0x0E48,
01461 /* U+0E49 */ 0x0E49,
01462 /* U+0E4A */ 0x0E4A,
01463 /* U+0E4B */ 0x0E4B,
01464 /* U+0E4C */ 0x0E4C,
01465 /* U+0E4D */ 0x0E4D,
01466 /* U+0E4E */ 0x0E4E,
01467 0x00,
01468 0x00,
01469 0x00,
01470 0x00,
01471 0x00,
01472 0x00,
01473 0x00,
01474 0x00,
01475 0x00,
01476 0x00,
01477 0x00,
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01559 0x00,  
01560 0x00,  
01561 0x00,  
01562 0x00,  
01563 0x00,  
01564 0x00,
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01565 /* U+0EB1 */ 0x0EB1,
01566 0x00,
01567 0x00,
01568 /* U+0EB4 */ 0x0EB4,
01569 /* U+0EB5 */ 0x0EB5,
01570 /* U+0EB6 */ 0x0EB6,
01571 /* U+0EB7 */ 0x0EB7,
01572 /* U+0EB8 */ 0x0EB8,
01573 /* U+0EB9 */ 0x0EB9,
01574 0x00,
01575 /* U+0EBB */ 0x0EBB,
01576 /* U+0EBC */ 0x0EBC,
01577 0x00,
01578 0x00,
01579 0x00,
01580 0x00,
01581 0x00,
01582 0x00,
01583 0x00,
01584 0x00,
01585 0x00,
01586 0x00,
01587 0x00,
01588 /* U+0EC8 */ 0x0EC8,
01589 /* U+0EC9 */ 0x0EC9,
01590 /* U+0ECA */ 0x0ECA,
01591 /* U+0ECB */ 0x0ECB,
01592 /* U+0ECC */ 0x0ECC,
01593 /* U+0ECD */ 0x0ECD,
01594 0x00,
01595 0x00,
01596 0x00,
01597 0x00,
01598 0x00,
01599 0x00,
01600 0x00,
01601 0x00,
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01663 0x00,
01664 0x00,
01665 0x00,
01666 0x00,
01667 0x00,
01668 /* U+0F18 */ 0x0F18,
01669 /* U+0F19 */ 0x0F19,
01670 0x00,
01671 0x00,
01672 0x00,
01673 0x00,
01674 0x00,
01675 0x00,
01676 0x00,
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01690 0x00,
01691 0x00,
01692 0x00,
01693 0x00,
01694 0x00,
01695 0x00,
01696 0x00,
01697 /* U+0F35 */ 0x0F35,
01698 0x00,
01699 /* U+0F37 */ 0x0F37,
01700 0x00,
01701 /* U+0F39 */ 0x0F39,
01702 0x00,
01703 0x00,
01704 0x00,
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01750 0x00,
01751 0x00,
01752 0x00,
01753 0x00,
01754 0x00,
01755 0x00,
01756 0x00,
01757 /* U+0F71 */ 0x0F71,
01758 /* U+0F72 */ 0x0F72,
01759 /* U+0F73 */ 0x0F73,
01760 /* U+0F74 */ 0x0F74,
01761 /* U+0F75 */ 0x0F75,
01762 /* U+0F76 */ 0x0F76,
01763 /* U+0F77 */ 0x0F77,
01764 /* U+0F78 */ 0x0F78,
01765 /* U+0F79 */ 0x0F79,
01766 /* U+0F7A */ 0x0F7A,
01767 /* U+0F7B */ 0x0F7B,
01768 /* U+0F7C */ 0x0F7C,
01769 /* U+0F7D */ 0x0F7D,
01770 /* U+0F7E */ 0x0F7E,
01771 0x00,
01772 /* U+0F80 */ 0x0F80,
01773 /* U+0F81 */ 0x0F81,
01774 /* U+0F82 */ 0x0F82,
01775 /* U+0F83 */ 0x0F83,
01776 /* U+0F84 */ 0x0F84,
01777 0x00,
01778 /* U+0F86 */ 0x0F86,
01779 /* U+0F87 */ 0x0F87,
01780 0x00,
01781 0x00,
01782 0x00,
01783 0x00,
01784 0x00,
01785 0x00,
01786 0x00,
01787 0x00,
01788 /* U+0F90 */ 0x0F90,
01789 /* U+0F91 */ 0x0F91,
01790 /* U+0F92 */ 0x0F92,
01791 /* U+0F93 */ 0x0F93,
01792 /* U+0F94 */ 0x0F94,
01793 /* U+0F95 */ 0x0F95,
01794 0x00,
01795 /* U+0F97 */ 0x0F97,
01796 0x00,
01797 /* U+0F99 */ 0x0F99,
01798 /* U+0F9A */ 0x0F9A,
01799 /* U+0F9B */ 0x0F9B,
01800 /* U+0F9C */ 0x0F9C,
01801 /* U+0F9D */ 0x0F9D,
01802 /* U+0F9E */ 0x0F9E,
01803 /* U+0F9F */ 0x0F9F,
01804 /* U+0FA0 */ 0x0FA0,
01805 /* U+0FA1 */ 0x0FA1,
01806 /* U+0FA2 */ 0x0FA2,
01807 /* U+0FA3 */ 0x0FA3,
01808 /* U+0FA4 */ 0x0FA4,
01809 /* U+0FA5 */ 0x0FA5,
01810 /* U+0FA6 */ 0x0FA6,
01811 /* U+0FA7 */ 0x0FA7,
01812 /* U+0FA8 */ 0x0FA8,
01813 /* U+0FA9 */ 0x0FA9,
01814 /* U+0FAA */ 0x0FAA,
01815 /* U+0FAB */ 0x0FAB,
01816 /* U+0FAC */ 0x0FAC,
01817 /* U+0FAD */ 0x0FAD,
01818 0x00,
01819 0x00,
01820 0x00,
01821 /* U+0FB1 */ 0x0FB1,
01822 /* U+0FB2 */ 0x0FB2,
01823 /* U+0FB3 */ 0x0FB3,
01824 /* U+0FB4 */ 0x0FB4,
01825 /* U+0FB5 */ 0x0FB5,
```

```
01826 /* U+0FB6 */ 0x0FB6,
01827 /* U+0FB7 */ 0x0FB7,
01828 0x00,
01829 /* U+0FB9 */ 0x0FB9,
01830 };
01831
01832 static const unsigned short ucs_table_20D0[] = {
01833 /* U+20D0 */ 0x20D0,
01834 /* U+20D1 */ 0x20D1,
01835 /* U+20D2 */ 0x20D2,
01836 /* U+20D3 */ 0x20D3,
01837 /* U+20D4 */ 0x20D4,
01838 /* U+20D5 */ 0x20D5,
01839 /* U+20D6 */ 0x20D6,
01840 /* U+20D7 */ 0x20D7,
01841 /* U+20D8 */ 0x20D8,
01842 /* U+20D9 */ 0x20D9,
01843 /* U+20DA */ 0x20DA,
01844 /* U+20DB */ 0x20DB,
01845 /* U+20DC */ 0x20DC,
01846 0x00,
01847 0x00,
01848 0x00,
01849 0x00,
01850 /* U+20E1 */ 0x20E1,
01851 };
01852
01853 static const unsigned short ucs_table_302A[] = {
01854 /* U+302A */ 0x302A,
01855 /* U+302B */ 0x302B,
01856 /* U+302C */ 0x302C,
01857 /* U+302D */ 0x302D,
01858 /* U+302E */ 0x302E,
01859 /* U+302F */ 0x302F,
01860 0x00,
01861 0x00,
01862 0x00,
01863 0x00,
01864 0x00,
01865 0x00,
01866 0x00,
01867 0x00,
01868 0x00,
01869 0x00,
01870 0x00,
01871 0x00,
01872 0x00,
01873 0x00,
01874 0x00,
01875 0x00,
01876 0x00,
01877 0x00,
01878 0x00,
01879 0x00,
01880 0x00,
01881 0x00,
01882 0x00,
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01887 0x00,
01888 0x00,
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01890 0x00,
01891 0x00,
01892 0x00,
01893 0x00,
01894 0x00,
01895 0x00,
01896 0x00,
01897 0x00,
01898 0x00,
01899 0x00,
01900 0x00,
01901 0x00,
01902 0x00,
01903 0x00,
01904 0x00,
01905 0x00,
01906 0x00,
01907 0x00,
01908 0x00,
01909 0x00,
01910 0x00,
01911 0x00,
01912 0x00,
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01913 0x00,
01914 0x00,
01915 0x00,
01916 0x00,
01917 0x00,
01918 0x00,
01919 0x00,
01920 0x00,
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01951 0x00,
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01957 0x00,
01958 0x00,
01959 0x00,
01960 0x00,
01961 0x00,
01962 0x00,
01963 0x00,
01964 0x00,
01965 /* U+3099 */ 0x309B,
01966 /* U+309A */ 0x309C,
01967 };
01968
01969 static const unsigned short ucs_table_FB1E[] = {
01970 /* U+FB1E */ 0xFB1E,
01971 };
01972
01973 static const unsigned short ucs_table_FE20[] = {
01974 /* U+FE20 */ 0xFE20,
01975 /* U+FE21 */ 0xFE21,
01976 /* U+FE22 */ 0xFE22,
01977 /* U+FE23 */ 0xFE23,
01978 };
```

13.256 symbol.h

```
00001 /* symbol */
00002
00003 static const char unicode_to_symbol_1b_0020[] = {
00004 /* U+0020 */ 0x20,
00005 /* U+0021 */ 0x21,
00006 0x00,
00007 /* U+0023 */ 0x23,
00008 0x00,
00009 /* U+0025 */ 0x25,
00010 /* U+0026 */ 0x26,
00011 0x00,
00012 /* U+0028 */ 0x28,
00013 /* U+0029 */ 0x29,
00014 0x00,
00015 /* U+002B */ 0x2B,
00016 /* U+002C */ 0x2C,
```

```
00017 0x00,
00018 /* U+002E */ 0x2E,
00019 /* U+002F */ 0x2F,
00020 /* U+0030 */ 0x30,
00021 /* U+0031 */ 0x31,
00022 /* U+0032 */ 0x32,
00023 /* U+0033 */ 0x33,
00024 /* U+0034 */ 0x34,
00025 /* U+0035 */ 0x35,
00026 /* U+0036 */ 0x36,
00027 /* U+0037 */ 0x37,
00028 /* U+0038 */ 0x38,
00029 /* U+0039 */ 0x39,
00030 /* U+003A */ 0x3A,
00031 /* U+003B */ 0x3B,
00032 /* U+003C */ 0x3C,
00033 /* U+003D */ 0x3D,
00034 /* U+003E */ 0x3E,
00035 /* U+003F */ 0x3F,
00036 0x00,
00037 0x00,
00038 0x00,
00039 0x00,
00040 0x00,
00041 0x00,
00042 0x00,
00043 0x00,
00044 0x00,
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00053 0x00,
00054 0x00,
00055 0x00,
00056 0x00,
00057 0x00,
00058 0x00,
00059 0x00,
00060 0x00,
00061 0x00,
00062 0x00,
00063 /* U+005B */ 0x5B,
00064 0x00,
00065 /* U+005D */ 0x5D,
00066 0x00,
00067 /* U+005F */ 0x5F,
00068 0x00,
00069 0x00,
00070 0x00,
00071 0x00,
00072 0x00,
00073 0x00,
00074 0x00,
00075 0x00,
00076 0x00,
00077 0x00,
00078 0x00,
00079 0x00,
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00081 0x00,
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00084 0x00,
00085 0x00,
00086 0x00,
00087 0x00,
00088 0x00,
00089 0x00,
00090 0x00,
00091 0x00,
00092 0x00,
00093 0x00,
00094 0x00,
00095 /* U+007B */ 0x7B,
00096 /* U+007C */ 0x7C,
00097 /* U+007D */ 0x7D,
00098 0x00,
00099 0x00,
00100 0x00,
00101 0x00,
00102 0x00,
00103 0x00,
```

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00104 0x00,
00105 0x00,
00106 0x00,
00107 0x00,
00108 0x00,
00109 0x00,
00110 0x00,
00111 0x00,
00112 0x00,
00113 0x00,
00114 0x00,
00115 0x00,
00116 0x00,
00117 0x00,
00118 0x00,
00119 0x00,
00120 0x00,
00121 0x00,
00122 0x00,
00123 0x00,
00124 0x00,
00125 0x00,
00126 0x00,
00127 0x00,
00128 0x00,
00129 0x00,
00130 0x00,
00131 0x00,
00132 /* U+00A0 */ 0x20,
00133 0x00,
00134 0x00,
00135 0x00,
00136 0x00,
00137 0x00,
00138 0x00,
00139 0x00,
00140 0x00,
00141 0x00,
00142 0x00,
00143 0x00,
00144 /* U+00AC */ (char) 0xD8,
00145 0x00,
00146 0x00,
00147 0x00,
00148 /* U+00B0 */ (char) 0xB0,
00149 /* U+00B1 */ (char) 0xB1,
00150 0x00,
00151 0x00,
00152 0x00,
00153 /* U+00B5 */ 0x6D,
00154 0x00,
00155 0x00,
00156 0x00,
00157 0x00,
00158 0x00,
00159 0x00,
00160 0x00,
00161 0x00,
00162 0x00,
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00179 0x00,
00180 0x00,
00181 0x00,
00182 0x00,
00183 0x00,
00184 0x00,
00185 0x00,
00186 0x00,
00187 /* U+00D7 */ (char) 0xB4,
00188 0x00,
00189 0x00,
00190 0x00,
```



```
00191 0x00,
00192 0x00,
00193 0x00,
00194 0x00,
00195 0x00,
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00199 0x00,
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00202 0x00,
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00209 0x00,
00210 0x00,
00211 0x00,
00212 0x00,
00213 0x00,
00214 0x00,
00215 0x00,
00216 0x00,
00217 0x00,
00218 0x00,
00219 /* U+00F7 */ (char)0xB8,
00220 };
00221
00222 static const char unicode_to_symbol_lb_0192[] = {
00223 /* U+0192 */ (char)0xA6,
00224 };
00225
00226 static const char unicode_to_symbol_lb_0391[] = {
00227 /* U+0391 */ 0x41,
00228 /* U+0392 */ 0x42,
00229 /* U+0393 */ 0x47,
00230 /* U+0394 */ 0x44,
00231 /* U+0395 */ 0x45,
00232 /* U+0396 */ 0x5A,
00233 /* U+0397 */ 0x48,
00234 /* U+0398 */ 0x51,
00235 /* U+0399 */ 0x49,
00236 /* U+039A */ 0x4B,
00237 /* U+039B */ 0x4C,
00238 /* U+039C */ 0x4D,
00239 /* U+039D */ 0x4E,
00240 /* U+039E */ 0x58,
00241 /* U+039F */ 0x4F,
00242 /* U+03A0 */ 0x50,
00243 /* U+03A1 */ 0x52,
00244 0x00,
00245 /* U+03A3 */ 0x53,
00246 /* U+03A4 */ 0x54,
00247 /* U+03A5 */ 0x55,
00248 /* U+03A6 */ 0x46,
00249 /* U+03A7 */ 0x43,
00250 /* U+03A8 */ 0x59,
00251 /* U+03A9 */ 0x57,
00252 0x00,
00253 0x00,
00254 0x00,
00255 0x00,
00256 0x00,
00257 0x00,
00258 0x00,
00259 /* U+03B1 */ 0x61,
00260 /* U+03B2 */ 0x62,
00261 /* U+03B3 */ 0x67,
00262 /* U+03B4 */ 0x64,
00263 /* U+03B5 */ 0x65,
00264 /* U+03B6 */ 0x7A,
00265 /* U+03B7 */ 0x68,
00266 /* U+03B8 */ 0x71,
00267 /* U+03B9 */ 0x69,
00268 /* U+03BA */ 0x6B,
00269 /* U+03BB */ 0x6C,
00270 /* U+03BC */ 0x6D,
00271 /* U+03BD */ 0x6E,
00272 /* U+03BE */ 0x78,
00273 /* U+03BF */ 0x6F,
00274 /* U+03C0 */ 0x70,
00275 /* U+03C1 */ 0x72,
00276 /* U+03C2 */ 0x56,
00277 /* U+03C3 */ 0x73,
```

```
00278 /* U+03C4 */ 0x74,
00279 /* U+03C5 */ 0x75,
00280 /* U+03C6 */ 0x66,
00281 /* U+03C7 */ 0x63,
00282 /* U+03C8 */ 0x79,
00283 /* U+03C9 */ 0x77,
00284 0x00,
00285 0x00,
00286 0x00,
00287 0x00,
00288 0x00,
00289 0x00,
00290 0x00,
00291 /* U+03D1 */ 0x4A,
00292 /* U+03D2 */ (char)0xA1,
00293 0x00,
00294 0x00,
00295 /* U+03D5 */ 0x6A,
00296 /* U+03D6 */ 0x76,
00297 };
00298
00299 static const char unicode_to_symbol_lb_2022[] = {
00300 /* U+2022 */ (char)0xB7,
00301 0x00,
00302 0x00,
00303 0x00,
00304 /* U+2026 */ (char)0xBC,
00305 0x00,
00306 0x00,
00307 0x00,
00308 0x00,
00309 0x00,
00310 0x00,
00311 0x00,
00312 0x00,
00313 0x00,
00314 0x00,
00315 0x00,
00316 /* U+2032 */ (char)0xA2,
00317 /* U+2033 */ (char)0xB2,
00318 0x00,
00319 0x00,
00320 0x00,
00321 0x00,
00322 0x00,
00323 0x00,
00324 0x00,
00325 0x00,
00326 0x00,
00327 0x00,
00328 0x00,
00329 0x00,
00330 0x00,
00331 0x00,
00332 0x00,
00333 0x00,
00334 /* U+2044 */ (char)0xA4,
00335 0x00,
00336 0x00,
00337 0x00,
00338 0x00,
00339 0x00,
00340 0x00,
00341 0x00,
00342 0x00,
00343 0x00,
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00380 0x00,
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00431 0x00,
00432 0x00,
00433 0x00,
00434 0x00,
00435 0x00,
00436 0x00,
00437 0x00,
00438 /* U+20AC */ (char)0xA0,
00439 0x00,
00440 0x00,
00441 0x00,
00442 0x00,
00443 0x00,
00444 0x00,
00445 0x00,
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00537 0x00,
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00539 /* U+2111 */ (char)0xC1,
00540 0x00,
00541 0x00,
00542 0x00,
00543 0x00,
00544 0x00,
00545 0x00,
00546 /* U+2118 */ (char)0xC3,
00547 0x00,
00548 0x00,
00549 0x00,
00550 /* U+211C */ (char)0xC2,
00551 0x00,
00552 0x00,
00553 0x00,
00554 0x00,
00555 0x00,
00556 0x00,
00557 0x00,
00558 0x00,
00559 0x00,
00560 /* U+2126 */ 0x57,
00561 0x00,
00562 0x00,
00563 0x00,
00564 0x00,
00565 0x00,
00566 0x00,
00567 0x00,
00568 0x00,
00569 0x00,
00570 0x00,
00571 0x00,
00572 0x00,
00573 0x00,
00574 0x00,
00575 /* U+2135 */ (char)0xC0,
00576 0x00,
00577 0x00,
00578 0x00,
00579 0x00,
00580 0x00,
00581 0x00,
00582 0x00,
00583 0x00,
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00649 0x00,
00650 0x00,
00651 0x00,
00652 0x00,
00653 0x00,
00654 0x00,
00655 0x00,
00656 0x00,
00657 0x00,
00658 0x00,
00659 0x00,
00660 0x00,
00661 0x00,
00662 0x00,
00663 0x00,
00664 0x00,
00665 0x00,
00666 /* U+2190 */ (char) 0xAC,
00667 /* U+2191 */ (char) 0xAD,
00668 /* U+2192 */ (char) 0xAE,
00669 /* U+2193 */ (char) 0xAF,
00670 /* U+2194 */ (char) 0xAB,
00671 0x00,
00672 0x00,
00673 0x00,
00674 0x00,
00675 0x00,
00676 0x00,
00677 0x00,
00678 0x00,
00679 0x00,
00680 0x00,
00681 0x00,
00682 0x00,
00683 0x00,
00684 0x00,
00685 0x00,
00686 0x00,
00687 0x00,
00688 0x00,
00689 0x00,
00690 0x00,
00691 0x00,
00692 0x00,
00693 0x00,
00694 0x00,
00695 0x00,
00696 0x00,
00697 0x00,
00698 0x00,
00699 0x00,
00700 0x00,
00701 0x00,
00702 0x00,
00703 /* U+21B5 */ (char) 0xBF,
00704 0x00,
00705 0x00,
00706 0x00,
00707 0x00,
00708 0x00,
00709 0x00,
00710 0x00,
00711 0x00,
00712 0x00,
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00713 0x00,
00714 0x00,
00715 0x00,
00716 0x00,
00717 0x00,
00718 0x00,
00719 0x00,
00720 0x00,
00721 0x00,
00722 0x00,
00723 0x00,
00724 0x00,
00725 0x00,
00726 0x00,
00727 0x00,
00728 0x00,
00729 0x00,
00730 /* U+21D0 */ (char)0xDC,
00731 /* U+21D1 */ (char)0xDD,
00732 /* U+21D2 */ (char)0xDE,
00733 /* U+21D3 */ (char)0xDF,
00734 /* U+21D4 */ (char)0xDB,
00735 0x00,
00736 0x00,
00737 0x00,
00738 0x00,
00739 0x00,
00740 0x00,
00741 0x00,
00742 0x00,
00743 0x00,
00744 0x00,
00745 0x00,
00746 0x00,
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00750 0x00,
00751 0x00,
00752 0x00,
00753 0x00,
00754 0x00,
00755 0x00,
00756 0x00,
00757 0x00,
00758 0x00,
00759 0x00,
00760 0x00,
00761 0x00,
00762 0x00,
00763 0x00,
00764 0x00,
00765 0x00,
00766 0x00,
00767 0x00,
00768 0x00,
00769 0x00,
00770 0x00,
00771 0x00,
00772 0x00,
00773 0x00,
00774 0x00,
00775 0x00,
00776 0x00,
00777 0x00,
00778 /* U+2200 */ 0x22,
00779 0x00,
00780 /* U+2202 */ (char)0xB6,
00781 /* U+2203 */ 0x24,
00782 0x00,
00783 /* U+2205 */ (char)0xC6,
00784 /* U+2206 */ 0x44,
00785 /* U+2207 */ (char)0xD1,
00786 /* U+2208 */ (char)0xCE,
00787 /* U+2209 */ (char)0xCF,
00788 0x00,
00789 /* U+220B */ 0x27,
00790 0x00,
00791 0x00,
00792 0x00,
00793 /* U+220F */ (char)0xD5,
00794 0x00,
00795 /* U+2211 */ (char)0xE5,
00796 /* U+2212 */ 0x2D,
00797 0x00,
00798 0x00,
00799 /* U+2215 */ (char)0xA4,
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00800 0x00,
00801 /* U+2217 */ 0x2A,
00802 0x00,
00803 0x00,
00804 /* U+221A */ (char) 0xD6,
00805 0x00,
00806 0x00,
00807 /* U+221D */ (char) 0xB5,
00808 /* U+221E */ (char) 0xA5,
00809 0x00,
00810 /* U+2220 */ (char) 0xD0,
00811 0x00,
00812 0x00,
00813 0x00,
00814 0x00,
00815 0x00,
00816 0x00,
00817 /* U+2227 */ (char) 0xD9,
00818 /* U+2228 */ (char) 0xDA,
00819 /* U+2229 */ (char) 0xC7,
00820 /* U+222A */ (char) 0xC8,
00821 /* U+222B */ (char) 0xF2,
00822 0x00,
00823 0x00,
00824 0x00,
00825 0x00,
00826 0x00,
00827 0x00,
00828 0x00,
00829 0x00,
00830 /* U+2234 */ 0x5C,
00831 0x00,
00832 0x00,
00833 0x00,
00834 0x00,
00835 0x00,
00836 0x00,
00837 0x00,
00838 /* U+223C */ 0x7E,
00839 0x00,
00840 0x00,
00841 0x00,
00842 0x00,
00843 0x00,
00844 0x00,
00845 0x00,
00846 0x00,
00847 /* U+2245 */ 0x40,
00848 0x00,
00849 0x00,
00850 /* U+2248 */ (char) 0xBB,
00851 0x00,
00852 0x00,
00853 0x00,
00854 0x00,
00855 0x00,
00856 0x00,
00857 0x00,
00858 0x00,
00859 0x00,
00860 0x00,
00861 0x00,
00862 0x00,
00863 0x00,
00864 0x00,
00865 0x00,
00866 0x00,
00867 0x00,
00868 0x00,
00869 0x00,
00870 0x00,
00871 0x00,
00872 0x00,
00873 0x00,
00874 /* U+2260 */ (char) 0xB9,
00875 /* U+2261 */ (char) 0xBA,
00876 0x00,
00877 0x00,
00878 /* U+2264 */ (char) 0xA3,
00879 /* U+2265 */ (char) 0xB3,
00880 0x00,
00881 0x00,
00882 0x00,
00883 0x00,
00884 0x00,
00885 0x00,
00886 0x00,
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00887 0x00,
00888 0x00,
00889 0x00,
00890 0x00,
00891 0x00,
00892 0x00,
00893 0x00,
00894 0x00,
00895 0x00,
00896 0x00,
00897 0x00,
00898 0x00,
00899 0x00,
00900 0x00,
00901 0x00,
00902 0x00,
00903 0x00,
00904 0x00,
00905 0x00,
00906 0x00,
00907 0x00,
00908 /* U+2282 */ (char) 0xCC,
00909 /* U+2283 */ (char) 0xC9,
00910 /* U+2284 */ (char) 0xCB,
00911 0x00,
00912 /* U+2286 */ (char) 0xCD,
00913 /* U+2287 */ (char) 0xCA,
00914 0x00,
00915 0x00,
00916 0x00,
00917 0x00,
00918 0x00,
00919 0x00,
00920 0x00,
00921 0x00,
00922 0x00,
00923 0x00,
00924 0x00,
00925 0x00,
00926 0x00,
00927 /* U+2295 */ (char) 0xC5,
00928 0x00,
00929 /* U+2297 */ (char) 0xC4,
00930 0x00,
00931 0x00,
00932 0x00,
00933 0x00,
00934 0x00,
00935 0x00,
00936 0x00,
00937 0x00,
00938 0x00,
00939 0x00,
00940 0x00,
00941 0x00,
00942 0x00,
00943 /* U+22A5 */ 0x5E,
00944 0x00,
00945 0x00,
00946 0x00,
00947 0x00,
00948 0x00,
00949 0x00,
00950 0x00,
00951 0x00,
00952 0x00,
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00956 0x00,
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00959 0x00,
00960 0x00,
00961 0x00,
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00963 0x00,
00964 0x00,
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00966 0x00,
00967 0x00,
00968 0x00,
00969 0x00,
00970 0x00,
00971 0x00,
00972 0x00,
00973 0x00,
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00974 0x00,  
00975 /* U+22C5 */ (char) 0xD7,  
00976 0x00,  
00977 0x00,  
00978 0x00,  
00979 0x00,  
00980 0x00,  
00981 0x00,  
00982 0x00,  
00983 0x00,  
00984 0x00,  
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00989 0x00,  
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01008 0x00,  
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01011 0x00,  
01012 0x00,  
01013 0x00,  
01014 0x00,  
01015 0x00,  
01016 0x00,  
01017 0x00,  
01018 0x00,  
01019 0x00,  
01020 0x00,  
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01036 0x00,  
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01038 0x00,  
01039 0x00,  
01040 0x00,  
01041 0x00,  
01042 0x00,  
01043 0x00,  
01044 0x00,  
01045 0x00,  
01046 0x00,  
01047 0x00,  
01048 0x00,  
01049 0x00,  
01050 0x00,  
01051 0x00,  
01052 0x00,  
01053 0x00,  
01054 0x00,  
01055 0x00,  
01056 0x00,  
01057 0x00,  
01058 0x00,  
01059 0x00,  
01060 0x00,
```

```

01061 0x00,
01062 0x00,
01063 0x00,
01064 0x00,
01065 0x00,
01066 /* U+2320 */ (char)0xF3,
01067 /* U+2321 */ (char)0xF5,
01068 0x00,
01069 0x00,
01070 0x00,
01071 0x00,
01072 0x00,
01073 0x00,
01074 0x00,
01075 /* U+2329 */ (char)0xE1,
01076 /* U+232A */ (char)0xF1,
01077 };
01078
01079 static const char unicode_to_symbol_lb_25CA[] = {
01080 /* U+25CA */ (char)0xE0,
01081 };
01082
01083 static const char unicode_to_symbol_lb_2660[] = {
01084 /* U+2660 */ (char)0xAA,
01085 0x00,
01086 0x00,
01087 /* U+2663 */ (char)0xA7,
01088 0x00,
01089 /* U+2665 */ (char)0xA9,
01090 /* U+2666 */ (char)0xA8,
01091 };
01092
01093 static const char unicode_to_symbol_lb_F6D9[] = {
01094 /* U+F6D9 */ (char)0xD3,
01095 /* U+F6DA */ (char)0xD2,
01096 /* U+F6DB */ (char)0xD4,
01097 };
01098
01099 static const char unicode_to_symbol_lb_F8E5[] = {
01100 /* U+F8E5 */ 0x60,
01101 /* U+F8E6 */ (char)0xBD,
01102 /* U+F8E7 */ (char)0xBE,
01103 /* U+F8E8 */ (char)0xE2,
01104 /* U+F8E9 */ (char)0xE3,
01105 /* U+F8EA */ (char)0xE4,
01106 /* U+F8EB */ (char)0xE6,
01107 /* U+F8EC */ (char)0xE7,
01108 /* U+F8ED */ (char)0xE8,
01109 /* U+F8EE */ (char)0xE9,
01110 /* U+F8EF */ (char)0xEA,
01111 /* U+F8F0 */ (char)0xEB,
01112 /* U+F8F1 */ (char)0xEC,
01113 /* U+F8F2 */ (char)0xED,
01114 /* U+F8F3 */ (char)0xEE,
01115 /* U+F8F4 */ (char)0xEF,
01116 /* U+F8F5 */ (char)0xF4,
01117 /* U+F8F6 */ (char)0xF6,
01118 /* U+F8F7 */ (char)0xF7,
01119 /* U+F8F8 */ (char)0xF8,
01120 /* U+F8F9 */ (char)0xF9,
01121 /* U+F8FA */ (char)0xFA,
01122 /* U+F8FB */ (char)0xFB,
01123 /* U+F8FC */ (char)0xFC,
01124 /* U+F8FD */ (char)0xFD,
01125 /* U+F8FE */ (char)0xFE,
01126 };

```

13.257 imKStoUCS.c

```

00001 /* $XFree86: xc/lib/X11/imKStoUCS.c,v 1.5 2003/11/17 22:20:11 dawes Exp $ */
00002
00003 #include "Xlibint.h"
00004 #include "Ximint.h"
00005
00006 static unsigned short const keysym_to_unicode_lal_lff[] = {
00007     0x0104, 0x02d8, 0x0141, 0x0000, 0x013d, 0x015a, 0x0000, /* 0x01a0-0x01a7 */
00008     0x0000, 0x0160, 0x015e, 0x0164, 0x0179, 0x0000, 0x017d, 0x017b, /* 0x01a8-0x01af */
00009     0x0000, 0x0105, 0x02db, 0x0142, 0x0000, 0x013e, 0x015b, 0x02c7, /* 0x01b0-0x01b7 */
00010     0x0000, 0x0161, 0x015f, 0x0165, 0x017a, 0x02dd, 0x017e, 0x017c, /* 0x01b8-0x01bf */
00011     0x0154, 0x0000, 0x0000, 0x0102, 0x0000, 0x0139, 0x0106, 0x0000, /* 0x01c0-0x01c7 */
00012     0x010c, 0x0000, 0x0118, 0x0000, 0x011a, 0x0000, 0x0000, 0x010e, /* 0x01c8-0x01cf */
00013     0x0110, 0x0143, 0x0147, 0x0000, 0x0000, 0x0150, 0x0000, /* 0x01d0-0x01d7 */
00014     0x0158, 0x016e, 0x0000, 0x0170, 0x0000, 0x0000, 0x0162, 0x0000, /* 0x01d8-0x01df */
00015     0x0155, 0x0000, 0x0000, 0x0103, 0x0000, 0x013a, 0x0107, 0x0000, /* 0x01e0-0x01e7 */
00016     0x010d, 0x0000, 0x0119, 0x0000, 0x011b, 0x0000, 0x0000, 0x010f, /* 0x01e8-0x01ef */

```

```

00017    0x0111, 0x0144, 0x0148, 0x0000, 0x0000, 0x0151, 0x0000, 0x0000, /* 0x01f0-0x01f7 */
00018    0x0159, 0x016f, 0x0000, 0x0171, 0x0000, 0x0000, 0x0163, 0x02d9 /* 0x01f8-0x01ff */
00019 };
00020
00021 static unsigned short const keysym_to_unicode_2a1_2fe[] = {
00022     0x0126, 0x0000, 0x0000, 0x0000, 0x0000, 0x0124, 0x0000, /* 0x02a0-0x02a7 */
00023     0x0000, 0x0130, 0x0000, 0x011e, 0x0134, 0x0000, 0x0000, 0x0000, /* 0x02a8-0x02af */
00024     0x0000, 0x0127, 0x0000, 0x0000, 0x0000, 0x0000, 0x0125, 0x0000, /* 0x02b0-0x02b7 */
00025     0x0000, 0x0131, 0x0000, 0x011f, 0x0135, 0x0000, 0x0000, 0x0000, /* 0x02b8-0x02bf */
00026     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x010a, 0x0108, 0x0000, /* 0x02c0-0x02c7 */
00027     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x02c8-0x02cf */
00028     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0120, 0x0000, 0x0000, /* 0x02d0-0x02d7 */
00029     0x011c, 0x0000, 0x0000, 0x0000, 0x0000, 0x016c, 0x015c, 0x0000, /* 0x02d8-0x02df */
00030     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x010b, 0x0109, 0x0000, /* 0x02e0-0x02e7 */
00031     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x02e8-0x02ef */
00032     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0121, 0x0000, 0x0000, /* 0x02f0-0x02f7 */
00033     0x011d, 0x0000, 0x0000, 0x0000, 0x0000, 0x016d, 0x015d /* 0x02f8-0x02ff */
00034 };
00035
00036 static unsigned short const keysym_to_unicode_3a2_3fe[] = {
00037     0x0138, 0x0156, 0x0000, 0x0000, 0x0128, 0x013b, 0x0000, /* 0x03a0-0x03a7 */
00038     0x0000, 0x0000, 0x0112, 0x0122, 0x0166, 0x0000, 0x0000, 0x0000, /* 0x03a8-0x03af */
00039     0x0000, 0x0000, 0x0000, 0x0157, 0x0000, 0x0129, 0x013c, 0x0000, /* 0x03b0-0x03b7 */
00040     0x0000, 0x0000, 0x0113, 0x0123, 0x0167, 0x014a, 0x0000, 0x014b, /* 0x03b8-0x03bf */
00041     0x0100, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x012e, /* 0x03c0-0x03c7 */
00042     0x0000, 0x0000, 0x0000, 0x0000, 0x0116, 0x0000, 0x0000, 0x012a, /* 0x03c8-0x03cf */
00043     0x0000, 0x0145, 0x014c, 0x0136, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x03d0-0x03d7 */
00044     0x0000, 0x0172, 0x0000, 0x0000, 0x0000, 0x0168, 0x016a, 0x0000, /* 0x03d8-0x03df */
00045     0x0101, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x012f, /* 0x03e0-0x03ef */
00046     0x0000, 0x0000, 0x0000, 0x0000, 0x0117, 0x0000, 0x0000, 0x012b, /* 0x03e8-0x03ef */
00047     0x0000, 0x0146, 0x014d, 0x0137, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x03f0-0x03f7 */
00048     0x0000, 0x0173, 0x0000, 0x0000, 0x0000, 0x0169, 0x016b /* 0x03f8-0x03ff */
00049 };
00050
00051 static unsigned short const keysym_to_unicode_4a1_4df[] = {
00052     0x3002, 0x3008, 0x3009, 0x3001, 0x30fb, 0x30f2, 0x30a1, /* 0x04a0-0x04a7 */
00053     0x30a3, 0x30a5, 0x30a7, 0x30a9, 0x30e3, 0x30e5, 0x30e7, 0x30c3, /* 0x04a8-0x04af */
00054     0x30fc, 0x30a2, 0x30a4, 0x30a6, 0x30a8, 0x30aa, 0x30ab, 0x30ad, /* 0x04b0-0x04b7 */
00055     0x30af, 0x30b1, 0x30b3, 0x30b5, 0x30b7, 0x30b9, 0x30bb, 0x30bd, /* 0x04b8-0x04bf */
00056     0x30bf, 0x30c1, 0x30c4, 0x30c6, 0x30c8, 0x30ca, 0x30cb, 0x30cc, /* 0x04c0-0x04c7 */
00057     0x30cd, 0x30ce, 0x30cf, 0x30d2, 0x30d5, 0x30d8, 0x30db, 0x30de, /* 0x04c8-0x04cf */
00058     0x30df, 0x30e0, 0x30e1, 0x30e2, 0x30e4, 0x30e6, 0x30e8, 0x30e9, /* 0x04d0-0x04df */
00059     0x30ea, 0x30eb, 0x30ec, 0x30ed, 0x30ef, 0x30f3, 0x309b, 0x309c /* 0x04d8-0x04df */
00060 };
00061
00062 static unsigned short const keysym_to_unicode_590_5fe[] = {
00063     0x06f0, 0x06f1, 0x06f2, 0x06f3, 0x06f4, 0x06f5, 0x06f6, 0x06f7, /* 0x0590-0x0597 */
00064     0x06f8, 0x06f9, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x0598-0x059f */
00065     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x066a, 0x0670, 0x0679, /* 0x05a0-0x05a7 */
00066
00067     0x067e, 0x0686, 0x0688, 0x0691, 0x060c, 0x0000, 0x06d4, 0x0000, /* 0x05ac-0x05af */
00068     0x0660, 0x0661, 0x0662, 0x0663, 0x0664, 0x0665, 0x0666, 0x0667, /* 0x05b0-0x05b7 */
00069     0x0668, 0x0669, 0x0000, 0x061b, 0x0000, 0x0000, 0x0000, 0x061f, /* 0x05b8-0x05bf */
00070     0x0000, 0x0621, 0x0622, 0x0623, 0x0624, 0x0625, 0x0626, 0x0627, /* 0x05c0-0x05c7 */
00071     0x0628, 0x0629, 0x062a, 0x062b, 0x062c, 0x062d, 0x062e, 0x062f, /* 0x05c8-0x05cf */
00072     0x0630, 0x0631, 0x0632, 0x0633, 0x0634, 0x0635, 0x0636, 0x0637, /* 0x05d0-0x05d7 */
00073     0x0638, 0x0639, 0x063a, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x05d8-0x05df */
00074     0x0640, 0x0641, 0x0642, 0x0643, 0x0644, 0x0645, 0x0646, 0x0647, /* 0x05e0-0x05ef */
00075     0x0648, 0x0649, 0x064a, 0x064b, 0x064c, 0x064d, 0x064e, 0x064f, /* 0x05f0-0x05ff */
00076     0x0650, 0x0651, 0x0652, 0x0653, 0x0654, 0x0655, 0x0698, 0x06a4, /* 0x05f8-0x05ff */
00077     0x06a9, 0x06af, 0x06ba, 0x06be, 0x06cc, 0x06d2, 0x06c1 /* 0x05f8-0x05fe */
00078 };
00079
00080 static unsigned short const keysym_to_unicode_680_6ff[] = {
00081     0x0492, 0x0496, 0x049a, 0x049c, 0x04a2, 0x04ae, 0x04b0, 0x04b2, /* 0x0680-0x0687 */
00082     0x04b6, 0x04b8, 0x04ba, 0x0000, 0x04d8, 0x04e2, 0x04e8, 0x04ee, /* 0x0688-0x068f */
00083     0x0493, 0x0497, 0x049b, 0x049d, 0x04a3, 0x04af, 0x04b1, 0x04b3, /* 0x0690-0x0697 */
00084     0x04b7, 0x04b9, 0x04bb, 0x0000, 0x04d9, 0x04e3, 0x04e9, 0x04ef, /* 0x0698-0x069f */
00085     0x0000, 0x0452, 0x0453, 0x0451, 0x0454, 0x0455, 0x0456, 0x0457, /* 0x06a0-0x06a7 */
00086     0x0458, 0x0459, 0x045a, 0x045b, 0x045c, 0x045d, 0x045e, 0x045f, /* 0x06a8-0x06af */
00087     0x2116, 0x0402, 0x0403, 0x0401, 0x0404, 0x0405, 0x0406, 0x0407, /* 0x06b0-0x06b7 */
00088     0x0408, 0x0409, 0x040a, 0x040b, 0x040c, 0x040d, 0x040e, 0x040f, /* 0x06b8-0x06bf */
00089     0x044e, 0x0430, 0x0431, 0x0446, 0x0434, 0x0435, 0x0444, 0x0433, /* 0x06c0-0x06c7 */
00090     0x0445, 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e, /* 0x06c8-0x06cf */
00091     0x043f, 0x044f, 0x0440, 0x0441, 0x0442, 0x0443, 0x0436, 0x0432, /* 0x06d0-0x06d7 */
00092     0x044c, 0x044b, 0x0437, 0x0448, 0x044d, 0x0449, 0x0447, 0x044a, /* 0x06d8-0x06df */
00093     0x042e, 0x0410, 0x0411, 0x0426, 0x0414, 0x0415, 0x0424, 0x0413, /* 0x06e0-0x06ef */
00094     0x0425, 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e, /* 0x06f0-0x06ef */
00095     0x041f, 0x042f, 0x0420, 0x0421, 0x0422, 0x0423, 0x0416, 0x0412, /* 0x06f8-0x06ff */
00096     0x042c, 0x042b, 0x0417, 0x0428, 0x042d, 0x0429, 0x0427, 0x042a /* 0x06f8-0x06ff */
00097 };
00098
00099 static unsigned short const keysym_to_unicode_7a1_7f9[] = {
00100     0x0386, 0x0388, 0x0389, 0x038a, 0x03aa, 0x0000, 0x038c, /* 0x07a0-0x07a7 */
00101     0x038e, 0x03ab, 0x0000, 0x038f, 0x0000, 0x0000, 0x0385, 0x2015, /* 0x07a8-0x07af */
00102     0x0000, 0x03ac, 0x03ad, 0x03ae, 0x03af, 0x03ca, 0x0390, 0x03cc, /* 0x07b0-0x07b7 */
00103     0x03cd, 0x03cb, 0x03bd, 0x03ce, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x07b8-0x07bf */

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00104     0x0000, 0x0391, 0x0392, 0x0393, 0x0394, 0x0395, 0x0396, 0x0397, /* 0x07c0-0x07c7 */
00105     0x0398, 0x0399, 0x039a, 0x039b, 0x039c, 0x039d, 0x039e, 0x039f, /* 0x07c8-0x07cf */
00106     0x03a0, 0x03a1, 0x03a2, 0x03a3, 0x0000, 0x03a4, 0x03a5, 0x03a6, 0x03a7, /* 0x07d0-0x07df */
00107     0x03a8, 0x03a9, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x07e0-0x07ef */
00108     0x0000, 0x03b1, 0x03b2, 0x03b3, 0x03b4, 0x03b5, 0x03b6, 0x03b7, /* 0x07f0-0x07f7 */
00109     0x03b8, 0x03b9, 0x03ba, 0x03bb, 0x03bc, 0x03bd, 0x03be, 0x03bf, /* 0x07f8-0x07ff */
00110     0x03c0, 0x03c1, 0x03c2, 0x03c3, 0x03c4, 0x03c5, 0x03c6, 0x03c7, /* 0x07f0-0x07f7 */
00111     0x03c8, 0x03c9, /* 0x07f8-0x07ff */
00112 };
00113
00114 static unsigned short const keysym_to_unicode_8a4_8fe[] = {
00115     0x2320, 0x2321, 0x0000, 0x231c, /* 0x08a0-0x08a7 */
00116     0x231d, 0x231e, 0x231f, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x08a8-0x08af */
00117     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x08b0-0x08b7 */
00118     0x0000, 0x0000, 0x0000, 0x0000, 0x2264, 0x2260, 0x2265, 0x222b, /* 0x08b8-0x08bf */
00119     0x2234, 0x0000, 0x221e, 0x0000, 0x0000, 0x2207, 0x0000, 0x0000, /* 0x08c0-0x08c7 */
00120     0x2245, 0x2246, 0x0000, 0x0000, 0x0000, 0x0000, 0x22a2, 0x0000, /* 0x08c8-0x08cf */
00121     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x221a, 0x0000, /* 0x08d0-0x08df */
00122     0x0000, 0x0000, 0x2282, 0x2283, 0x2229, 0x222a, 0x2227, 0x2228, /* 0x08e0-0x08ef */
00123     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x08f0-0x08ff */
00124     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x08e8-0x08ef */
00125     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0192, 0x0000, /* 0x08f0-0x08ff */
00126     0x0000, 0x0000, 0x0000, 0x2190, 0x2191, 0x2192, 0x2193, /* 0x08f8-0x08ff */
00127 };
00128
00129 static unsigned short const keysym_to_unicode_9df_9f8[] = {
00130     0x2422, /* 0x09d8-0x09df */
00131     0x2666, 0x25a6, 0x2409, 0x240c, 0x240d, 0x240a, 0x0000, 0x0000, /* 0x09e0-0x09ef */
00132     0x240a, 0x240b, 0x2518, 0x2510, 0x250c, 0x2514, 0x253c, 0x2500, /* 0x09e8-0x09ef */
00133     0x0000, 0x0000, 0x0000, 0x0000, 0x251c, 0x2524, 0x2534, 0x252c, /* 0x09f0-0x09ff */
00134     0x2502, /* 0x09f8-0x09ff */
00135 };
00136
00137 static unsigned short const keysym_to_unicode_aal_afe[] = {
00138     0x2003, 0x2002, 0x2004, 0x2005, 0x2007, 0x2008, 0x2009, /* 0x0aa0-0x0aa7 */
00139     0x200a, 0x2014, 0x2013, 0x0000, 0x0000, 0x2026, 0x2025, /* 0x0aa8-0x0aaf */
00140     0x2153, 0x2154, 0x2155, 0x2156, 0x2157, 0x2158, 0x2159, 0x215a, /* 0xab0-0xab7 */
00141     0x2105, 0x0000, 0x0000, 0x2012, 0x2039, 0x2024, 0x203a, 0x0000, /* 0xab8-0abf */
00142     0x0000, 0x0000, 0x0000, 0x215b, 0x215c, 0x215d, 0x215e, 0x0000, /* 0xac0-0xac7 */
00143     0x0000, 0x2122, 0x2120, 0x0000, 0x25c1, 0x25b7, 0x25cb, 0x25ad, /* 0xac8-0acf */
00144     0x2018, 0x2019, 0x201c, 0x201d, 0x211e, 0x0000, 0x2032, 0x2033, /* 0xad0-0xad7 */
00145     0x0000, 0x271d, 0x0000, 0x220e, 0x25c2, 0x2023, 0x25cf, 0x25ac, /* 0xad8-0xadf */
00146     0x25e6, 0x25ab, 0x25ae, 0x25b5, 0x25bf, 0x2606, 0x2022, 0x25aa, /* 0xae0-0xae7 */
00147     0x25b4, 0x25be, 0x261a, 0x261b, 0x2663, 0x2666, 0x2665, 0x0000, /* 0xae8-0xaf7 */
00148     0x2720, 0x2020, 0x2021, 0x2713, 0x2612, 0x266f, 0x266d, 0x2642, /* 0xaf0-0xaf7 */
00149     0x2640, 0x2121, 0x2315, 0x2117, 0x2038, 0x201a, 0x201e, /* 0xaf8-0aff */
00150 };
00151
00152 /* none of the APL keysyms match the Unicode characters */
00153
00154 static unsigned short const keysym_to_unicode_cdf_cfa[] = {
00155     0x2017, /* 0xcd8-0cdf */
00156     0x05d0, 0x05d1, 0x05d2, 0x05d3, 0x05d4, 0x05d5, 0x05d6, 0x05d7, /* 0xce0-0xce7 */
00157     0x05d8, 0x05d9, 0x05da, 0x05db, 0x05dc, 0x05dd, 0x05de, 0x05df, /* 0xce8-0cef7 */
00158     0x05e0, 0x05e1, 0x05e2, 0x05e3, 0x05e4, 0x05e5, 0x05e6, 0x05e7, /* 0xcf0-0xcf7 */
00159     0x05e8, 0x05e9, 0x05ea, /* 0xcf8-0cff */
00160 };
00161
00162 static unsigned short const keysym_to_unicode_dal_df9[] = {
00163     0x0e01, 0x0e02, 0x0e03, 0x0e04, 0x0e05, 0x0e06, 0x0e07, /* 0xda0-0xda7 */
00164     0x0e08, 0x0e09, 0x0e0a, 0x0e0b, 0x0e0c, 0x0e0d, 0x0e0e, 0x0e0f, /* 0xda8-0daf7 */
00165     0x0e10, 0x0e11, 0x0e12, 0x0e13, 0x0e14, 0x0e15, 0x0e16, 0x0e17, /* 0xdb0-0xdb7 */
00166     0x0e18, 0x0e19, 0x0e1a, 0x0e1b, 0x0e1c, 0x0e1d, 0x0e1e, 0x0e1f, /* 0xdb8-0dbf7 */
00167     0x0e20, 0x0e21, 0x0e22, 0x0e23, 0x0e24, 0x0e25, 0x0e26, 0x0e27, /* 0xdc0-0xdc7 */
00168     0x0e28, 0x0e29, 0x0e2a, 0x0e2b, 0x0e2c, 0x0e2d, 0x0e2e, 0x0e2f, /* 0xdc8-0dcf7 */
00169     0x0e30, 0x0e31, 0x0e32, 0x0e33, 0x0e34, 0x0e35, 0x0e36, 0x0e37, /* 0xdd0-0xdd7 */
00170     0x0e38, 0x0e39, 0x0e3a, 0x0000, 0x0000, 0x0000, 0x0e3e, 0x0e3f, /* 0xdd8-0ddf7 */
00171     0x0e40, 0x0e41, 0x0e42, 0x0e43, 0x0e44, 0x0e45, 0x0e46, 0x0e47, /* 0xde0-0xde7 */
00172     0x0e48, 0x0e49, 0x0e4a, 0x0e4b, 0x0e4c, 0x0e4d, 0x0000, 0x0000, /* 0xde8-0def7 */
00173     0x0e50, 0x0e51, 0x0e52, 0x0e53, 0x0e54, 0x0e55, 0x0e56, 0x0e57, /* 0xdf0-0xdf7 */
00174     0x0e58, 0x0e59, /* 0xdf8-0dff */
00175 };
00176
00177 static unsigned short const keysym_to_unicode_ea0_eff[] = {
00178     0x0000, 0x1101, 0x1101, 0x11aa, 0x1102, 0x11ac, 0x11ad, 0x1103, /* 0xea0-0xea7 */
00179     0x1104, 0x1105, 0x11b0, 0x11b1, 0x11b2, 0x11b3, 0x11b4, 0x11b5, /* 0xea8-0eaf7 */
00180     0x11b6, 0x1106, 0x1107, 0x1108, 0x11b9, 0x1109, 0x110a, 0x110b, /* 0xeb0-0xeb7 */
00181     0x110c, 0x110d, 0x110e, 0x110f, 0x1110, 0x1111, 0x1112, 0x1161, /* 0xeb8-0ebf7 */
00182     0x1162, 0x1163, 0x1164, 0x1165, 0x1166, 0x1167, 0x1168, 0x1169, /* 0xec0-0xec7 */
00183     0x116a, 0x116b, 0x116c, 0x116d, 0x116e, 0x116f, 0x1170, 0x1171, /* 0xec8-0ecf7 */
00184     0x1172, 0x1173, 0x1174, 0x1175, 0x11a8, 0x11a9, 0x11aa, 0x11ab, /* 0xed0-0xed7 */
00185     0x11ac, 0x11ad, 0x11ae, 0x11af, 0x11b0, 0x11b1, 0x11b2, 0x11b3, /* 0xed8-0edf7 */
00186     0x11b4, 0x11b5, 0x11b6, 0x11b7, 0x11b8, 0x11b9, 0x11ba, 0x11bb, /* 0xee0-0xee7 */
00187     0x11bc, 0x11bd, 0x11be, 0x11bf, 0x11c0, 0x11c1, 0x11c2, 0x0000, /* 0xee8-0eef7 */
00188     0x0000, 0x0000, 0x1140, 0x0000, 0x0000, 0x1159, 0x119e, 0x0000, /* 0xef0-0xef7 */
00189     0x11eb, 0x0000, 0x11f9, 0x0000, 0x0000, 0x0000, 0x20a9, /* 0xef8-0eff7 */
00190 };

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00191
00192 static unsigned short keysym_to_unicode_12a1_12fe[] = {
00193     0x1e02, 0x1e03, 0x0000, 0x0000, 0x0000, 0x1e0a, 0x0000, /* 0x12a0-0x12a7 */
00194     0x1e80, 0x0000, 0x1e82, 0x1e0b, 0x1ef2, 0x0000, 0x0000, 0x0000, /* 0x12a8-0x12af */
00195     0x1e1e, 0x1ef, 0x0000, 0x0000, 0x1e40, 0x1e41, 0x0000, 0x1e56, /* 0x12b0-0x12b7 */
00196     0x1e81, 0x1e57, 0x1e83, 0x1e60, 0x1ef3, 0x1e84, 0x1e85, 0x1e61, /* 0x12b8-0x12bf */
00197     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x12c0-0x12c7 */
00198     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x12c8-0x12cf */
00199     0x0174, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x1e6a, /* 0x12d0-0x12d7 */
00200     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0176, 0x0000, /* 0x12d8-0x12df */
00201     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x12e0-0x12e7 */
00202     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x12e8-0x12ef */
00203     0x0175, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x1e6b, /* 0x12f0-0x12f7 */
00204     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0177, /* 0x12f0-0x12ff */
00205 };
00206
00207 static unsigned short const keysym_to_unicode_13bc_13be[] = {
00208     0x0152, 0x0153, 0x0178, /* 0x13b8-0x13bf */
00209 };
00210
00211 static unsigned short keysym_to_unicode_14a1_14ff[] = {
00212     0x2741, 0x00a7, 0x0589, 0x0029, 0x0028, 0x00bb, 0x00ab, /* 0x14a0-0x14a7 */
00213     0x2014, 0x002e, 0x055d, 0x002c, 0x2013, 0x058a, 0x2026, 0x055c, /* 0x14a8-0x14af */
00214     0x055b, 0x055e, 0x0531, 0x0561, 0x0532, 0x0562, 0x0533, 0x0563, /* 0x14b0-0x14b7 */
00215     0x0534, 0x0564, 0x0535, 0x0565, 0x0536, 0x0566, 0x0537, 0x0567, /* 0x14b8-0x14bf */
00216     0x0538, 0x0568, 0x0539, 0x0569, 0x053a, 0x056a, 0x053b, 0x056b, /* 0x14c0-0x14c7 */
00217     0x053c, 0x056c, 0x053d, 0x056d, 0x053e, 0x056e, 0x053f, 0x056f, /* 0x14c8-0x14cf */
00218     0x0540, 0x0570, 0x0541, 0x0571, 0x0542, 0x0572, 0x0543, 0x0573, /* 0x14d0-0x14d7 */
00219     0x0544, 0x0574, 0x0545, 0x0575, 0x0546, 0x0576, 0x0547, 0x0577, /* 0x14d8-0x14df */
00220     0x0548, 0x0578, 0x0549, 0x0579, 0x054a, 0x057a, 0x054b, 0x057b, /* 0x14e0-0x14e7 */
00221     0x054c, 0x057c, 0x054d, 0x057d, 0x054e, 0x057e, 0x054f, 0x057f, /* 0x14e8-0x14ef */
00222     0x0550, 0x0580, 0x0551, 0x0581, 0x0552, 0x0582, 0x0553, 0x0583, /* 0x14f0-0x14f7 */
00223     0x0554, 0x0584, 0x0555, 0x0585, 0x0556, 0x0586, 0x2019, 0x0027, /* 0x14f8-0x14ff */
00224 };
00225
00226 static unsigned short keysym_to_unicode_15d0_15f6[] = {
00227     0x10d0, 0x10d1, 0x10d2, 0x10d3, 0x10d4, 0x10d5, 0x10d6, 0x10d7, /* 0x15d0-0x15d7 */
00228     0x10d8, 0x10d9, 0x10da, 0x10db, 0x10dc, 0x10dd, 0x10de, 0x10df, /* 0x15d8-0x15df */
00229     0x10e0, 0x10e1, 0x10e2, 0x10e3, 0x10e4, 0x10e5, 0x10e6, 0x10e7, /* 0x15e0-0x15e7 */
00230     0x10e8, 0x10e9, 0x10ea, 0x10eb, 0x10ec, 0x10ed, 0x10ee, 0x10ef, /* 0x15e8-0x15ef */
00231     0x10f0, 0x10f1, 0x10f2, 0x10f3, 0x10f4, 0x10f5, 0x10f6, /* 0x15f0-0x15f7 */
00232 };
00233
00234 static unsigned short keysym_to_unicode_16a0_16f6[] = {
00235     0x0000, 0x0000, 0xf0a2, 0x1e8a, 0x0000, 0xf0a5, 0x012c, 0xf0a7, /* 0x16a0-0x16a7 */
00236     0xf0a8, 0x01b5, 0x01e6, 0x0000, 0x0000, 0x0000, 0x0000, 0x019f, /* 0x16a8-0x16af */
00237     0x0000, 0x0000, 0xf0b2, 0x1e8b, 0x01d1, 0xf0b5, 0x012d, 0xf0b7, /* 0x16b0-0x16b7 */
00238     0xf0b8, 0x01b6, 0x01e7, 0x0000, 0x0000, 0x01d2, 0x0000, 0x0275, /* 0x16b8-0x16bf */
00239     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x018f, 0x0000, /* 0x16c0-0x16c7 */
00240     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x16c8-0x16cf */
00241     0x0000, 0x1e36, 0xf0d2, 0xf0d3, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x16d0-0x16d7 */
00242     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x16d8-0x16df */
00243     0x0000, 0x1e37, 0xf0e2, 0xf0e3, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x16e0-0x16e7 */
00244     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /* 0x16e8-0x16ef */
00245     0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0259, /* 0x16f0-0x16f6 */
00246 };
00247
00248 static unsigned short const keysym_to_unicode_1e9f_1eff[] = {
00249     0x0303,
00250     0x1ea0, 0x1ea1, 0x1ea2, 0x1ea3, 0x1ea4, 0x1ea5, 0x1ea6, 0x1ea7, /* 0x1ea0-0x1ea7 */
00251     0x1ea8, 0x1ea9, 0x1eaa, 0x1eab, 0x1eac, 0x1ead, 0x1eae, 0x1eaf, /* 0x1ea8-0x1eaf */
00252     0x1eb0, 0x1eb1, 0x1eb2, 0x1eb3, 0x1eb4, 0x1eb5, 0x1eb6, 0x1eb7, /* 0x1eb0-0x1eb7 */
00253     0x1eb8, 0x1eb9, 0x1eba, 0x1ebb, 0x1ebc, 0x1ebd, 0x1ebe, 0x1ebf, /* 0x1eb8-0x1ebf */
00254     0x1ec0, 0x1ec1, 0x1ec2, 0x1ec3, 0x1ec4, 0x1ec5, 0x1ec6, 0x1ec7, /* 0x1ec0-0x1ec7 */
00255     0x1ec8, 0x1ec9, 0x1eca, 0x1ecb, 0x1ecc, 0x1ecd, 0x1ece, 0x1ecf, /* 0x1ec8-0x1ecf */
00256     0x1ed0, 0x1ed1, 0x1ed2, 0x1ed3, 0x1ed4, 0x1ed5, 0x1ed6, 0x1ed7, /* 0x1ed0-0x1ed7 */
00257     0x1ed8, 0x1ed9, 0x1eda, 0x1edb, 0x1edc, 0x1edd, 0x1ede, 0x1edf, /* 0x1ed8-0x1edf */
00258     0x1ee0, 0x1ee1, 0x1ee2, 0x1ee3, 0x1ee4, 0x1ee5, 0x1ee6, 0x1ee7, /* 0x1ee0-0x1ee7 */
00259     0x1ee8, 0x1ee9, 0x1eea, 0x1eeb, 0x1eec, 0x1eed, 0x1eee, 0x1eef, /* 0x1ee8-0x1eef */
00260     0x1ef0, 0x1ef1, 0x0300, 0x0301, 0x1ef4, 0x1ef5, 0x1ef6, 0x1ef7, /* 0x1ef0-0x1ef7 */
00261     0x1ef8, 0x1ef9, 0x01a0, 0x01a1, 0x01af, 0x01b0, 0x0309, 0x0323, /* 0x1ef8-0x1eff */
00262 };
00263
00264 static unsigned short const keysym_to_unicode_20a0_20ac[] = {
00265     0x20a0, 0x20a1, 0x20a2, 0x20a3, 0x20a4, 0x20a5, 0x20a6, 0x20a7, /* 0x20a0-0x20a7 */
00266     0x20a8, 0x20a9, 0x20aa, 0x20ab, 0x20ac, /* 0x20a8-0x20af */
00267 };
00268
00269 static unsigned int
00270 KeySymToUcs4(KeySym keysym)
00271 {
00272     /* 'Unicode keysym' */
00273     if ((keysym & 0xff000000) == 0x01000000)
00274         return (keysym & 0x00ffffff);
00275
00276     if (keysym > 0 && keysym < 0x100)
00277         return keysym;

```

```

00278     else if (keysym > 0x1a0 && keysym < 0x200)
00279         return keysym_to_unicode_1a1_1ff[keysym - 0x1a1];
00280     else if (keysym > 0x2a0 && keysym < 0x2ff)
00281         return keysym_to_unicode_2a1_2fe[keysym - 0x2a1];
00282     else if (keysym > 0x3a1 && keysym < 0x3ff)
00283         return keysym_to_unicode_3a2_3fe[keysym - 0x3a2];
00284     else if (keysym > 0x4a0 && keysym < 0x4e0)
00285         return keysym_to_unicode_4a1_4df[keysym - 0x4a1];
00286     else if (keysym > 0x589 && keysym < 0x5ff)
00287         return keysym_to_unicode_590_5fe[keysym - 0x590];
00288     else if (keysym > 0x67f && keysym < 0x700)
00289         return keysym_to_unicode_680_6ff[keysym - 0x680];
00290     else if (keysym > 0x7a0 && keysym < 0x7fa)
00291         return keysym_to_unicode_7a1_7f9[keysym - 0x7a1];
00292     else if (keysym > 0x8a3 && keysym < 0x8ff)
00293         return keysym_to_unicode_8a4_8fe[keysym - 0x8a4];
00294     else if (keysym > 0x9de && keysym < 0x9f9)
00295         return keysym_to_unicode_9df_9f8[keysym - 0x9df];
00296     else if (keysym > 0xaa0 && keysym < 0xaff)
00297         return keysym_to_unicode_aa1_afe[keysym - 0xaa1];
00298     else if (keysym > 0xcde && keysym < 0xcfb)
00299         return keysym_to_unicode_cdf_cfa[keysym - 0xcdf];
00300     else if (keysym > 0xda0 && keysym < 0xdfa)
00301         return keysym_to_unicode_da1_df9[keysym - 0xda1];
00302     else if (keysym > 0xe9f && keysym < 0xf00)
00303         return keysym_to_unicode_ea0_eff[keysym - 0xea0];
00304     else if (keysym > 0x12a0 && keysym < 0x12ff)
00305         return keysym_to_unicode_12a1_12fe[keysym - 0x12a1];
00306     else if (keysym > 0x13bb && keysym < 0x13bf)
00307         return keysym_to_unicode_13bc_13be[keysym - 0x13bc];
00308     else if (keysym > 0x14a0 && keysym < 0x1500)
00309         return keysym_to_unicode_14a1_14ff[keysym - 0x14a1];
00310     else if (keysym > 0x15cf && keysym < 0x15f7)
00311         return keysym_to_unicode_15d0_15f6[keysym - 0x15d0];
00312     else if (keysym > 0x169f && keysym < 0x16f7)
00313         return keysym_to_unicode_16a0_16f6[keysym - 0x16a0];
00314     else if (keysym > 0x1e9e && keysym < 0x1f00)
00315         return keysym_to_unicode_1e9f_1eff[keysym - 0x1e9f];
00316     else if (keysym > 0x209f && keysym < 0x20ad)
00317         return keysym_to_unicode_20a0_20ac[keysym - 0x20a0];
00318     else
00319         return 0;
00320 }

```

13.258 armSCII_8.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/armSCII_8.h,v 1.4 2003/07/15 17:33:45 pascal Exp $ */
00002
00003 /*
00004  * ARMSCII-8
00005  */
00006
00007 static const unsigned short armSCII_8_2uni[96] = {
00008     /* 0xa0 */
00009     0x00a0, 0xffffd, 0x0587, 0x0589, 0x0029, 0x0028, 0x00bb, 0x00ab,
00010     0x2014, 0x002e, 0x055d, 0x002c, 0x002d, 0x058a, 0x2026, 0x055c,
00011     /* 0xb0 */
00012     0x055b, 0x055e, 0x0531, 0x0561, 0x0532, 0x0562, 0x0533, 0x0563,
00013     0x0534, 0x0564, 0x0535, 0x0565, 0x0536, 0x0566, 0x0537, 0x0567,
00014     /* 0xc0 */
00015     0x0538, 0x0568, 0x0539, 0x0569, 0x053a, 0x056a, 0x053b, 0x056b,
00016     0x053c, 0x056c, 0x053d, 0x056d, 0x053e, 0x056e, 0x053f, 0x056f,
00017     /* 0xd0 */
00018     0x0540, 0x0570, 0x0541, 0x0571, 0x0542, 0x0572, 0x0543, 0x0573,
00019     0x0544, 0x0574, 0x0545, 0x0575, 0x0546, 0x0576, 0x0547, 0x0577,
00020     /* 0xe0 */
00021     0x0548, 0x0578, 0x0549, 0x0579, 0x054a, 0x057a, 0x054b, 0x057b,
00022     0x054c, 0x057c, 0x054d, 0x057d, 0x054e, 0x057e, 0x054f, 0x057f,
00023     /* 0xf0 */
00024     0x0550, 0x0580, 0x0551, 0x0581, 0x0552, 0x0582, 0x0553, 0x0583,
00025     0x0554, 0x0584, 0x0555, 0x0585, 0x0556, 0x0586, 0x055a, 0xffffd,
00026 };
00027
00028 static int
00029 armSCII_8_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00030 {
00031     unsigned char c = *s;
00032     if (c < 0xa0) {
00033         *pwc = (ucs4_t) c;
00034         return 1;
00035     }
00036     else {
00037         unsigned short wc = armSCII_8_2uni[c-0xa0];
00038         if (wc != 0xffffd) {
00039             *pwc = (ucs4_t) wc;

```

```

00040     return 1;
00041     }
00042     }
00043     return RET_ILSEQ;
00044 }
00045
00046 static const unsigned char armSCII_8_page00[8] = {
00047     0xa5, 0xa4, 0x2a, 0x2b, 0xab, 0xac, 0xa9, 0x2f, /* 0x28-0x2f */
00048 };
00049 static const unsigned char armSCII_8_page00_1[32] = {
00050     0xa0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00051     0x00, 0x00, 0x00, 0xa7, 0x00, 0x00, 0x00, 0x00, /* 0xa8-0xaf */
00052     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb0-0xb7 */
00053     0x00, 0x00, 0x00, 0xa6, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00054 };
00055 static const unsigned char armSCII_8_page05[96] = {
00056     0x00, 0xb2, 0xb4, 0xb6, 0xb8, 0xba, 0xbc, 0xbe, /* 0x30-0x37 */
00057     0xc0, 0xc2, 0xc4, 0xc6, 0xc8, 0xca, 0xcc, 0xce, /* 0x38-0x3f */
00058     0xd0, 0xd2, 0xd4, 0xd6, 0xd8, 0xda, 0xdc, 0xde, /* 0x40-0x47 */
00059     0xe0, 0xe2, 0xe4, 0xe6, 0xe8, 0xea, 0xec, 0xee, /* 0x48-0x4f */
00060     0xf0, 0xf2, 0xf4, 0xf6, 0xf8, 0xfa, 0xfc, 0x00, /* 0x50-0x57 */
00061     0x00, 0x00, 0xfe, 0xb0, 0xaf, 0xaa, 0xb1, 0x00, /* 0x58-0x5f */
00062     0x00, 0xb3, 0xb5, 0xb7, 0xb9, 0xbb, 0xbd, 0xbf, /* 0x60-0x67 */
00063     0xc1, 0xc3, 0xc5, 0xc7, 0xc9, 0xcb, 0xcd, 0xcf, /* 0x68-0x6f */
00064     0xd1, 0xd3, 0xd5, 0xd7, 0xd9, 0xdb, 0xdd, 0xdf, /* 0x70-0x77 */
00065     0xe1, 0xe3, 0xe5, 0xe7, 0xe9, 0xeb, 0xed, 0xef, /* 0x78-0x7f */
00066     0xf1, 0xf3, 0xf5, 0xf7, 0xf9, 0xfb, 0xfd, 0xa2, /* 0x80-0x87 */
00067     0x00, 0xa3, 0xad, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00068 };
00069 static const unsigned char armSCII_8_page20[24] = {
00070     0x00, 0x00, 0x00, 0x00, 0xa8, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00071     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00072     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xae, 0x00, /* 0x20-0x27 */
00073 };
00074
00075 static int
00076 armSCII_8_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00077 {
00078     unsigned char c = 0;
00079     if (wc < 0x0028) {
00080         *r = wc;
00081         return 1;
00082     }
00083     else if (wc >= 0x0028 && wc < 0x0030)
00084         c = armSCII_8_page00[wc-0x0028];
00085     else if (wc >= 0x0030 && wc < 0x00a0)
00086         c = wc;
00087     else if (wc >= 0x00a0 && wc < 0x00c0)
00088         c = armSCII_8_page00_1[wc-0x00a0];
00089     else if (wc >= 0x0530 && wc < 0x0590)
00090         c = armSCII_8_page05[wc-0x0530];
00091     else if (wc >= 0x2010 && wc < 0x2028)
00092         c = armSCII_8_page20[wc-0x2010];
00093     if (c != 0) {
00094         *r = c;
00095         return 1;
00096     }
00097     return RET_ILSEQ;
00098 }

```

13.259 ascii.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/ascii.h,v 1.3 2000/11/29 17:40:28 dawes Exp $ */
00002
00003 /*
00004  * ASCII
00005  */
00006
00007 static int
00008 ascii_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00009 {
00010     unsigned char c = *s;
00011     if (c < 0x80) {
00012         *pwc = (ucs4_t) c;
00013         return 1;
00014     }
00015     return RET_ILSEQ;
00016 }
00017
00018 static int
00019 ascii_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00020 {
00021     if (wc < 0x0080) {
00022         *r = wc;
00023         return 1;

```



```
00024 }
00025 return RET_ILSEQ;
00026 }
```

13.260 big5.h

```
00001 /* $XFree86: xc/lib/X11/lcUniConv/big5.h,v 1.2 2003/05/27 22:26:28 tsi Exp $ */
00002
00003 /*
00004  * BIG5
00005  */
00006 #ifndef NEED_TOWC
00007 static const unsigned short big5_2uni_pageal[6121] = {
00008     /* Oxal */
00009     0x3000, 0xff0c, 0x3001, 0x3002, 0xff0e, 0x2022, 0xff1b, 0xff1a,
00010     0xff1f, 0xff01, 0xfe30, 0x2026, 0x2025, 0xfe50, 0xff64, 0xfe52,
00011     0x00b7, 0xfe54, 0xfe55, 0xfe56, 0xfe57, 0xff5c, 0x2013, 0xfe31,
00012     0x2014, 0xfe33, 0xfffd, 0xfe34, 0xfe4f, 0xff08, 0xff09, 0xfe35,
00013     0xfe36, 0xff5b, 0xff5d, 0xfe37, 0xfe38, 0x3014, 0x3015, 0xfe39,
00014     0xfe3a, 0x3010, 0x3011, 0xfe3b, 0xfe3c, 0x300a, 0x300b, 0xfe3d,
00015     0xfe3e, 0x3008, 0x3009, 0xfe3f, 0xfe40, 0x300c, 0x300d, 0xfe41,
00016     0xfe42, 0x300e, 0x300f, 0xfe43, 0xfe44, 0xfe59, 0xfe5a, 0xfe5b,
00017     0xfe5c, 0xfe5d, 0xfe5e, 0x2018, 0x2019, 0x201c, 0x201d, 0x301d,
00018     0x301e, 0x2035, 0x2032, 0xff03, 0xff06, 0xff0a, 0x203b, 0x00a7,
00019     0x3003, 0x25cb, 0x25cf, 0x25b3, 0x25b2, 0x25ce, 0x2606, 0x2605,
00020     0x25c7, 0x25c6, 0x25a1, 0x25a0, 0x25bd, 0x25bc, 0x32a3, 0x2105,
00021     0x203e, 0xfffd, 0xff3f, 0xfffd, 0xfe49, 0xfe4a, 0xfe4d, 0xfe4e,
00022     0xfe4b, 0xfe4c, 0xfe5f, 0xfe60, 0xfe61, 0xff0b, 0xff0d, 0x00d7,
00023     0x00f7, 0x00b1, 0x221a, 0xff1c, 0xff1e, 0xff1d, 0x2266, 0x2267,
00024     0x2260, 0x221e, 0x2252, 0x2261, 0xfe62, 0xfe63, 0xfe64, 0xfe65,
00025     0xfe66, 0x223c, 0x2229, 0x222a, 0x22a5, 0x2220, 0x221f, 0x22bf,
00026     0x33d2, 0x33d1, 0x222b, 0x222e, 0x2235, 0x2234, 0x2640, 0x2642,
00027     0x2641, 0x2609, 0x2191, 0x2193, 0x2190, 0x2192, 0x2196, 0x2197,
00028     0x2199, 0x2198, 0x2225, 0x2223, 0xfffd,
00029     /* Oxa2 */
00030     0xfffd, 0xff0f, 0xff3c, 0xff04, 0x00a5, 0x3012, 0x00a2, 0x00a3,
00031     0xff05, 0xff20, 0x2103, 0x2109, 0xfe69, 0xfe6a, 0xfe6b, 0x33d5,
00032     0x339c, 0x339d, 0x339e, 0x339e, 0x33ce, 0x33a1, 0x338e, 0x338f, 0x33c4,
00033     0x00b0, 0x5159, 0x515b, 0x515e, 0x515d, 0x5161, 0x5163, 0x55e7,
00034     0x74e9, 0x7cce, 0x2581, 0x2582, 0x2583, 0x2584, 0x2585, 0x2586,
00035     0x2587, 0x2588, 0x258f, 0x258e, 0x258d, 0x258c, 0x258b, 0x258a,
00036     0x2589, 0x253c, 0x2534, 0x252c, 0x2524, 0x251c, 0x2594, 0x2500,
00037     0x2502, 0x2595, 0x250c, 0x2510, 0x2514, 0x2518, 0x256d, 0x256e,
00038     0x2570, 0x256f, 0x2550, 0x255e, 0x256a, 0x2561, 0x25e2, 0x25e3,
00039     0x25e5, 0x25e4, 0x2571, 0x2572, 0x2573, 0xff10, 0xff11, 0xff12,
00040     0xff13, 0xff14, 0xff15, 0xff16, 0xff17, 0xff18, 0xff19, 0x2160,
00041     0x2161, 0x2162, 0x2163, 0x2164, 0x2165, 0x2166, 0x2167, 0x2168,
00042     0x2169, 0x3021, 0x3022, 0x3023, 0x3024, 0x3025, 0x3026, 0x3027,
00043     0x3028, 0x3029, 0xfffd, 0x5344, 0xfffd, 0xff21, 0xff22, 0xff23,
00044     0xff24, 0xff25, 0xff26, 0xff27, 0xff28, 0xff29, 0xff2a, 0xff2b,
00045     0xff2c, 0xff2d, 0xff2e, 0xff2f, 0xff30, 0xff31, 0xff32, 0xff33,
00046     0xff34, 0xff35, 0xff36, 0xff37, 0xff38, 0xff39, 0xff3a, 0xff41,
00047     0xff42, 0xff43, 0xff44, 0xff45, 0xff46, 0xff47, 0xff48, 0xff49,
00048     0xff4a, 0xff4b, 0xff4c, 0xff4d, 0xff4e, 0xff4f, 0xff50, 0xff51,
00049     0xff52, 0xff53, 0xff54, 0xff55, 0xff56,
00050     /* Oxa3 */
00051     0xff57, 0xff58, 0xff59, 0xff5a, 0x0391, 0x0392, 0x0393, 0x0394,
00052     0x0395, 0x0396, 0x0397, 0x0398, 0x0399, 0x039a, 0x039b, 0x039c,
00053     0x039d, 0x039e, 0x039f, 0x03a0, 0x03a1, 0x03a3, 0x03a4, 0x03a5,
00054     0x03a6, 0x03a7, 0x03a8, 0x03a9, 0x03b1, 0x03b2, 0x03b3, 0x03b4,
00055     0x03b5, 0x03b6, 0x03b7, 0x03b8, 0x03b9, 0x03ba, 0x03bb, 0x03bc,
00056     0x03bd, 0x03be, 0x03bf, 0x03c0, 0x03c1, 0x03c3, 0x03c4, 0x03c5,
00057     0x03c6, 0x03c7, 0x03c8, 0x03c9, 0x3105, 0x3106, 0x3107, 0x3108,
00058     0x3109, 0x310a, 0x310b, 0x310c, 0x310d, 0x310e, 0x310f, 0x3110,
00059     0x3111, 0x3112, 0x3113, 0x3114, 0x3115, 0x3116, 0x3117, 0x3118,
00060     0x3119, 0x311a, 0x311b, 0x311c, 0x311d, 0x311e, 0x311f, 0x3120,
00061     0x3121, 0x3122, 0x3123, 0x3124, 0x3125, 0x3126, 0x3127, 0x3128,
00062     0x3129, 0x02d9, 0x02c9, 0x02ca, 0x02c7, 0x02cb, 0xfffd, 0xfffd,
00063     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00064     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00065     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00066     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00067     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00068     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00069     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00070     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00071     /* Oxa4 */
00072     0x4e00, 0x4e59, 0x4e01, 0x4e03, 0x4e43, 0x4e5d, 0x4e86, 0x4e8c,
00073     0x4eba, 0x513f, 0x5165, 0x516b, 0x51e0, 0x5200, 0x5201, 0x529b,
00074     0x5315, 0x5341, 0x535c, 0x53c8, 0x4e09, 0x4e0b, 0x4e08, 0x4e0a,
00075     0x4e2b, 0x4e38, 0x51e1, 0x4e45, 0x4e48, 0x4e5f, 0x4e5e, 0x4e8e,
00076     0x4ea1, 0x5140, 0x5203, 0x52fa, 0x5343, 0x53c9, 0x53e3, 0x571f,
00077     0x58eb, 0x5915, 0x5927, 0x5973, 0x5b50, 0x5b51, 0x5b53, 0x5b58,
00078     0x5c0f, 0x5c22, 0x5c38, 0x5c71, 0x5ddd, 0x5de5, 0x5df1, 0x5df2,
00079     0x5df3, 0x5dfe, 0x5e72, 0x5efe, 0x5f0b, 0x5f13, 0x624d, 0x4e11,
```

```
00080 0x4e10, 0x4e0d, 0x4e2d, 0x4e30, 0x4e39, 0x4e4b, 0x5c39, 0x4e88,
00081 0x4e91, 0x4e95, 0x4e92, 0x4e94, 0x4ea2, 0x4ec1, 0x4ec0, 0x4ec3,
00082 0x4ec6, 0x4ec7, 0x4ecd, 0x4eca, 0x4ecb, 0x4ec4, 0x5143, 0x5141,
00083 0x5167, 0x516d, 0x516e, 0x516c, 0x5197, 0x51f6, 0x5206, 0x5207,
00084 0x5208, 0x52f8, 0x52fe, 0x52ff, 0x5316, 0x5339, 0x5348, 0x5347,
00085 0x5345, 0x535e, 0x5384, 0x53cb, 0x53ca, 0x53cd, 0x58ec, 0x5929,
00086 0x592b, 0x592a, 0x592d, 0x5b54, 0x5c11, 0x5c24, 0x5c3a, 0x5c6f,
00087 0x5df4, 0x5e7b, 0x5eff, 0x5f14, 0x5f15, 0x5fc3, 0x6208, 0x6236,
00088 0x624b, 0x624e, 0x652f, 0x6587, 0x6597, 0x65a4, 0x65b9, 0x65e5,
00089 0x66f0, 0x6708, 0x6728, 0x6b20, 0x6b62, 0x6b79, 0x6bcb, 0x6bd4,
00090 0x6bdb, 0x6c0f, 0x6c34, 0x706b, 0x722a, 0x7236, 0x723b, 0x7247,
00091 0x7259, 0x725b, 0x72ac, 0x738b, 0x4e19,
00092 /* 0xa5 */
00093 0x4e16, 0x4e15, 0x4e14, 0x4e18, 0x4e3b, 0x4e4d, 0x4e4f, 0x4e4e,
00094 0x4ee5, 0x4ed8, 0x4ed4, 0x4ed5, 0x4ed6, 0x4ed7, 0x4ee3, 0x4ee4,
00095 0x4ed9, 0x4ede, 0x5145, 0x5144, 0x5189, 0x518a, 0x51ac, 0x51f9,
00096 0x51fa, 0x51f8, 0x520a, 0x52a0, 0x529f, 0x5305, 0x5306, 0x5317,
00097 0x531d, 0x4edf, 0x534a, 0x5349, 0x5361, 0x5360, 0x536f, 0x536e,
00098 0x53bb, 0x53ef, 0x53e4, 0x53f3, 0x53ec, 0x53ee, 0x53e9, 0x53e8,
00099 0x53fc, 0x53f8, 0x53f5, 0x53eb, 0x53e6, 0x53ea, 0x53f2, 0x53f1,
00100 0x53f0, 0x53e5, 0x53ed, 0x53fb, 0x56db, 0x56da, 0x5916, 0x592e,
00101 0x5931, 0x5974, 0x5976, 0x5b55, 0x5b83, 0x5c3c, 0x5de8, 0x5de7,
00102 0x5de6, 0x5e02, 0x5e03, 0x5e73, 0x5e7c, 0x5f01, 0x5f18, 0x5f17,
00103 0x5fc5, 0x620a, 0x6253, 0x6254, 0x6252, 0x6251, 0x65a5, 0x65e6,
00104 0x672e, 0x672c, 0x672a, 0x672b, 0x672d, 0x6b63, 0x6bcd, 0x6c11,
00105 0x6c10, 0x6c38, 0x6c41, 0x6c40, 0x6c3e, 0x72af, 0x738a, 0x7389,
00106 0x74dc, 0x74e6, 0x7518, 0x751f, 0x7528, 0x7529, 0x7530, 0x7531,
00107 0x7532, 0x7533, 0x758b, 0x767d, 0x76ae, 0x76bf, 0x76ee, 0x77db,
00108 0x77e2, 0x77f3, 0x793a, 0x79be, 0x7a74, 0x7acb, 0x4e1e, 0x4e1f,
00109 0x4e52, 0x4e53, 0x4e69, 0x4e99, 0x4ea4, 0x4ea5, 0x4eef,
00110 0x4f09, 0x4f19, 0x4f0a, 0x4f15, 0x4f0d, 0x4f10, 0x4f11, 0x4f0f,
00111 0x4ef2, 0x4ef6, 0x4efb, 0x4ef0, 0x4ef3, 0x4efd, 0x4f01, 0x4f0b,
00112 0x5149, 0x5147, 0x514e, 0x5148, 0x5168,
00113 /* 0xa6 */
00114 0x5171, 0x518d, 0x51b0, 0x5217, 0x5211, 0x5212, 0x520e, 0x5216,
00115 0x52a3, 0x5308, 0x5321, 0x5320, 0x5370, 0x5371, 0x5409, 0x540f,
00116 0x540c, 0x540a, 0x5410, 0x5401, 0x540b, 0x5404, 0x5411, 0x540d,
00117 0x5408, 0x5403, 0x540e, 0x5406, 0x5412, 0x56e0, 0x56de, 0x56dd,
00118 0x5733, 0x5730, 0x5728, 0x572d, 0x572c, 0x572f, 0x5729, 0x5919,
00119 0x591a, 0x5937, 0x5938, 0x5984, 0x5978, 0x5983, 0x597d, 0x5979,
00120 0x5982, 0x5981, 0x5b57, 0x5b58, 0x5b87, 0x5b88, 0x5b85, 0x5b89,
00121 0x5bfa, 0x5c16, 0x5c79, 0x5dde, 0x5e06, 0x5e76, 0x5e74, 0x5f0f,
00122 0x5f1b, 0x5fd9, 0x5fd6, 0x620e, 0x620c, 0x620d, 0x6210, 0x6263,
00123 0x625b, 0x6258, 0x6536, 0x65e9, 0x65e8, 0x65ec, 0x65ed, 0x66f2,
00124 0x66f3, 0x6709, 0x673d, 0x6734, 0x6731, 0x6735, 0x6b21, 0x6b64,
00125 0x6b7b, 0x6c16, 0x6c5d, 0x6c57, 0x6c59, 0x6c5f, 0x6c60, 0x6c50,
00126 0x6c55, 0x6c61, 0x6c5b, 0x6c4d, 0x6c4e, 0x7070, 0x725f, 0x725d,
00127 0x767e, 0x7af9, 0x7cf3, 0x7cf8, 0x7f36, 0x7f8a, 0x7fbd, 0x8001,
00128 0x8003, 0x800c, 0x8012, 0x8033, 0x807f, 0x8089, 0x808b, 0x808c,
00129 0x81e3, 0x81ea, 0x81f3, 0x81fc, 0x820c, 0x821b, 0x821f, 0x826e,
00130 0x8272, 0x827e, 0x866b, 0x8840, 0x884c, 0x8863, 0x897f, 0x9621,
00131 0x4e32, 0x4ea8, 0x4f4d, 0x4f4f, 0x4f47, 0x4f57, 0x4f5e, 0x4f34,
00132 0x4f5b, 0x4f55, 0x4f30, 0x4f50, 0x4f51, 0x4f3d, 0x4f3a, 0x4f38,
00133 0x4f43, 0x4f54, 0x4f3c, 0x4f46, 0x4f63,
00134 /* 0xa7 */
00135 0x4f5c, 0x4f60, 0x4f2f, 0x4f4e, 0x4f36, 0x4f59, 0x4f5d, 0x4f48,
00136 0x4f5a, 0x514c, 0x514b, 0x514d, 0x5175, 0x51b6, 0x51b7, 0x5225,
00137 0x5224, 0x5229, 0x522a, 0x5228, 0x52ab, 0x52a9, 0x52aa, 0x52ac,
00138 0x5323, 0x5373, 0x5375, 0x541d, 0x542d, 0x541e, 0x543e, 0x5426,
00139 0x544e, 0x5427, 0x5446, 0x5443, 0x5433, 0x5448, 0x5442, 0x541b,
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00141 0x5420, 0x543c, 0x5440, 0x5431, 0x542b, 0x541f, 0x542c, 0x56ea,
00142 0x56f0, 0x56e4, 0x56eb, 0x574a, 0x5751, 0x5740, 0x574d, 0x5747,
00143 0x574e, 0x573e, 0x5750, 0x574f, 0x573b, 0x58ef, 0x593e, 0x599d,
00144 0x5992, 0x59a8, 0x599e, 0x59a3, 0x5999, 0x5996, 0x598d, 0x59a4,
00145 0x5993, 0x598a, 0x59a5, 0x5b5d, 0x5b5c, 0x5b5a, 0x5b5b, 0x5b8c,
00146 0x5b8b, 0x5b8f, 0x5c2c, 0x5c40, 0x5c41, 0x5c3f, 0x5c3e, 0x5c90,
00147 0x5c91, 0x5c94, 0x5c8c, 0x5deb, 0x5e0c, 0x5e8f, 0x5e87, 0x5e8a,
00148 0x5ef7, 0x5f04, 0x5f1f, 0x5f64, 0x5f62, 0x5f77, 0x5f79, 0x5fd8,
00149 0x5fcc, 0x5fd7, 0x5fcd, 0x5ff1, 0x5feb, 0x5ff8, 0x5fea, 0x6212,
00150 0x6211, 0x6284, 0x6297, 0x6296, 0x6280, 0x6276, 0x6289, 0x626d,
00151 0x628a, 0x627c, 0x627e, 0x6279, 0x6273, 0x6292, 0x626f, 0x6298,
00152 0x626e, 0x6295, 0x6293, 0x6291, 0x6286, 0x6539, 0x653b, 0x6538,
00153 0x65f1, 0x66f4, 0x675f, 0x674e, 0x674f, 0x6750, 0x6751, 0x675c,
00154 0x6756, 0x675e, 0x6749, 0x6746, 0x6760,
00155 /* 0xa8 */
00156 0x6753, 0x6757, 0x6b65, 0x6bcf, 0x6c42, 0x6c5e, 0x6c99, 0x6c81,
00157 0x6c88, 0x6c89, 0x6c85, 0x6c9b, 0x6c6a, 0x6c7a, 0x6c90, 0x6c70,
00158 0x6c8c, 0x6c68, 0x6c96, 0x6c92, 0x6c7d, 0x6c83, 0x6c72, 0x6c7e,
00159 0x6c74, 0x6c86, 0x6c76, 0x6c8d, 0x6c94, 0x6c98, 0x6c82, 0x7076,
00160 0x707c, 0x707d, 0x7078, 0x7262, 0x7261, 0x7260, 0x72c4, 0x72c2,
00161 0x7396, 0x752c, 0x752b, 0x7537, 0x7538, 0x7682, 0x76ef, 0x77e3,
00162 0x79c1, 0x79c0, 0x79bf, 0x7a76, 0x7cfb, 0x7f55, 0x8096, 0x8093,
00163 0x809d, 0x8098, 0x809b, 0x809a, 0x80b2, 0x826f, 0x8292, 0x828b,
00164 0x828d, 0x898b, 0x89d2, 0x8a00, 0x8c37, 0x8c46, 0x8c55, 0x8c9d,
00165 0x8d64, 0x8d70, 0x8db3, 0x8eab, 0x8eca, 0x8f9b, 0x8fb0, 0x8fc2,
00166 0x8fc6, 0x8fc5, 0x8fc4, 0x5de1, 0x9091, 0x90a2, 0x90aa, 0x90a6,
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00168 0x962c, 0x4e26, 0x4e56, 0x4e73, 0x4e8b, 0x4e9b, 0x4e9e, 0x4eab,
00169 0x4eac, 0x4f6f, 0x4f9d, 0x4f8d, 0x4f73, 0x4f7f, 0x4f6c, 0x4f9b,
00170 0x4f8b, 0x4f86, 0x4f83, 0x4f70, 0x4f75, 0x4f88, 0x4f69, 0x4f7b,
00171 0x4f96, 0x4f7e, 0x4f8f, 0x4f91, 0x4f7a, 0x5154, 0x5152, 0x5155,
00172 0x5169, 0x5177, 0x517e, 0x5176, 0x5178, 0x51bd, 0x51fd, 0x5238,
00173 0x5237, 0x523a, 0x5230, 0x522e, 0x5236, 0x5241, 0x52be, 0x52bb,
00174 0x5352, 0x5354, 0x5353, 0x5351, 0x5366, 0x5377, 0x5378, 0x5379,
00175 0x53d6, 0x53d4, 0x53d7, 0x5473, 0x5475,
00176 /* 0xa9 */
00177 0x5496, 0x5478, 0x5495, 0x5480, 0x547b, 0x5477, 0x5484, 0x5492,
00178 0x5486, 0x547c, 0x5490, 0x5471, 0x5476, 0x548c, 0x549a, 0x5462,
00179 0x5468, 0x548b, 0x547d, 0x548e, 0x56fa, 0x5783, 0x5777, 0x576a,
00180 0x5769, 0x5761, 0x5766, 0x5764, 0x577c, 0x591c, 0x5949, 0x5947,
00181 0x5948, 0x5944, 0x5944, 0x5954, 0x595e, 0x59bb, 0x59d4, 0x59b9, 0x59ae,
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00183 0x59b3, 0x59d2, 0x59c5, 0x5b5f, 0x5b64, 0x5b63, 0x5b97, 0x5b9a,
00184 0x5b98, 0x5b9c, 0x5b99, 0x5b9b, 0x5c1a, 0x5c48, 0x5c45, 0x5c46,
00185 0x5cb7, 0x5ca1, 0x5cb8, 0x5ca9, 0x5cab, 0x5cb1, 0x5cb3, 0x5e18,
00186 0x5e1a, 0x5e16, 0x5e15, 0x5e1b, 0x5e11, 0x5e78, 0x5e9a, 0x5e97,
00187 0x5e9c, 0x5e95, 0x5e96, 0x5e96, 0x5ef6, 0x5f26, 0x5f27, 0x5f29, 0x5f80,
00188 0x5f81, 0x5f7f, 0x5f7c, 0x5fdd, 0x5fe0, 0x5ffd, 0x5ff5, 0x5fff,
00189 0x600f, 0x6014, 0x602f, 0x6035, 0x6016, 0x602a, 0x6015, 0x6021,
00190 0x6027, 0x6029, 0x602b, 0x602b, 0x601b, 0x6216, 0x6215, 0x623f, 0x623e,
00191 0x6240, 0x627f, 0x62c9, 0x62cc, 0x62c4, 0x62bf, 0x62c2, 0x62b9,
00192 0x62d2, 0x62db, 0x62ab, 0x62d3, 0x62d4, 0x62cb, 0x62c8, 0x62a8,
00193 0x62bd, 0x62bc, 0x62d0, 0x62d0, 0x62d9, 0x62c7, 0x62cd, 0x62b5, 0x62da,
00194 0x62b1, 0x62d8, 0x62d6, 0x62d7, 0x62c6, 0x62ac, 0x62ce, 0x653e,
00195 0x65a7, 0x65bc, 0x65fa, 0x6614, 0x6613, 0x660c, 0x6606, 0x6602,
00196 0x660e, 0x6600, 0x660f, 0x6615, 0x660a,
00197 /* 0xaa */
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00199 0x6773, 0x6777, 0x6787, 0x679d, 0x6797, 0x676f, 0x6770, 0x677f,
00200 0x6789, 0x677e, 0x6790, 0x6775, 0x679a, 0x6793, 0x677c, 0x676a,
00201 0x6772, 0x6b23, 0x6b66, 0x6b67, 0x6b7f, 0x6c13, 0x6c1b, 0x6ce3,
00202 0x6ce8, 0x6cf3, 0x6cb1, 0x6ccc, 0x6ce5, 0x6cb3, 0x6cbd, 0x6cbe,
00203 0x6cbc, 0x6ce2, 0x6cab, 0x6cd5, 0x6cd3, 0x6cb8, 0x6cc4, 0x6cb9,
00204 0x6cc1, 0x6cae, 0x6cd7, 0x6cc5, 0x6cf1, 0x6cbf, 0x6cbb, 0x6ce1,
00205 0x6cdb, 0x6cac, 0x6cac, 0x6cef, 0x6cdc, 0x6cd6, 0x6ce0, 0x7095,
00206 0x708e, 0x7092, 0x708a, 0x7099, 0x722c, 0x722d, 0x7238, 0x7248,
00207 0x7267, 0x7269, 0x72c0, 0x72ce, 0x72d9, 0x72d7, 0x72d0, 0x73a9,
00208 0x73a8, 0x739f, 0x739f, 0x73ab, 0x73a5, 0x753d, 0x7599, 0x759a,
00209 0x7684, 0x76c2, 0x76f2, 0x76f4, 0x77e5, 0x77fd, 0x793e, 0x7940,
00210 0x7941, 0x79c9, 0x79c8, 0x7a7a, 0x7a79, 0x7afa, 0x7cfe, 0x7f54,
00211 0x7f8c, 0x7f8b, 0x8005, 0x8005, 0x80ba, 0x80a5, 0x80a2, 0x80b1, 0x80a1,
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00214 0x82ac, 0x82a5, 0x82af, 0x82b8, 0x82a3, 0x82b0, 0x82be, 0x82b7,
00215 0x864e, 0x8671, 0x521d, 0x8868, 0x8ecb, 0x8fce, 0x8fd4, 0x8fd1,
00216 0x90b5, 0x90b8, 0x90b1, 0x90b6, 0x91c7, 0x91d1, 0x9577, 0x9580,
00217 0x961c, 0x9640, 0x963f, 0x963b, 0x9644,
00218 /* 0xab */
00219 0x9642, 0x96b9, 0x96e8, 0x9752, 0x975e, 0x4e9f, 0x4ead, 0x4eae,
00220 0x4fe1, 0x4fb5, 0x4faf, 0x4fbf, 0x4fe0, 0x4fd1, 0x4fcf, 0x4fdd,
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00222 0x4fc4, 0x4fc2, 0x4fda, 0x4fce, 0x4fde, 0x4fb7, 0x5157, 0x5192,
00223 0x5191, 0x51a0, 0x524e, 0x5243, 0x524a, 0x524d, 0x524c, 0x524b,
00224 0x5247, 0x52c7, 0x52c9, 0x52c3, 0x52c1, 0x530d, 0x5357, 0x537b,
00225 0x539a, 0x53db, 0x54ac, 0x54c0, 0x54a8, 0x54ce, 0x54c9, 0x54b8,
00226 0x54a6, 0x54b3, 0x54c7, 0x54c2, 0x54bd, 0x54aa, 0x54c1, 0x54c4,
00227 0x54c8, 0x54af, 0x54ab, 0x54b1, 0x54bb, 0x54a9, 0x54a7, 0x54bf,
00228 0x56ff, 0x5782, 0x578b, 0x57a0, 0x57a3, 0x57a2, 0x57ce, 0x57ae,
00229 0x5793, 0x5955, 0x5951, 0x594f, 0x594e, 0x5950, 0x59dc, 0x59d8,
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00234 0x5f2d, 0x5f65, 0x5f88, 0x5f85, 0x5f8a, 0x5f8b, 0x5f87, 0x5f8c,
00235 0x5f89, 0x6012, 0x601d, 0x6020, 0x6025, 0x600e, 0x6028, 0x604d,
00236 0x6070, 0x6068, 0x6062, 0x6046, 0x6043, 0x606c, 0x606b, 0x606a,
00237 0x6064, 0x6241, 0x62dc, 0x6316, 0x6309, 0x62fc, 0x62ed, 0x6301,
00238 0x62ee, 0x62fd, 0x6307, 0x62f1, 0x62f7,
00239 /* 0xac */
00240 0x62ef, 0x62ec, 0x62fe, 0x62f4, 0x6311, 0x6302, 0x653f, 0x6545,
00241 0x65ab, 0x65bd, 0x65e2, 0x6625, 0x662d, 0x6620, 0x6627, 0x662f,
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00244 0x67c4, 0x67d1, 0x67b4, 0x67da, 0x67e5, 0x67b8, 0x67cf, 0x67de,
00245 0x67f3, 0x67b0, 0x67d9, 0x67e2, 0x67dd, 0x67d2, 0x6b6a, 0x6b83,
00246 0x6b86, 0x6bb5, 0x6bd2, 0x6bd7, 0x6c1f, 0x6cc9, 0x6d0b, 0x6d32,
00247 0x6d2a, 0x6d41, 0x6d25, 0x6d0c, 0x6d31, 0x6d1e, 0x6d17, 0x6d3b,
00248 0x6d3d, 0x6d3e, 0x6d36, 0x6d1b, 0x6cf5, 0x6d39, 0x6d27, 0x6d38,
00249 0x6d29, 0x6d2e, 0x6d35, 0x6d0e, 0x6d2b, 0x70ab, 0x70ba, 0x70b3,
00250 0x70ac, 0x70af, 0x70ad, 0x70b8, 0x70ae, 0x70a4, 0x7230, 0x7272,
00251 0x726f, 0x7274, 0x72e9, 0x72e0, 0x72e1, 0x73b7, 0x73ca, 0x73bb,
00252 0x73b2, 0x73cd, 0x73c0, 0x73b3, 0x751a, 0x752d, 0x754f, 0x754c,
00253 0x754e, 0x754b, 0x75ab, 0x75a4, 0x75a5, 0x75a2, 0x75a3, 0x7678,
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00257 0x79b9, 0x79ba, 0x79d1, 0x79d2, 0x79cb, 0x7a7f, 0x7a81, 0x7aff,
00258 0x7afd, 0x7c7d, 0x7d02, 0x7d05, 0x7d00, 0x7d09, 0x7d07, 0x7d04,
00259 0x7d06, 0x7f38, 0x7f8e, 0x7fbf, 0x8004,
00260 /* 0xad */
00261 0x8010, 0x800d, 0x8011, 0x8036, 0x80d6, 0x80e5, 0x80da, 0x80c3,
00262 0x80c4, 0x80cc, 0x80e1, 0x80db, 0x80ce, 0x80de, 0x80e4, 0x80dd,
00263 0x81f4, 0x8222, 0x82e7, 0x8303, 0x8305, 0x82e3, 0x82db, 0x82e6,
00264 0x8304, 0x82e5, 0x8302, 0x8309, 0x82d2, 0x82d7, 0x82f1, 0x8301,
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00267 0x8a08, 0x8a02, 0x8a03, 0x8c9e, 0x8ca0, 0x8d74, 0x8d73, 0x8db4,
00268 0x8ecd, 0x8ecc, 0x8ff0, 0x8fe6, 0x8fe2, 0x8fea, 0x8fe5, 0x8fed,
00269 0x8feb, 0x8fe4, 0x8fe8, 0x90ca, 0x90ce, 0x90c1, 0x90c3, 0x914b,
00270 0x914a, 0x91cd, 0x9582, 0x9650, 0x964b, 0x964c, 0x964d, 0x9762,
00271 0x9769, 0x97cb, 0x97ed, 0x97f3, 0x9801, 0x98a8, 0x98db, 0x98df,
00272 0x9996, 0x9999, 0x4e58, 0x4eb3, 0x500c, 0x500d, 0x5023, 0x4fef,
00273 0x5026, 0x5025, 0x4ff8, 0x5029, 0x5016, 0x5006, 0x503c, 0x501f,
00274 0x501a, 0x5012, 0x501c, 0x5011, 0x4ffa, 0x5000, 0x5014, 0x5028, 0x4ff1,
00275 0x5021, 0x500b, 0x5019, 0x5018, 0x4ff3, 0x4fee, 0x502d, 0x502a,
00276 0x4ffe, 0x502b, 0x5009, 0x517c, 0x51a4, 0x51a5, 0x51a2, 0x51cd,
00277 0x51cc, 0x51c6, 0x51cb, 0x5256, 0x525c, 0x5254, 0x525b, 0x525d,
00278 0x532a, 0x537f, 0x539f, 0x539d, 0x53df, 0x54e8, 0x5510, 0x5501,
00279 0x5537, 0x54fc, 0x54e5, 0x54f2, 0x5506, 0x54fa, 0x5514, 0x54e9,
00280 0x54ed, 0x54e1, 0x5509, 0x54ee, 0x54ea,
00281 /* 0xae */
00282 0x54e6, 0x5527, 0x5507, 0x54fd, 0x550f, 0x5703, 0x5704, 0x57c2,
00283 0x57d4, 0x57cb, 0x57c3, 0x5809, 0x590f, 0x5957, 0x5958, 0x595a,
00284 0x5a11, 0x5a18, 0x5a1c, 0x5a1f, 0x5a1b, 0x5a13, 0x59ec, 0x5a20,
00285 0x5a23, 0x5a29, 0x5a25, 0x5a0c, 0x5a09, 0x5b6b, 0x5c58, 0x5bb0,
00286 0x5bb3, 0x5bb6, 0x5bb4, 0x5bae, 0x5bb5, 0x5bb9, 0x5bb8, 0x5c04,
00287 0x5c51, 0x5c55, 0x5c50, 0x5ced, 0x5cfd, 0x5cfb, 0x5cea, 0x5ce8,
00288 0x5cf0, 0x5cf6, 0x5d01, 0x5cf4, 0x5dee, 0x5e2d, 0x5e2b, 0x5eab,
00289 0x5ead, 0x5ea7, 0x5f31, 0x5f92, 0x5f91, 0x5f90, 0x6059, 0x6063,
00290 0x6065, 0x6050, 0x6055, 0x606d, 0x6069, 0x606f, 0x6084, 0x609f,
00291 0x609a, 0x608d, 0x6094, 0x608c, 0x6085, 0x6096, 0x6247, 0x62f3,
00292 0x6308, 0x62ff, 0x634e, 0x634e, 0x633e, 0x632f, 0x6355, 0x6342, 0x6346,
00293 0x634f, 0x6349, 0x633a, 0x6350, 0x633d, 0x632a, 0x632b, 0x6328,
00294 0x634d, 0x634c, 0x6548, 0x6549, 0x6599, 0x65c1, 0x65c5, 0x6642,
00295 0x6649, 0x664f, 0x6643, 0x6652, 0x664c, 0x6645, 0x6641, 0x66f8,
00296 0x6714, 0x6715, 0x6717, 0x6821, 0x6838, 0x6848, 0x6846, 0x6853,
00297 0x6839, 0x6842, 0x6854, 0x6829, 0x68b3, 0x6817, 0x684c, 0x6851,
00298 0x683d, 0x67f4, 0x6850, 0x6840, 0x683c, 0x6843, 0x682a, 0x6845,
00299 0x6813, 0x6818, 0x6841, 0x6b8a, 0x6b89, 0x6bb7, 0x6c23, 0x6c27,
00300 0x6c28, 0x6c26, 0x6c24, 0x6cf0, 0x6d6a, 0x6d95, 0x6d88, 0x6d87,
00301 0x6d66, 0x6d78, 0x6d77, 0x6d59, 0x6d93,
00302 /* 0xaf */
00303 0x6d6c, 0x6d89, 0x6d6e, 0x6d5a, 0x6d74, 0x6d69, 0x6d8c, 0x6d8a,
00304 0x6d79, 0x6d85, 0x6d65, 0x6d94, 0x70ca, 0x70d8, 0x70e4, 0x70d9,
00305 0x70c8, 0x70cf, 0x7239, 0x7279, 0x72fc, 0x72f9, 0x72fd, 0x72f8,
00306 0x72f7, 0x7386, 0x73ed, 0x7409, 0x73ee, 0x73e0, 0x73ea, 0x73de,
00307 0x7554, 0x755d, 0x755c, 0x755a, 0x7559, 0x75be, 0x75c5, 0x75c7,
00308 0x75b2, 0x75b3, 0x75bd, 0x75bc, 0x75b9, 0x75c2, 0x75b8, 0x768b,
00309 0x76b0, 0x76ca, 0x76cd, 0x76ce, 0x7729, 0x771f, 0x7720, 0x7728,
00310 0x77e9, 0x7830, 0x7827, 0x7838, 0x781d, 0x7834, 0x7837, 0x7825,
00311 0x782d, 0x7820, 0x781f, 0x7832, 0x7955, 0x7950, 0x7960, 0x795f,
00312 0x7956, 0x795e, 0x795d, 0x7957, 0x795a, 0x79e4, 0x79e3, 0x79e7,
00313 0x79df, 0x79e6, 0x79e9, 0x79d8, 0x7a84, 0x7a88, 0x7ad9, 0x7b06,
00314 0x7b11, 0x7c89, 0x7d21, 0x7d17, 0x7d0b, 0x7d0a, 0x7d20, 0x7d22,
00315 0x7d14, 0x7d10, 0x7d15, 0x7d1a, 0x7d1c, 0x7d0d, 0x7d19, 0x7d1b,
00316 0x7f3a, 0x7f5e, 0x7f5d, 0x7fc5, 0x7fc1, 0x8006, 0x8018, 0x8015,
00317 0x8019, 0x8017, 0x803d, 0x803f, 0x80f1, 0x8102, 0x80f0, 0x8105,
00318 0x80ed, 0x80f4, 0x8106, 0x80f8, 0x80f3, 0x8108, 0x80fd, 0x810a,
00319 0x80fc, 0x80ef, 0x81ed, 0x81ec, 0x8200, 0x8210, 0x822a, 0x822b,
00320 0x8228, 0x822c, 0x82bb, 0x832b, 0x8352, 0x8354, 0x834a, 0x8338,
00321 0x8350, 0x8349, 0x8335, 0x8334, 0x834f, 0x8332, 0x8339, 0x8336,
00322 0x8317, 0x8340, 0x8331, 0x8328, 0x8343,
00323 /* 0xb0 */
00324 0x8654, 0x868a, 0x86aa, 0x8693, 0x86a4, 0x86a9, 0x868c, 0x86a3,
00325 0x869c, 0x8870, 0x8877, 0x8881, 0x8882, 0x887d, 0x8879, 0x8a18,
00326 0x8a10, 0x8a0e, 0x8a0c, 0x8a15, 0x8a0a, 0x8a17, 0x8a13, 0x8a16,
00327 0x8a0f, 0x8a11, 0x8c48, 0x8c7a, 0x8c79, 0x8ca1, 0x8ca2, 0x8d77,
00328 0x8eac, 0x8ed2, 0x8ed4, 0x8ecf, 0x8fb1, 0x9001, 0x9006, 0x8ff7,
00329 0x9000, 0x8ff4, 0x8ff4, 0x9003, 0x8ff4, 0x9005, 0x8ff8, 0x9095,
00330 0x90e1, 0x90dd, 0x90e2, 0x9152, 0x914d, 0x914c, 0x91d8, 0x91dd,
00331 0x91d7, 0x91dc, 0x91d9, 0x9583, 0x9662, 0x9663, 0x9661, 0x965b,
00332 0x965d, 0x9664, 0x9658, 0x965e, 0x96bb, 0x98e2, 0x99ac, 0x9aa8,
00333 0x9ad8, 0x9b25, 0x9b32, 0x9b3c, 0x4e7e, 0x507a, 0x507d, 0x505c,
00334 0x5047, 0x5043, 0x504c, 0x505a, 0x5049, 0x5065, 0x5076, 0x504e,
00335 0x5055, 0x5075, 0x5074, 0x5077, 0x504f, 0x500f, 0x506f, 0x506d,
00336 0x515c, 0x5195, 0x51f0, 0x526a, 0x526f, 0x52d2, 0x52d9, 0x52d8,
00337 0x52d5, 0x5310, 0x530f, 0x5319, 0x533f, 0x5340, 0x533e, 0x53c3,
00338 0x66fc, 0x5546, 0x556a, 0x5566, 0x5544, 0x555e, 0x5561, 0x5543,
00339 0x554a, 0x5531, 0x5556, 0x555f, 0x5555, 0x552f, 0x5564, 0x5538,
00340 0x552e, 0x555c, 0x552c, 0x5563, 0x5533, 0x5541, 0x5557, 0x5708,
```

```
00341 0x570b, 0x5709, 0x57df, 0x5805, 0x580a, 0x5806, 0x57e0, 0x57e4,
00342 0x57fa, 0x5802, 0x5835, 0x57f7, 0x57f9, 0x5920, 0x5962, 0x5a36,
00343 0x5a41, 0x5a49, 0x5a66, 0x5a6a, 0x5a40,
00344 /* 0xb1 */
00345 0x5a3c, 0x5a62, 0x5a5a, 0x5a46, 0x5a4a, 0x5b70, 0x5bc7, 0x5bc5,
00346 0x5bc4, 0x5bc2, 0x5bbf, 0x5bc6, 0x5c09, 0x5c08, 0x5c07, 0x5c60,
00347 0x5c5c, 0x5c5d, 0x5d07, 0x5d06, 0x5d0e, 0x5d1b, 0x5d16, 0x5d22,
00348 0x5d11, 0x5d29, 0x5d14, 0x5d19, 0x5d24, 0x5d27, 0x5d17, 0x5de2,
00349 0x5e38, 0x5e36, 0x5e33, 0x5e37, 0x5eb7, 0x5eb8, 0x5eb6, 0x5eb5,
00350 0x5ebe, 0x5f35, 0x5f37, 0x5f57, 0x5f6c, 0x5f69, 0x5f6b, 0x5f97,
00351 0x5f99, 0x5f9e, 0x5f98, 0x5fa1, 0x5fa0, 0x5f9c, 0x607f, 0x60a3,
00352 0x6089, 0x60a0, 0x60a8, 0x60cb, 0x60b4, 0x60e6, 0x60bd, 0x60c5,
00353 0x60bb, 0x60b5, 0x60dc, 0x60bc, 0x60d8, 0x60d5, 0x60c6, 0x60df,
00354 0x60b8, 0x60da, 0x60c7, 0x621a, 0x621b, 0x6248, 0x63a0, 0x63a7,
00355 0x6372, 0x6396, 0x63a2, 0x63a5, 0x6377, 0x6367, 0x6398, 0x63aa,
00356 0x6371, 0x63a9, 0x6389, 0x6383, 0x639b, 0x636b, 0x63a8, 0x6384,
00357 0x6388, 0x6399, 0x63a1, 0x63ac, 0x6392, 0x638f, 0x6380, 0x637b,
00358 0x6369, 0x6368, 0x637a, 0x655d, 0x6556, 0x6551, 0x6559, 0x6557,
00359 0x555f, 0x654f, 0x6558, 0x6555, 0x6554, 0x659c, 0x659b, 0x65ac,
00360 0x65cf, 0x65cb, 0x65cc, 0x65ce, 0x665d, 0x665a, 0x6664, 0x6668,
00361 0x6666, 0x665e, 0x66f9, 0x52d7, 0x671b, 0x6881, 0x68af, 0x68a2,
00362 0x6893, 0x68b5, 0x687f, 0x6876, 0x68b1, 0x68a7, 0x6897, 0x68b0,
00363 0x6883, 0x68c4, 0x68ad, 0x6886, 0x6885, 0x6894, 0x689d, 0x68a8,
00364 0x689f, 0x68a1, 0x6882, 0x6b32, 0x6bba,
00365 /* 0xb2 */
00366 0x6beb, 0x6bec, 0x6c2b, 0x6d8e, 0x6dbc, 0x6df3, 0x6dd9, 0x6db2,
00367 0x6de1, 0x6dcc, 0x6de4, 0x6dfb, 0x6dfa, 0x6e05, 0x6dc7, 0x6dcb,
00368 0x6daf, 0x6ddl, 0x6dae, 0x6dde, 0x6df9, 0x6db8, 0x6df7, 0x6df5,
00369 0x6dc5, 0x6dd2, 0x6e1a, 0x6db5, 0x6dda, 0x6deb, 0x6dd8, 0x6dea,
00370 0x6df1, 0x6dee, 0x6de8, 0x6dc6, 0x6dc4, 0x6daa, 0x6dec, 0x6dbf,
00371 0x6de6, 0x70f9, 0x7109, 0x710a, 0x70fd, 0x70ef, 0x723d, 0x727d,
00372 0x7281, 0x731c, 0x731b, 0x7316, 0x7313, 0x7319, 0x7387, 0x7405,
00373 0x740a, 0x7403, 0x7406, 0x740e, 0x740d, 0x74e0, 0x74f6, 0x74f7,
00374 0x751c, 0x7522, 0x7565, 0x7566, 0x7562, 0x7570, 0x758f, 0x75d4,
00375 0x75d5, 0x75b5, 0x75ca, 0x75cd, 0x768e, 0x76d4, 0x76d2, 0x76db,
00376 0x7737, 0x773e, 0x773c, 0x7736, 0x7738, 0x773a, 0x786b, 0x7843,
00377 0x784e, 0x7965, 0x7968, 0x796d, 0x79fb, 0x7a92, 0x7a95, 0x7b20,
00378 0x7b28, 0x7b1b, 0x7b2c, 0x7b26, 0x7b19, 0x7b1e, 0x7b2e, 0x7c92,
00379 0x7c97, 0x7c95, 0x7d46, 0x7d43, 0x7d71, 0x7d2e, 0x7d3c, 0x7d3c,
00380 0x7d40, 0x7d30, 0x7d33, 0x7d44, 0x7d2f, 0x7d42, 0x7d32, 0x7d31,
00381 0x7f3d, 0x7f9e, 0x7f9a, 0x7fcc, 0x7fce, 0x7fd2, 0x801c, 0x804a,
00382 0x8046, 0x812f, 0x8116, 0x8123, 0x812b, 0x8129, 0x8130, 0x8124,
00383 0x8202, 0x8235, 0x8237, 0x8236, 0x8239, 0x838e, 0x839e, 0x8398,
00384 0x8378, 0x83a2, 0x8396, 0x83bd, 0x83ab, 0x8392, 0x838a, 0x8393,
00385 0x8389, 0x83a0, 0x8377, 0x837b, 0x837c,
00386 /* 0xb3 */
00387 0x8386, 0x83a7, 0x8655, 0x5f6a, 0x86c7, 0x86c0, 0x86b6, 0x86c4,
00388 0x86b5, 0x86cb, 0x86cb, 0x86b1, 0x86af, 0x86c9, 0x8853, 0x889e,
00389 0x8888, 0x88ab, 0x8892, 0x8896, 0x888d, 0x888b, 0x8993, 0x898f,
00390 0x8a2a, 0x8a1d, 0x8a23, 0x8a25, 0x8a31, 0x8a2d, 0x8a1f, 0x8a1b,
00391 0x8a22, 0x8c49, 0x8c5a, 0x8ca9, 0x8cac, 0x8cab, 0x8ca8, 0x8caa,
00392 0x8ca7, 0x8d67, 0x8d66, 0x8dbe, 0x8dba, 0x8edb, 0x8edf, 0x9019,
00393 0x900d, 0x901a, 0x9017, 0x9023, 0x901f, 0x901d, 0x9010, 0x9015,
00394 0x901e, 0x9020, 0x900f, 0x9022, 0x9016, 0x901b, 0x9014, 0x90e8,
00395 0x90ed, 0x90fd, 0x9157, 0x91ce, 0x91f5, 0x91e6, 0x91e3, 0x91e7,
00396 0x91ed, 0x91e9, 0x9589, 0x966a, 0x9675, 0x9673, 0x9678, 0x9670,
00397 0x9674, 0x9676, 0x9677, 0x966c, 0x96c0, 0x96ea, 0x96e9, 0x7ae0,
00398 0x7adf, 0x9802, 0x9803, 0x9b5a, 0x9ce5, 0x9e75, 0x9e7f, 0x9ea5,
00399 0x9ebb, 0x50a2, 0x508d, 0x5085, 0x5099, 0x5091, 0x5080, 0x5096,
00400 0x5098, 0x509a, 0x6700, 0x51f1, 0x5272, 0x5274, 0x5275, 0x5269,
00401 0x52de, 0x52dd, 0x52db, 0x535a, 0x53a5, 0x557b, 0x5580, 0x55a7,
00402 0x557c, 0x558a, 0x559d, 0x5598, 0x5582, 0x559c, 0x55aa, 0x5594,
00403 0x5587, 0x558b, 0x5583, 0x55b3, 0x55ae, 0x559f, 0x553e, 0x55b2,
00404 0x559a, 0x55bb, 0x55ac, 0x55b1, 0x557e, 0x5589, 0x55ab, 0x5599,
00405 0x570d, 0x582f, 0x582a, 0x5834, 0x5824, 0x5830, 0x5831, 0x5821,
00406 0x581d, 0x5820, 0x58f9, 0x58fa, 0x5960,
00407 /* 0xb4 */
00408 0x5a77, 0x5a9a, 0x5a7f, 0x5a92, 0x5a9b, 0x5aa7, 0x5b73, 0x5b71,
00409 0x5bd2, 0x5bcc, 0x5bd3, 0x5bd0, 0x5c0a, 0x5c0b, 0x5c31, 0x5d4c,
00410 0x5d50, 0x5d34, 0x5d47, 0x5dfd, 0x5e45, 0x5e3d, 0x5e40, 0x5e43,
00411 0x5e7e, 0x5eca, 0x5ec1, 0x5ec2, 0x5ec4, 0x5f3c, 0x5f6d, 0x5fa9,
00412 0x5faa, 0x5fa8, 0x60d1, 0x60e1, 0x60b2, 0x60b6, 0x60e0, 0x611c,
00413 0x6123, 0x60fa, 0x6115, 0x60f0, 0x60fb, 0x60f4, 0x6168, 0x60f1,
00414 0x610e, 0x60f6, 0x6109, 0x6100, 0x6112, 0x621f, 0x6249, 0x63a3,
00415 0x638c, 0x63cf, 0x63c0, 0x63e9, 0x63c9, 0x63c6, 0x63cd, 0x63d2,
00416 0x63e3, 0x63d0, 0x63e1, 0x63d6, 0x63ed, 0x63ee, 0x6376, 0x63f4,
00417 0x63ea, 0x63db, 0x6452, 0x63da, 0x63f9, 0x655e, 0x6566, 0x6562,
00418 0x6563, 0x6591, 0x6590, 0x65af, 0x666e, 0x6670, 0x6674, 0x6676,
00419 0x666f, 0x6691, 0x667a, 0x667e, 0x6677, 0x667f, 0x66ff, 0x671f,
00420 0x671d, 0x68fa, 0x68d5, 0x68e0, 0x68d8, 0x68d7, 0x6905, 0x68df,
00421 0x68f5, 0x68ee, 0x68e7, 0x68f9, 0x68d2, 0x68f2, 0x68e3, 0x68cb,
00422 0x68cd, 0x690d, 0x6912, 0x690e, 0x68c9, 0x68da, 0x696e, 0x68fb,
00423 0x6b3e, 0x6b3a, 0x6b3d, 0x6b98, 0x6b96, 0x6bbc, 0x6bef, 0x6c2e,
00424 0x6c2f, 0x6c2c, 0x6e2f, 0x6e38, 0x6e54, 0x6e21, 0x6e32, 0x6e67,
00425 0x6e4a, 0x6e20, 0x6e25, 0x6e23, 0x6e1b, 0x6e5b, 0x6e58, 0x6e24,
00426 0x6e56, 0x6e6e, 0x6e2d, 0x6e26, 0x6e6f, 0x6e34, 0x6e4d, 0x6e3a,
00427 0x6e2c, 0x6e43, 0x6e1d, 0x6e3e, 0x6ecb,
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00428 /* 0xb5 */
00429 0x6e89, 0x6e19, 0x6e4e, 0x6e63, 0x6e44, 0x6e72, 0x6e69, 0x6e5f,
00430 0x7119, 0x711a, 0x7126, 0x7130, 0x7121, 0x7136, 0x716e, 0x711c,
00431 0x724c, 0x7284, 0x7280, 0x7336, 0x7325, 0x7334, 0x7329, 0x743a,
00432 0x742a, 0x7433, 0x7422, 0x7425, 0x7435, 0x7436, 0x7434, 0x742f,
00433 0x741b, 0x7426, 0x7428, 0x7525, 0x7526, 0x756b, 0x756a, 0x75e2,
00434 0x75db, 0x75e3, 0x75d9, 0x75d8, 0x75de, 0x75e0, 0x767b, 0x767c,
00435 0x7696, 0x7693, 0x76b4, 0x76dc, 0x774f, 0x77ed, 0x785d, 0x786c,
00436 0x786f, 0x7a0d, 0x7a08, 0x7a0b, 0x7a05, 0x7a00, 0x7a98, 0x7a97,
00437 0x7a96, 0x7ae5, 0x7ae3, 0x7b49, 0x7b56, 0x7b46, 0x7b50, 0x7b52,
00438 0x7b54, 0x7b4d, 0x7b4b, 0x7b4f, 0x7b51, 0x7c9f, 0x7ca5, 0x7d5e,
00439 0x7d50, 0x7d68, 0x7d55, 0x7d2b, 0x7d6e, 0x7d72, 0x7d61, 0x7d66,
00440 0x7d62, 0x7d70, 0x7d73, 0x5584, 0x7fd4, 0x7fd5, 0x800b, 0x8052,
00441 0x8085, 0x8155, 0x8154, 0x814b, 0x8151, 0x814e, 0x8139, 0x8146,
00442 0x813e, 0x814c, 0x814c, 0x8153, 0x8174, 0x8212, 0x821c, 0x83e9, 0x8403,
00443 0x83f8, 0x840d, 0x83e0, 0x83c5, 0x840b, 0x83c1, 0x83ef, 0x83f1,
00444 0x83f4, 0x8457, 0x840a, 0x83f0, 0x840c, 0x83cc, 0x83fd, 0x83f2,
00445 0x83ca, 0x8438, 0x840e, 0x840e, 0x8404, 0x83dc, 0x8407, 0x83d4, 0x83df,
00446 0x865b, 0x86df, 0x86d9, 0x86ed, 0x86d4, 0x86db, 0x86e4, 0x86d0,
00447 0x86de, 0x8857, 0x88c1, 0x88c2, 0x88b1, 0x8983, 0x8996, 0x8a3b,
00448 0x8a60, 0x8a55, 0x8a5e, 0x8a3c, 0x8a41,
00449 /* 0xb6 */
00450 0x8a54, 0x8a5b, 0x8a50, 0x8a46, 0x8a34, 0x8a3a, 0x8a36, 0x8a56,
00451 0x8c61, 0x8c82, 0x8caf, 0x8cbc, 0x8cb3, 0x8cbd, 0x8cc1, 0x8cbb,
00452 0x8cc0, 0x8cb4, 0x8cb7, 0x8cb6, 0x8cbf, 0x8cb8, 0x8d8a, 0x8d85,
00453 0x8d81, 0x8dce, 0x8ddd, 0x8dcb, 0x8dda, 0x8dd1, 0x8dcc, 0x8ddb,
00454 0x8dc6, 0x8efb, 0x8ef8, 0x8efc, 0x8f9c, 0x902e, 0x9035, 0x9031,
00455 0x9038, 0x9032, 0x9036, 0x9102, 0x90f5, 0x9109, 0x90fe, 0x9163,
00456 0x9165, 0x91cf, 0x9214, 0x9215, 0x9223, 0x9209, 0x921e, 0x920d,
00457 0x9210, 0x9207, 0x9211, 0x9594, 0x958f, 0x958b, 0x9591, 0x9593,
00458 0x9592, 0x958e, 0x968a, 0x968e, 0x968b, 0x967d, 0x9685, 0x9686,
00459 0x968d, 0x9672, 0x9684, 0x96c1, 0x96c5, 0x96c4, 0x96c6, 0x96c7,
00460 0x96ef, 0x96f2, 0x97cc, 0x9805, 0x9806, 0x9808, 0x98e7, 0x98ea,
00461 0x98ef, 0x98e9, 0x98f2, 0x98ed, 0x99ae, 0x99ad, 0x9ec3, 0x9ecd,
00462 0x9ed1, 0x4e82, 0x50ad, 0x50b5, 0x50b2, 0x50b3, 0x50c5, 0x50be,
00463 0x50ac, 0x50b7, 0x50bb, 0x50af, 0x50c7, 0x527f, 0x5277, 0x527d,
00464 0x52df, 0x52e6, 0x52e4, 0x52e2, 0x52e3, 0x532f, 0x55df, 0x55e8,
00465 0x55d3, 0x55de, 0x55ce, 0x55dc, 0x55c7, 0x55d1, 0x55e3, 0x55e4,
00466 0x55ef, 0x55da, 0x55e1, 0x55c5, 0x55c6, 0x55e5, 0x55c9, 0x5712,
00467 0x5713, 0x585e, 0x5851, 0x5858, 0x5857, 0x585a, 0x5854, 0x586b,
00468 0x584c, 0x586d, 0x584a, 0x5862, 0x5852, 0x584b, 0x5967, 0x5ac1,
00469 0x5ac9, 0x5acc, 0x5abe, 0x5abd, 0x5abc,
00470 /* 0xb7 */
00471 0x5ab3, 0x5ac2, 0x5ab2, 0x5d69, 0x5d6f, 0x5e4c, 0x5e79, 0x5ec9,
00472 0x5ec8, 0x5f12, 0x5f59, 0x5fac, 0x5fae, 0x611a, 0x610f, 0x6148,
00473 0x611f, 0x60f3, 0x611b, 0x60f9, 0x6101, 0x6108, 0x614e, 0x614c,
00474 0x6144, 0x614d, 0x613e, 0x6134, 0x6127, 0x610d, 0x6106, 0x6137,
00475 0x6221, 0x6222, 0x6413, 0x643e, 0x641e, 0x642a, 0x642d, 0x643d,
00476 0x642c, 0x640f, 0x641c, 0x6414, 0x640d, 0x6436, 0x6416, 0x6417,
00477 0x6406, 0x656c, 0x659f, 0x65b0, 0x6697, 0x6689, 0x6687, 0x6688,
00478 0x6696, 0x6684, 0x6698, 0x668d, 0x6703, 0x6994, 0x696d, 0x695a,
00479 0x6977, 0x6960, 0x6954, 0x6975, 0x6930, 0x6982, 0x694a, 0x6968,
00480 0x696b, 0x695e, 0x6953, 0x6979, 0x6986, 0x695d, 0x6963, 0x695b,
00481 0x6b47, 0x6b72, 0x6bc0, 0x6bbf, 0x6bd3, 0x6bfd, 0x6ea2, 0x6eaf,
00482 0x6ed3, 0x6eb6, 0x6ec2, 0x6e90, 0x6e9d, 0x6ec7, 0x6ec5, 0x6ea5,
00483 0x6e98, 0x6ebc, 0x6eba, 0x6eab, 0x6ed1, 0x6e96, 0x6e9c, 0x6ec4,
00484 0x6ed4, 0x6eaa, 0x6ea7, 0x6eb4, 0x714e, 0x7159, 0x7169, 0x7164,
00485 0x7149, 0x7167, 0x715c, 0x716c, 0x7166, 0x714c, 0x7165, 0x715e,
00486 0x7146, 0x7168, 0x7156, 0x723a, 0x7252, 0x7337, 0x7345, 0x733f,
00487 0x733e, 0x746f, 0x745a, 0x7455, 0x745f, 0x745e, 0x7441, 0x743f,
00488 0x7459, 0x745b, 0x745c, 0x7576, 0x7578, 0x7600, 0x75f0, 0x7601,
00489 0x75f2, 0x75f1, 0x75fa, 0x75ff, 0x75f4, 0x75f3, 0x76de, 0x76df,
00490 0x775b, 0x776b, 0x7766, 0x775e, 0x7763,
00491 /* 0xb8 */
00492 0x7779, 0x776a, 0x776c, 0x775c, 0x7765, 0x7768, 0x7762, 0x77ee,
00493 0x788e, 0x78b0, 0x7897, 0x7898, 0x788c, 0x7889, 0x787c, 0x7891,
00494 0x7893, 0x787f, 0x797a, 0x797f, 0x7981, 0x842c, 0x79bd, 0x7a1c,
00495 0x7a1a, 0x7a20, 0x7a14, 0x7a1f, 0x7a1e, 0x7a9f, 0x7aa0, 0x7b77,
00496 0x7bc0, 0x7b60, 0x7b6e, 0x7b67, 0x7cb1, 0x7cb3, 0x7cb5, 0x7d93,
00497 0x7d79, 0x7d91, 0x7d81, 0x7d8f, 0x7d5b, 0x7f6e, 0x7f69, 0x7f6a,
00498 0x7f72, 0x7fa9, 0x7fa8, 0x7fa4, 0x8056, 0x8058, 0x8086, 0x8084,
00499 0x8171, 0x8170, 0x8178, 0x8165, 0x816e, 0x8173, 0x816b, 0x8179,
00500 0x8174, 0x8166, 0x8205, 0x8247, 0x8482, 0x8477, 0x843d, 0x8431,
00501 0x8475, 0x8466, 0x846b, 0x846b, 0x846c, 0x845b, 0x843c, 0x8435,
00502 0x8461, 0x8463, 0x8469, 0x846d, 0x8446, 0x865e, 0x865c, 0x865f,
00503 0x86f9, 0x8713, 0x8708, 0x8707, 0x8700, 0x86fe, 0x86fe, 0x8702,
00504 0x8703, 0x8706, 0x870a, 0x870a, 0x8859, 0x88df, 0x88d4, 0x88d9, 0x88dc,
00505 0x88d8, 0x88dd, 0x88e1, 0x88ca, 0x88d5, 0x88d2, 0x899c, 0x89e3,
00506 0x8a6b, 0x8a72, 0x8a73, 0x8a66, 0x8a69, 0x8a70, 0x8a87, 0x8a7c,
00507 0x8a63, 0x8aa0, 0x8aa7, 0x8a71, 0x8a85, 0x8a6d, 0x8a62, 0x8a6e, 0x8a6c,
00508 0x8a79, 0x8a7b, 0x8a3e, 0x8a68, 0x8c62, 0x8c8a, 0x8c89, 0x8cca,
00509 0x8cc7, 0x8cc8, 0x8cc4, 0x8cb2, 0x8cc3, 0x8cc2, 0x8cc5, 0x8de1,
00510 0x8ddf, 0x8de8, 0x8def, 0x8df3, 0x8dfa, 0x8dea, 0x8de4, 0x8de6,
00511 0x8eb2, 0x8f03, 0x8f09, 0x8efe, 0x8f0a,
00512 /* 0xb9 */
00513 0x8f9f, 0x8fb2, 0x904b, 0x904a, 0x9053, 0x9042, 0x9054, 0x903c,
00514 0x9055, 0x9050, 0x9047, 0x904f, 0x904e, 0x904d, 0x9051, 0x903e,
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00515 0x9041, 0x9112, 0x9117, 0x916c, 0x916a, 0x9169, 0x91c9, 0x9237,
00516 0x9257, 0x9238, 0x923d, 0x9240, 0x923e, 0x925b, 0x924b, 0x9264,
00517 0x9251, 0x9234, 0x9249, 0x924d, 0x9245, 0x9239, 0x923f, 0x925a,
00518 0x9598, 0x9698, 0x9694, 0x9695, 0x96cd, 0x96cb, 0x96c9, 0x96ca,
00519 0x96f7, 0x96f6, 0x96f9, 0x96f6, 0x9756, 0x9774, 0x9776, 0x9810,
00520 0x9811, 0x9813, 0x980a, 0x9812, 0x980c, 0x98fc, 0x98f4, 0x98fd,
00521 0x98fe, 0x99b3, 0x99b1, 0x99b4, 0x9ae1, 0x9ce9, 0x9e82, 0x9f0e,
00522 0x9f13, 0x9f20, 0x50e7, 0x50ee, 0x50e5, 0x50d6, 0x50ed, 0x50da,
00523 0x50d5, 0x50cf, 0x50d1, 0x50f1, 0x50ce, 0x50e9, 0x5162, 0x51f3,
00524 0x5283, 0x5282, 0x5331, 0x53ad, 0x55fe, 0x5600, 0x561b, 0x5617,
00525 0x55fd, 0x5614, 0x5606, 0x5609, 0x560d, 0x560e, 0x55f7, 0x5616,
00526 0x561f, 0x5608, 0x5610, 0x55f6, 0x5718, 0x5716, 0x5875, 0x587e,
00527 0x5883, 0x5893, 0x588a, 0x5879, 0x5885, 0x587d, 0x58fd, 0x5925,
00528 0x5922, 0x5924, 0x596a, 0x5969, 0x5ae1, 0x5ae6, 0x5ae9, 0x5ad7,
00529 0x5ad6, 0x5ad8, 0x5ae3, 0x5b75, 0x5bde, 0x5be7, 0x5be1, 0x5be5,
00530 0x5be6, 0x5be8, 0x5be2, 0x5be4, 0x5bdf, 0x5c0d, 0x5c62, 0x5d84,
00531 0x5d87, 0x5e5b, 0x5e63, 0x5e55, 0x5e57, 0x5e54, 0x5ed3, 0x5ed6,
00532 0x5f0a, 0x5f46, 0x5f70, 0x5fb9, 0x6147,
00533 /* 0xba */
00534 0x613f, 0x614b, 0x6177, 0x6162, 0x6163, 0x615f, 0x615a, 0x6158,
00535 0x6175, 0x622a, 0x6487, 0x6458, 0x6454, 0x64a4, 0x6478, 0x645f,
00536 0x647a, 0x6451, 0x6467, 0x6434, 0x646d, 0x647b, 0x6572, 0x65a1,
00537 0x65d7, 0x65d6, 0x66a2, 0x66a8, 0x669d, 0x669c, 0x669a, 0x6695,
00538 0x69c1, 0x69ae, 0x69d3, 0x69cb, 0x699b, 0x69b7, 0x69b9, 0x69ab,
00539 0x69b4, 0x69d0, 0x69cd, 0x69ad, 0x69cc, 0x69a6, 0x69c3, 0x69a3,
00540 0x6b49, 0x6b4c, 0x6c33, 0x6f33, 0x6f14, 0x6efe, 0x6f13, 0x6ef4,
00541 0x6f29, 0x6f3e, 0x6f20, 0x6f2c, 0x6f0f, 0x6f0e, 0x6f22, 0x6eff,
00542 0x6eef, 0x6f06, 0x6f31, 0x6f38, 0x6f32, 0x6f23, 0x6f15, 0x6f2b,
00543 0x6f2f, 0x6f88, 0x6f2a, 0x6eec, 0x6f01, 0x6ef2, 0x6ecc, 0x6ef7,
00544 0x7194, 0x7199, 0x717d, 0x717d, 0x718a, 0x7184, 0x7192, 0x723e, 0x7292,
00545 0x7296, 0x7344, 0x7350, 0x7464, 0x7463, 0x746a, 0x7470, 0x746d,
00546 0x7504, 0x7591, 0x7627, 0x760d, 0x760b, 0x7609, 0x7613, 0x76e1,
00547 0x76e3, 0x7784, 0x777d, 0x777f, 0x7761, 0x78c1, 0x789f, 0x78a7,
00548 0x78b3, 0x78a9, 0x78a3, 0x798e, 0x798f, 0x798d, 0x7a2e, 0x7a31,
00549 0x7aaa, 0x7aa9, 0x7aed, 0x7aef, 0x7ba1, 0x7b95, 0x7b8b, 0x7b75,
00550 0x7b97, 0x7b9d, 0x7b94, 0x7b8f, 0x7bb8, 0x7b87, 0x7b84, 0x7cb9,
00551 0x7cbd, 0x7cbe, 0x7dbb, 0x7db0, 0x7d9c, 0x7dbd, 0x7dbe, 0x7da0,
00552 0x7dca, 0x7db4, 0x7db2, 0x7db1, 0x7dba, 0x7da2, 0x7dbf, 0x7db5,
00553 0x7db8, 0x7dad, 0x7dd2, 0x7dc7, 0x7dac,
00554 /* 0xbb */
00555 0x7f70, 0x7fe0, 0x7fe1, 0x7fdf, 0x805e, 0x805a, 0x8087, 0x8150,
00556 0x8180, 0x818f, 0x8188, 0x818a, 0x817f, 0x8182, 0x81e7, 0x81fa,
00557 0x8207, 0x8214, 0x821e, 0x824b, 0x84c9, 0x84bf, 0x84c6, 0x84c4,
00558 0x8499, 0x849e, 0x84b2, 0x849c, 0x84cb, 0x84b8, 0x84c0, 0x84d3,
00559 0x8490, 0x84bc, 0x84d1, 0x84ca, 0x873f, 0x871c, 0x873b, 0x8722,
00560 0x8725, 0x8734, 0x8718, 0x8755, 0x8737, 0x8729, 0x88f3, 0x8902,
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00562 0x8a8c, 0x8a9e, 0x8aa3, 0x8a8d, 0x8aa1, 0x8a93, 0x8aa4, 0x8aaa,
00563 0x8aa5, 0x8aa8, 0x8a98, 0x8a91, 0x8a9a, 0x8aa7, 0x8c6a, 0x8c8d,
00564 0x8c8c, 0x8cd3, 0x8cd1, 0x8cd2, 0x8d6b, 0x8d99, 0x8d95, 0x8dfc,
00565 0x8f14, 0x8f12, 0x8f1c, 0x8f15, 0x8f13, 0x8fa3, 0x9060, 0x905c,
00566 0x9063, 0x9059, 0x905e, 0x9062, 0x905d, 0x905b, 0x9119, 0x9118,
00567 0x911e, 0x9175, 0x9178, 0x9177, 0x9174, 0x9278, 0x9280, 0x9285,
00568 0x9298, 0x9296, 0x927b, 0x927c, 0x9293, 0x929c, 0x92a8, 0x927c, 0x9291,
00569 0x95a1, 0x95a8, 0x95a9, 0x95a3, 0x95a5, 0x95a4, 0x9699, 0x969c,
00570 0x969b, 0x96cc, 0x96d2, 0x9700, 0x977c, 0x9785, 0x97f6, 0x9817,
00571 0x9818, 0x98af, 0x98b1, 0x9903, 0x9905, 0x990c, 0x9909, 0x99c1,
00572 0x9aaf, 0x9ab0, 0x9ae6, 0x9b41, 0x9b42, 0x9cf4, 0x9cf6, 0x9cf3,
00573 0x9ebc, 0x9f3b, 0x9f4a, 0x5104, 0x5100, 0x50fb, 0x50f5, 0x50f9,
00574 0x5102, 0x5108, 0x5109, 0x5105, 0x51dc,
00575 /* 0xbc */
00576 0x5287, 0x5288, 0x5289, 0x528d, 0x528a, 0x52f0, 0x53b2, 0x562e,
00577 0x563b, 0x5639, 0x5632, 0x563f, 0x5634, 0x5629, 0x5653, 0x564e,
00578 0x5657, 0x5674, 0x5636, 0x562f, 0x5630, 0x5880, 0x589f, 0x589e,
00579 0x58b3, 0x589c, 0x58ae, 0x58a9, 0x58a6, 0x596d, 0x5b09, 0x5afb,
00580 0x5b0b, 0x5af5, 0x5b0c, 0x5b08, 0x5bee, 0x5bec, 0x5be9, 0x5beb,
00581 0x5c64, 0x5c65, 0x5d9d, 0x5d94, 0x5e62, 0x5e5f, 0x5e61, 0x5ee2,
00582 0x5eda, 0x5edd, 0x5eed, 0x5ee3, 0x5ee0, 0x5f48, 0x5f71, 0x5fb7,
00583 0x5fb5, 0x6176, 0x6167, 0x616e, 0x615d, 0x6155, 0x6182, 0x617c,
00584 0x6170, 0x616b, 0x617e, 0x61a7, 0x6190, 0x61ab, 0x618e, 0x61ac,
00585 0x619a, 0x61a4, 0x6194, 0x61ae, 0x622e, 0x6469, 0x646f, 0x6479,
00586 0x649e, 0x64b2, 0x6488, 0x6490, 0x64b0, 0x64a5, 0x6493, 0x6495,
00587 0x64a9, 0x6492, 0x64ae, 0x64ad, 0x64ab, 0x649a, 0x64ac, 0x6499,
00588 0x64a2, 0x64b3, 0x6575, 0x6577, 0x6578, 0x66ae, 0x66ab, 0x66b4,
00589 0x66b1, 0x66a3, 0x66af, 0x66e8, 0x6a01, 0x6a1e, 0x6a19, 0x69fd,
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00592 0x6f51, 0x6f66, 0x6f54, 0x6f86, 0x6f6d, 0x6f5b, 0x6f78, 0x6f6e,
00593 0x6f8e, 0x6f7a, 0x6f70, 0x6f64, 0x6f97, 0x6f58, 0x6ed5, 0x6f6f,
00594 0x6f60, 0x6f5f, 0x719f, 0x71ac, 0x71b1, 0x71a8, 0x7256, 0x729b,
00595 0x734e, 0x7357, 0x7469, 0x748b, 0x7483,
00596 /* 0xbd */
00597 0x747e, 0x7480, 0x757f, 0x7620, 0x7629, 0x761f, 0x7624, 0x7626,
00598 0x7621, 0x7622, 0x769a, 0x76ba, 0x76e4, 0x778e, 0x7787, 0x778c,
00599 0x7791, 0x778b, 0x78cb, 0x78c5, 0x78ba, 0x78ca, 0x78be, 0x78d5,
00600 0x78bc, 0x78d0, 0x7a3f, 0x7a3c, 0x7a40, 0x7a3d, 0x7a37, 0x7a3b,
00601 0x7aaf, 0x7aae, 0x7bad, 0x7bb1, 0x7bc4, 0x7bb4, 0x7bc6, 0x7bc7,
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00603 0x7dd8, 0x7dec, 0x7ddd, 0x7de8, 0x7de3, 0x7dda, 0x7dde, 0x7de9,
00604 0x7d9e, 0x7dd9, 0x7df2, 0x7df9, 0x7ff5, 0x7f77, 0x7faf, 0x7fe9,
00605 0x8026, 0x819b, 0x819c, 0x819d, 0x81a0, 0x819a, 0x8198, 0x8517,
00606 0x853d, 0x851a, 0x84ee, 0x852c, 0x852d, 0x8513, 0x8511, 0x8523,
00607 0x8521, 0x8514, 0x84ec, 0x8525, 0x84ff, 0x8506, 0x8782, 0x8774,
00608 0x8776, 0x8760, 0x8766, 0x8778, 0x8768, 0x8759, 0x8757, 0x874c,
00609 0x8753, 0x885b, 0x885d, 0x8910, 0x8907, 0x8912, 0x8913, 0x8915,
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00611 0x8ab2, 0x8ac9, 0x8ac2, 0x8abf, 0x8ab0, 0x8ad6, 0x8acd, 0x8ab6,
00612 0x8ab9, 0x8adb, 0x8c4c, 0x8c4e, 0x8c6c, 0x8ce0, 0x8cde, 0x8ce6,
00613 0x8ce4, 0x8cec, 0x8ced, 0x8ce2, 0x8ce3, 0x8cdc, 0x8cea, 0x8ce1,
00614 0x8d6d, 0x8d9f, 0x8da3, 0x8e2b, 0x8e10, 0x8e1d, 0x8e22, 0x8e0f,
00615 0x8e29, 0x8e1f, 0x8e21, 0x8e1e, 0x8eba, 0x8f1d, 0x8f1b, 0x8f1f,
00616 0x8f29, 0x8f26, 0x8f2a, 0x8f1c, 0x8f1e,
00617 /* 0xbe */
00618 0x8f25, 0x9069, 0x906e, 0x9068, 0x906d, 0x9077, 0x9130, 0x912d,
00619 0x9127, 0x9131, 0x9187, 0x9189, 0x918b, 0x9183, 0x92c5, 0x92bb,
00620 0x92b7, 0x92ea, 0x92ac, 0x92e4, 0x92c1, 0x92b3, 0x92bc, 0x92d2,
00621 0x92c7, 0x92f0, 0x92b2, 0x95ad, 0x95b1, 0x9704, 0x9706, 0x9707,
00622 0x9709, 0x8cec, 0x978d, 0x978b, 0x978f, 0x9821, 0x982b, 0x981c,
00623 0x98b3, 0x990a, 0x9913, 0x9912, 0x9918, 0x99dd, 0x99d0, 0x99df,
00624 0x99db, 0x99d1, 0x99d5, 0x99d2, 0x99d9, 0x99ab7, 0x99ae, 0x99af,
00625 0x9b27, 0x9b45, 0x9b44, 0x9b77, 0x9b6f, 0x9d06, 0x9d09, 0x9d03,
00626 0x9ea9, 0x9ebe, 0x9ece, 0x58a8, 0x9f52, 0x5112, 0x5118, 0x5114,
00627 0x5110, 0x5115, 0x5180, 0x51aa, 0x51dd, 0x5291, 0x5293, 0x52f3,
00628 0x5659, 0x566b, 0x5679, 0x5669, 0x5664, 0x5678, 0x566a, 0x5668,
00629 0x5665, 0x5671, 0x566f, 0x566c, 0x5662, 0x5676, 0x58c1, 0x58be,
00630 0x58c7, 0x58c5, 0x596e, 0x5b1d, 0x5b34, 0x5b78, 0x5bf0, 0x5c0e,
00631 0x5f4a, 0x61b2, 0x6191, 0x61a9, 0x618a, 0x61cd, 0x61b6, 0x61be,
00632 0x61ca, 0x61c8, 0x6230, 0x64c5, 0x64c1, 0x64cb, 0x64bb, 0x64bc,
00633 0x64da, 0x64c4, 0x64c7, 0x64c2, 0x64cd, 0x64bf, 0x64d2, 0x64d4,
00634 0x64be, 0x6574, 0x66c6, 0x66c9, 0x66b9, 0x66c4, 0x66c7, 0x66b8,
00635 0x6a3d, 0x6a38, 0x6a3a, 0x6a59, 0x6a6b, 0x6a58, 0x6a39, 0x6a44,
00636 0x6a62, 0x6a61, 0x6a4b, 0x6a47, 0x6a35, 0x6a5f, 0x6a48, 0x6b59,
00637 0x6b77, 0x6c05, 0x6fc2, 0x6fb1, 0x6fal,
00638 /* 0xbf */
00639 0x6fc3, 0x6fa4, 0x6fc1, 0x6fa7, 0x6fb3, 0x6fc0, 0x6fb9, 0x6fb6,
00640 0x6fa6, 0x6fa0, 0x6fb4, 0x71be, 0x71c9, 0x71d0, 0x71d2, 0x71c8,
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00642 0x749c, 0x74a3, 0x7498, 0x749f, 0x749e, 0x74e2, 0x750c, 0x750d,
00643 0x7634, 0x7638, 0x763a, 0x76e7, 0x76e5, 0x77a0, 0x779e, 0x779f,
00644 0x77a5, 0x78e8, 0x78da, 0x78ec, 0x78e7, 0x79a6, 0x7a4d, 0x7a4e,
00645 0x7a46, 0x7a4c, 0x7a4b, 0x7aba, 0x7bd9, 0x7c11, 0x7bc9, 0x7be4,
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00647 0x7e08, 0x7e1b, 0x7e23, 0x7e1e, 0x7e1d, 0x7e09, 0x7e10, 0x7f79,
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00649 0x81fb, 0x8208, 0x8258, 0x8259, 0x854a, 0x8559, 0x8548, 0x8568,
00650 0x8569, 0x8543, 0x8549, 0x856d, 0x856a, 0x855e, 0x8783, 0x879f,
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00652 0x8921, 0x89aa, 0x89a6, 0x89ae, 0x8afa, 0x8aeb, 0x8af1, 0x8b00,
00653 0x8adc, 0x8ae7, 0x8aee, 0x8afe, 0x8b01, 0x8b02, 0x8af7, 0x8aed,
00654 0x8af3, 0x8af6, 0x8afc, 0x8c6b, 0x8c6d, 0x8c93, 0x8cf4, 0x8e44,
00655 0x8e31, 0x8e34, 0x8e42, 0x8e39, 0x8e35, 0x8f3b, 0x8f2f, 0x8f38,
00656 0x8f33, 0x8fa8, 0x8fa6, 0x9075, 0x9074, 0x9078, 0x9072, 0x907c,
00657 0x907a, 0x9134, 0x9192, 0x9320, 0x9336, 0x92f8, 0x9333, 0x932f,
00658 0x9322, 0x92fc, 0x932b, 0x9304, 0x931a,
00659 /* 0xc0 */
00660 0x9310, 0x9326, 0x9321, 0x9315, 0x932e, 0x9319, 0x95bb, 0x96a7,
00661 0x96a8, 0x96aa, 0x96d5, 0x970e, 0x9711, 0x9716, 0x970d, 0x9713,
00662 0x970f, 0x975b, 0x975c, 0x9766, 0x9798, 0x9830, 0x9838, 0x983b,
00663 0x9837, 0x982d, 0x9839, 0x9824, 0x9910, 0x9928, 0x991e, 0x991b,
00664 0x9921, 0x991a, 0x99ed, 0x99e2, 0x99f1, 0x99ab8, 0x99abc, 0x99ab,
00665 0x9aed, 0x9b28, 0x9b91, 0x9d15, 0x9d23, 0x9d26, 0x9d28, 0x9d12,
00666 0x9d1b, 0x9ed8, 0x9ed4, 0x9fd8, 0x9fd9, 0x512a, 0x511f, 0x5121,
00667 0x5132, 0x52f5, 0x568e, 0x5680, 0x5690, 0x5685, 0x5687, 0x568f,
00668 0x58d5, 0x58d3, 0x58d1, 0x58ce, 0x5b30, 0x5b2a, 0x5b24, 0x5b7a,
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00671 0x64ce, 0x64ca, 0x64d8, 0x64e0, 0x64f0, 0x64e6, 0x64ec, 0x64f1,
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00673 0x6a84, 0x6aa2, 0x6a9c, 0x6adb, 0x6aa3, 0x6a7e, 0x6a97, 0x6a90,
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00675 0x6fe0, 0x6fdb, 0x6fe4, 0x6feb, 0x6fef, 0x6f80, 0x6fec, 0x6fe1,
00676 0x6fe9, 0x6fd5, 0x6fee, 0x6ff0, 0x71e7, 0x71df, 0x71ee, 0x71e6,
00677 0x71e5, 0x71ed, 0x71ec, 0x71f4, 0x71e0, 0x7235, 0x7246, 0x7370,
00678 0x7372, 0x74a9, 0x74b0, 0x74a6, 0x74a8, 0x7646, 0x7642, 0x764c,
00679 0x76ea, 0x77b3, 0x77aa, 0x77b0, 0x77ac,
00680 /* 0xc1 */
00681 0x77a7, 0x77ad, 0x77ef, 0x78f7, 0x78fa, 0x78f4, 0x78ef, 0x7901,
00682 0x79a7, 0x79aa, 0x7a57, 0x7abf, 0x7c07, 0x7c0d, 0x7bfe, 0x7bf7,
00683 0x7c0c, 0x7be0, 0x7ce0, 0x7cdc, 0x7cde, 0x7ce2, 0x7cd1, 0x7cd9,
00684 0x7cdd, 0x7e2e, 0x7e3e, 0x7e46, 0x7e37, 0x7e32, 0x7e43, 0x7e2b,
00685 0x7e3d, 0x7e31, 0x7e45, 0x7e41, 0x7e34, 0x7e39, 0x7e48, 0x7e35,
00686 0x7e3f, 0x7e2f, 0x7f44, 0x7ff3, 0x7ffc, 0x8071, 0x8072, 0x8070,
00687 0x806f, 0x8073, 0x81c6, 0x81c3, 0x81ba, 0x81c2, 0x81c0, 0x81bf,
00688 0x81bd, 0x81c9, 0x81be, 0x81e8, 0x8209, 0x8271, 0x85aa, 0x8584,
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00691 0x87bb, 0x87ba, 0x87c8, 0x87cb, 0x893b, 0x8936, 0x8944, 0x8938,
00692 0x893d, 0x89ac, 0x8b0e, 0x8b17, 0x8b19, 0x8b1b, 0x8b0a, 0x8b20,
00693 0x8b1d, 0x8b04, 0x8b10, 0x8c41, 0x8c3f, 0x8c73, 0x8cfa, 0x8cfd,
00694 0x8cfc, 0x8cf8, 0x8cfb, 0x8cfb, 0x8da8, 0x8e49, 0x8e4b, 0x8e4a,
00695 0x8f44, 0x8f3e, 0x8f42, 0x8f45, 0x8f3f, 0x907f, 0x907d, 0x9084,
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00698 0x936c, 0x935b, 0x9370, 0x935a, 0x9354, 0x95ca, 0x95cb, 0x95cc,
00699 0x95c8, 0x95c6, 0x96b1, 0x96b8, 0x96d6, 0x971c, 0x971e, 0x97a0,
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00701 /* 0xc2 */
00702 0x99ff, 0x9bae, 0x9bab, 0x9baa, 0x9bad, 0x9d3b, 0x9d3f, 0x9e8b,
00703 0x9ecf, 0x9ede, 0x9edc, 0x9edd, 0x9edb, 0x9f3e, 0x9f4b, 0x53e2,
00704 0x5695, 0x56ae, 0x58d9, 0x58d8, 0x5b38, 0x5f5d, 0x61e3, 0x6233,
00705 0x64f4, 0x64f2, 0x64fe, 0x6506, 0x64fa, 0x64fb, 0x64ff, 0x65b7,
00706 0x66dc, 0x6726, 0x6ab3, 0x6aac, 0x6ac3, 0x6abb, 0x6ab8, 0x6ac2,
00707 0x6aae, 0x6aaf, 0x6b5f, 0x6b78, 0x6baf, 0x7009, 0x700b, 0x6ffe,
00708 0x7006, 0x6fff, 0x7011, 0x700f, 0x71fb, 0x71fc, 0x71fe, 0x71f8,
00709 0x7377, 0x7375, 0x74a7, 0x74bf, 0x7515, 0x7656, 0x7658, 0x7652,
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00711 0x7a60, 0x7ac4, 0x7ac5, 0x7c2b, 0x7c27, 0x7c2a, 0x7c1e, 0x7c23,
00712 0x7c21, 0x7ce7, 0x7e54, 0x7e55, 0x7e5e, 0x7e5a, 0x7e61, 0x7e52,
00713 0x7e59, 0x7f48, 0x7ff9, 0x7ffb, 0x8077, 0x8076, 0x81cd, 0x81cf,
00714 0x820a, 0x85cf, 0x85a9, 0x85cd, 0x85d0, 0x85c9, 0x85b0, 0x85ba,
00715 0x85b9, 0x85a6, 0x87ef, 0x87ec, 0x87f2, 0x87e0, 0x8986, 0x89b2,
00716 0x89f4, 0x8b28, 0x8b39, 0x8b2c, 0x8b2b, 0x8c50, 0x8d05, 0x8e59,
00717 0x8e63, 0x8e66, 0x8e64, 0x8e5f, 0x8e55, 0x8ec0, 0x8f49, 0x8f4d,
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00721 0x96db, 0x96de, 0x9724, 0x97a3, 0x97a6,
00722 /* 0xc3 */
00723 0x97ad, 0x97f9, 0x984d, 0x984f, 0x984c, 0x984e, 0x9853, 0x98ba,
00724 0x993e, 0x993f, 0x993d, 0x992e, 0x99a5, 0x9a0e, 0x9ac1, 0x9b03,
00725 0x9b06, 0x9b4f, 0x9b4e, 0x9b4d, 0x9bca, 0x9bc9, 0x9bfd, 0x9bc8,
00726 0x9bc0, 0x9d51, 0x9d5d, 0x9d60, 0x9ee0, 0x9f15, 0x9f2c, 0x5133,
00727 0x56a5, 0x58de, 0x58df, 0x58e2, 0x5bf5, 0x9f90, 0x5eec, 0x61f2,
00728 0x61f7, 0x61f6, 0x61f5, 0x6500, 0x650f, 0x66e0, 0x66dd, 0x6ae5,
00729 0x6add, 0x6ada, 0x6ad3, 0x701b, 0x701f, 0x7028, 0x701a, 0x701d,
00730 0x7015, 0x7018, 0x7206, 0x720d, 0x7258, 0x72a2, 0x7378, 0x737a,
00731 0x74bd, 0x74ca, 0x74e3, 0x7587, 0x7586, 0x765f, 0x7661, 0x77c7,
00732 0x7919, 0x79b1, 0x7a6b, 0x7a69, 0x7c3e, 0x7c3f, 0x7c38, 0x7c3d,
00733 0x7c37, 0x7c40, 0x7e6b, 0x7e6d, 0x7e79, 0x7e69, 0x7e6a, 0x7f85,
00734 0x7e73, 0x7fb6, 0x7fb9, 0x7fb8, 0x81d8, 0x85e9, 0x85dd, 0x85ea,
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00736 0x87fe, 0x8960, 0x895f, 0x8956, 0x895e, 0x8b41, 0x8b5c, 0x8b58,
00737 0x8b49, 0x8b5a, 0x8b4e, 0x8b4f, 0x8b46, 0x8b59, 0x8d08, 0x8d0a,
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00741 0x93d8, 0x93e4, 0x93d7, 0x93e8, 0x95dc, 0x96b4, 0x96e3, 0x972a,
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00743 /* 0xc4 */
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00747 0x56b6, 0x56b4, 0x56bc, 0x58e4, 0x5b40, 0x5b43, 0x5b7d, 0x5bf6,
00748 0x5dc9, 0x61f8, 0x61fa, 0x6518, 0x6514, 0x6519, 0x66e6, 0x6727,
00749 0x6aec, 0x703e, 0x7030, 0x7032, 0x7210, 0x737b, 0x74cf, 0x7662,
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00751 0x7c43, 0x7c4d, 0x7cef, 0x7cf0, 0x8fae, 0x7e7d, 0x7e7c, 0x7e82,
00752 0x7f4c, 0x8000, 0x81da, 0x8266, 0x85fb, 0x85f9, 0x8611, 0x85fa,
00753 0x8606, 0x860b, 0x8607, 0x860a, 0x8814, 0x8815, 0x8964, 0x89ba,
00754 0x89f8, 0x8b70, 0x8b6c, 0x8b66, 0x8b6f, 0x8b5f, 0x8b6b, 0x8d0f,
00755 0x8d0d, 0x8e89, 0x8e81, 0x8e85, 0x8e82, 0x91b4, 0x91cb, 0x9418,
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00760 0x651c, 0x6595, 0x66e9, 0x6afb, 0x6b04, 0x6afa, 0x6bb2, 0x704c,
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00762 0x7e8c, 0x7fbc, 0x8617, 0x862d, 0x861a, 0x8823, 0x8822, 0x8821,
00763 0x881f, 0x896a, 0x896c, 0x89bd, 0x8b74,
00764 /* 0xc5 */
00765 0x8b77, 0x8b7d, 0x8d13, 0x8e8a, 0x8e8d, 0x8e8b, 0x8f5f, 0x8faf,
00766 0x91ba, 0x942e, 0x9433, 0x9435, 0x943a, 0x9438, 0x9432, 0x942b,
00767 0x95e2, 0x9738, 0x9739, 0x9732, 0x97ff, 0x9867, 0x9865, 0x9957,
00768 0x9a45, 0x9a43, 0x9a40, 0x9a3e, 0x9acf, 0x9b54, 0x9b51, 0x9c2d,
00769 0x9c25, 0x9daf, 0x9db4, 0x9dc2, 0x9db8, 0x9e9d, 0x9eeF, 0x9f19,
00770 0x9f5c, 0x9f66, 0x9f67, 0x513c, 0x513b, 0x56c8, 0x56ca, 0x56c9,
00771 0x5b7f, 0x5dd4, 0x5dd2, 0x5f4e, 0x61ff, 0x6524, 0x6b0a, 0x6b61,
00772 0x7051, 0x7058, 0x7380, 0x74e4, 0x758a, 0x766e, 0x766c, 0x79b3,
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00774 0x8b80, 0x8d16, 0x8d17, 0x8e91, 0x8e93, 0x8f61, 0x9148, 0x9444,
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00779 0x7c64, 0x7c63, 0x7c65, 0x7e93, 0x7e96, 0x7e94, 0x81e2, 0x8638,
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00783 0x58e9, 0x652c, 0x705e, 0x7671, 0x7672, 0x77d7, 0x7f50, 0x7f88,
00784 0x8836, 0x8839, 0x8862, 0x8b93, 0x8b92,
00785 /* 0xc6 */
00786 0x8b96, 0x8277, 0x8d1b, 0x91c0, 0x946a, 0x9742, 0x9748, 0x9744,
00787 0x97c6, 0x9870, 0x9a5f, 0x9b22, 0x9b58, 0x9c5f, 0x9df9, 0x9dfa,
00788 0x9e7c, 0x9e7d, 0x9f07, 0x9f77, 0x9f72, 0x5ef3, 0x6b16, 0x7063,
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00790 0x9871, 0x995e, 0x9ad6, 0x9b23, 0x9ecc, 0x7064, 0x77da, 0x8b9a,
00791 0x9477, 0x97c9, 0x9a62, 0x9a65, 0x7e9c, 0x8b9c, 0x8eaa, 0x91c5,
00792 0x947d, 0x947e, 0x947c, 0x9c77, 0x9c78, 0x9ef7, 0x8c54, 0x947f,
00793 0x9e1a, 0x7228, 0x9a6a, 0x9b31, 0x9e1b, 0x9e1e, 0x7c72, 0x30fe,
00794 0x309d, 0x309e, 0x3005, 0x3041, 0x3042, 0x3043, 0x3044, 0x3045,
00795 0x3046, 0x3047, 0x3048, 0x3049, 0x304a, 0x304b, 0x304c, 0x304d,
00796 0x304e, 0x304f, 0x3050, 0x3051, 0x3052, 0x3053, 0x3054, 0x3055,
00797 0x3056, 0x3057, 0x3058, 0x3059, 0x305a, 0x305b, 0x305c, 0x305d,
00798 0x305e, 0x305f, 0x3060, 0x3061, 0x3062, 0x3063, 0x3064, 0x3065,
00799 0x3066, 0x3067, 0x3068, 0x3069, 0x306a, 0x306b, 0x306c, 0x306d,
00800 0x306e, 0x306f, 0x3070, 0x3071, 0x3072, 0x3073, 0x3074, 0x3075,
00801 0x3076, 0x3077, 0x3078, 0x3079, 0x307a, 0x307b, 0x307c, 0x307d,
00802 0x307e, 0x307f, 0x3080, 0x3081, 0x3082, 0x3083, 0x3084, 0x3085,
00803 0x3086, 0x3087, 0x3088, 0x3089, 0x308a, 0x308b, 0x308c, 0x308d,
00804 0x308e, 0x308f, 0x3090, 0x3091, 0x3092, 0x3093, 0x30a1, 0x30a2,
00805 0x30a3, 0x30a4, 0x30a5, 0x30a6, 0x30a7,
00806 /* 0xc7 */
00807 0x30a8, 0x30a9, 0x30aa, 0x30ab, 0x30ac, 0x30ad, 0x30ae, 0x30af,
00808 0x30b0, 0x30b1, 0x30b2, 0x30b3, 0x30b4, 0x30b5, 0x30b6, 0x30b7,
00809 0x30b8, 0x30b9, 0x30ba, 0x30bb, 0x30bc, 0x30bd, 0x30be, 0x30bf,
00810 0x30c0, 0x30c1, 0x30c2, 0x30c3, 0x30c4, 0x30c5, 0x30c6, 0x30c7,
00811 0x30c8, 0x30c9, 0x30ca, 0x30cb, 0x30cc, 0x30cd, 0x30ce, 0x30cf,
00812 0x30d0, 0x30d1, 0x30d2, 0x30d3, 0x30d4, 0x30d5, 0x30d6, 0x30d7,
00813 0x30d8, 0x30d9, 0x30da, 0x30db, 0x30dc, 0x30dd, 0x30de, 0x30df,
00814 0x30e0, 0x30e1, 0x30e2, 0x30e3, 0x30e4, 0x30e5, 0x30e6, 0x30e7,
00815 0x30e8, 0x30e9, 0x30ea, 0x30eb, 0x30ec, 0x30ed, 0x30ee, 0x30ef,
00816 0x30f0, 0x30f1, 0x30f2, 0x30f3, 0x30f4, 0x30f5, 0x30f6, 0x0414,
00817 0x0415, 0x0401, 0x0416, 0x0417, 0x0418, 0x0419, 0x041a, 0x041b,
00818 0x041c, 0x0423, 0x0424, 0x0425, 0x0426, 0x0427, 0x0428, 0x0429,
00819 0x042a, 0x042b, 0x042c, 0x042d, 0x042e, 0x042f, 0x0430, 0x0431,
00820 0x0432, 0x0433, 0x0434, 0x0435, 0x0436, 0x0437, 0x0438, 0x0439,
00821 0x043a, 0x043b, 0x043c, 0x043d, 0x043e, 0x043f, 0x0440,
00822 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446, 0x0447, 0x0448,
00823 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e, 0x044f, 0x2460,
00824 0x2461, 0x2462, 0x2463, 0x2464, 0x2465, 0x2466, 0x2467, 0x2468,
00825 0x2469, 0x2474, 0x2475, 0x2476, 0x2477, 0x2478, 0x2479, 0x247a,
00826 0x247b, 0x247c, 0x247d,
00827 };
00828 static const unsigned short big5_2uni_pagec9[7652] = {
00829 /* 0xc9 */
00830 0x4e42, 0x4e5c, 0x51f5, 0x531a, 0x5382, 0x4e07, 0x4e0c, 0x4e47,
00831 0x4e8d, 0x56d7, 0xfa0c, 0x5c6e, 0x5f73, 0x4e0f, 0x5187, 0x4e0e,
00832 0x4e2e, 0x4e93, 0x4ec2, 0x4ec9, 0x4ec8, 0x5198, 0x52fc, 0x536c,
00833 0x53b9, 0x5720, 0x5903, 0x592c, 0x5c10, 0x5dff, 0x65e1, 0x6bb3,
00834 0x6bcc, 0x6c14, 0x723f, 0x4e31, 0x4e3c, 0x4ee8, 0x4edc, 0x4ee9,
00835 0x4ee1, 0x4edd, 0x4eda, 0x520c, 0x531c, 0x534c, 0x5722, 0x5723,
00836 0x5917, 0x592f, 0x5b81, 0x5b84, 0x5c12, 0x5c3b, 0x5c74, 0x5c73,
00837 0x5e04, 0x5e80, 0x5e82, 0x5fc9, 0x6209, 0x6250, 0x6c15, 0x6c36,
00838 0x6c43, 0x6c3f, 0x6c3b, 0x72ae, 0x72b0, 0x738a, 0x79b8, 0x808a,
00839 0x961e, 0x4f0e, 0x4f18, 0x4f2c, 0x4ef5, 0x4f14, 0x4ef1, 0x4f00,
00840 0x4ef7, 0x4f08, 0x4f1d, 0x4f02, 0x4f05, 0x4f22, 0x4f13, 0x4f04,
00841 0x4ef4, 0x4f12, 0x51b1, 0x5213, 0x5209, 0x5210, 0x52a6, 0x5322,
00842 0x531f, 0x534d, 0x538a, 0x5407, 0x56e1, 0x56df, 0x572e, 0x572a,
00843 0x5734, 0x593c, 0x5980, 0x597c, 0x5985, 0x597b, 0x597e, 0x5977,
00844 0x597f, 0x5b56, 0x5c15, 0x5c25, 0x5c7c, 0x5c7a, 0x5c7b, 0x5c7e,
00845 0x5ddf, 0x5e75, 0x5e84, 0x5f02, 0x5f1a, 0x5f74, 0x5fd5, 0x5fd4,
00846 0x5fcf, 0x625c, 0x625e, 0x6264, 0x6261, 0x6266, 0x6262, 0x6259,
00847 0x6260, 0x625a, 0x6265, 0x65ef, 0x65ee, 0x673e, 0x6739, 0x6738,
00848 0x673b, 0x673a, 0x673f, 0x673c, 0x6733, 0x6c18, 0x6c46, 0x6c52,
00849 0x6c5c, 0x6c4f, 0x6c4a, 0x6c54, 0x6c4b,
00850 /* 0xca */
00851 0x6c4c, 0x7071, 0x725e, 0x72b4, 0x72b5, 0x738e, 0x752a, 0x767f,
00852 0x7a75, 0x7f51, 0x8278, 0x827c, 0x8280, 0x827d, 0x827f, 0x864d,
00853 0x897e, 0x9099, 0x9097, 0x9098, 0x909b, 0x9094, 0x9622, 0x9624,
00854 0x9620, 0x9623, 0x4f56, 0x4f3b, 0x4f62, 0x4f49, 0x4f53, 0x4f64,
00855 0x4f3e, 0x4f67, 0x4f52, 0x4f5f, 0x4f41, 0x4f58, 0x4f2d, 0x4f33,
00856 0x4f3f, 0x4f61, 0x518f, 0x51b9, 0x521c, 0x521e, 0x5221, 0x52ad,
00857 0x52ae, 0x5309, 0x5363, 0x5372, 0x538e, 0x538f, 0x5430, 0x5437,
00858 0x542a, 0x5454, 0x5445, 0x5449, 0x541c, 0x5425, 0x5418, 0x543d,
00859 0x544f, 0x5441, 0x5428, 0x5424, 0x5447, 0x56ee, 0x56e7, 0x56e5,
00860 0x5741, 0x5745, 0x574c, 0x5749, 0x574b, 0x5752, 0x5906, 0x5940,
00861 0x59a6, 0x5998, 0x59a0, 0x5997, 0x599e, 0x59a2, 0x5990, 0x598f,
00862 0x59a7, 0x59a1, 0x5b8e, 0x5b92, 0x5c28, 0x5c2a, 0x5c8d, 0x5c8f,
```

```
00863 0x5c88, 0x5c8b, 0x5c89, 0x5c92, 0x5c8a, 0x5c86, 0x5c93, 0x5c95,
00864 0x5de0, 0x5e0a, 0x5e0e, 0x5e8b, 0x5e89, 0x5e8c, 0x5e88, 0x5e8d,
00865 0x5f05, 0x5f1d, 0x5ff1, 0x5ff7, 0x5ff6, 0x5fd2, 0x5fd1, 0x5fd0, 0x5fed,
00866 0x5fe8, 0x5fee, 0x5ff3, 0x5fe1, 0x5fe4, 0x5fe3, 0x5ffa, 0x5fef,
00867 0x5ff7, 0x5ff6, 0x6000, 0x5ff4, 0x623a, 0x6283, 0x628c, 0x628e,
00868 0x628f, 0x629d, 0x6284, 0x6287, 0x6271, 0x627b, 0x627a, 0x6270, 0x6281,
00869 0x6288, 0x6277, 0x627d, 0x6272, 0x6274, 0x6537, 0x65f0, 0x65f4,
00870 0x65f3, 0x65f2, 0x65f5, 0x6745, 0x6747,
00871 /* 0xcb */
00872 0x6759, 0x6755, 0x674c, 0x6748, 0x675d, 0x674d, 0x675a, 0x674b,
00873 0x6bd0, 0x6c19, 0x6c1a, 0x6c78, 0x6c67, 0x6c6b, 0x6c84, 0x6c8b,
00874 0x6c8f, 0x6c71, 0x6c6f, 0x6c69, 0x6c9a, 0x6c6d, 0x6c87, 0x6c95,
00875 0x6c9c, 0x6c66, 0x6c73, 0x6c65, 0x6c7b, 0x6c8e, 0x7074, 0x707a,
00876 0x7263, 0x72bf, 0x72bd, 0x72c3, 0x72c6, 0x72c1, 0x72ba, 0x72c5,
00877 0x7395, 0x7397, 0x7393, 0x7394, 0x7392, 0x753a, 0x7539, 0x7594,
00878 0x7595, 0x7681, 0x793d, 0x8034, 0x8095, 0x8099, 0x8090, 0x8092,
00879 0x809c, 0x8290, 0x828f, 0x8285, 0x828e, 0x8291, 0x8293, 0x828a,
00880 0x8283, 0x8284, 0x8c78, 0x8fc9, 0x8fbf, 0x909f, 0x90a1, 0x90a5,
00881 0x909e, 0x90a7, 0x90a0, 0x9630, 0x9628, 0x962f, 0x962d, 0x4e33,
00882 0x4f98, 0x4f7c, 0x4f85, 0x4f7d, 0x4f80, 0x4f87, 0x4f76, 0x4f74,
00883 0x4f89, 0x4f84, 0x4f8d, 0x4f77, 0x4f4c, 0x4f97, 0x4f6a, 0x4f9a, 0x4f79,
00884 0x4f81, 0x4f78, 0x4f90, 0x4f9c, 0x4f94, 0x4f9e, 0x4f92, 0x4f82,
00885 0x4f95, 0x4f6b, 0x4f6e, 0x519e, 0x51bc, 0x51be, 0x5235, 0x5232,
00886 0x5233, 0x5246, 0x5231, 0x523c, 0x530a, 0x530b, 0x533c, 0x5392,
00887 0x5394, 0x5487, 0x547f, 0x5481, 0x5491, 0x5482, 0x5488, 0x546b,
00888 0x547a, 0x547e, 0x5465, 0x546c, 0x5474, 0x5466, 0x548d, 0x546f,
00889 0x5461, 0x5460, 0x5498, 0x5498, 0x5463, 0x5467, 0x5464, 0x56f7, 0x56f9,
00890 0x576f, 0x5772, 0x576d, 0x576b, 0x5771, 0x5770, 0x5776, 0x5780,
00891 0x5775, 0x577b, 0x5773, 0x5774, 0x5762,
00892 /* 0xcc */
00893 0x5768, 0x577d, 0x590c, 0x5945, 0x59b5, 0x59ba, 0x59cf, 0x59ce,
00894 0x59b2, 0x59cc, 0x59c1, 0x59b6, 0x59bc, 0x59c3, 0x59d6, 0x59b1,
00895 0x59bd, 0x59c0, 0x59c8, 0x59b4, 0x59c7, 0x5b62, 0x5b65, 0x5b93,
00896 0x5b95, 0x5c44, 0x5c47, 0x5cae, 0x5ca4, 0x5ca0, 0x5cb5, 0x5caf,
00897 0x5ca8, 0x5cac, 0x5c9f, 0x5ca3, 0x5cad, 0x5ca2, 0x5caa, 0x5ca7,
00898 0x5c9d, 0x5ca5, 0x5cb6, 0x5cb0, 0x5ca6, 0x5e17, 0x5e14, 0x5e19,
00899 0x5f28, 0x5f22, 0x5f23, 0x5f24, 0x5f54, 0x5f82, 0x5f7e, 0x5f7d,
00900 0x5fde, 0x5fe5, 0x602d, 0x6026, 0x6019, 0x6032, 0x600b, 0x6034,
00901 0x600a, 0x6017, 0x6033, 0x601a, 0x601e, 0x602c, 0x6022, 0x600d,
00902 0x6010, 0x602e, 0x6013, 0x6011, 0x600c, 0x6009, 0x601c, 0x6214,
00903 0x623d, 0x62ad, 0x62b4, 0x62d1, 0x62be, 0x62aa, 0x62b6, 0x62ca,
00904 0x62ae, 0x62b3, 0x62af, 0x62bb, 0x62a9, 0x62b0, 0x62b8, 0x653d,
00905 0x65a8, 0x65bb, 0x6609, 0x65fc, 0x6604, 0x6612, 0x6608, 0x65fb,
00906 0x6603, 0x660b, 0x660d, 0x6605, 0x65fd, 0x6611, 0x6610, 0x66f6,
00907 0x670a, 0x6785, 0x676c, 0x678e, 0x6792, 0x6776, 0x677b, 0x6798,
00908 0x6786, 0x6784, 0x6774, 0x678d, 0x678c, 0x677a, 0x679f, 0x6791,
00909 0x6799, 0x6783, 0x677d, 0x6781, 0x6778, 0x6779, 0x6794, 0x6b25,
00910 0x6b80, 0x6b7e, 0x6bde, 0x6c1d, 0x6c93, 0x6cec, 0x6ceb, 0x6cee,
00911 0x6cd9, 0x6cb6, 0x6cd4, 0x6cad, 0x6ce7, 0x6cb7, 0x6cd0, 0x6cc2,
00912 0x6cba, 0x6cc3, 0x6cc6, 0x6ccd, 0x6cf2,
00913 /* 0xcd */
00914 0x6cd2, 0x6cdd, 0x6cb4, 0x6c8a, 0x6c9d, 0x6c80, 0x6cde, 0x6cc0,
00915 0x6d30, 0x6ccd, 0x6cc7, 0x6cb0, 0x6cf9, 0x6ccf, 0x6ce9, 0x6cd1,
00916 0x7094, 0x7098, 0x7085, 0x7093, 0x7086, 0x7084, 0x7091, 0x7096,
00917 0x7082, 0x709a, 0x7083, 0x726a, 0x72d6, 0x72cb, 0x72d8, 0x72c9,
00918 0x72dc, 0x72d2, 0x72d4, 0x72da, 0x72cc, 0x72d1, 0x73a4, 0x73a1,
00919 0x73ad, 0x73a6, 0x73a2, 0x73a0, 0x73ac, 0x739d, 0x74dd, 0x74e8,
00920 0x753f, 0x7540, 0x753e, 0x758c, 0x7598, 0x76af, 0x76f3, 0x76f1,
00921 0x76f0, 0x76f5, 0x77f8, 0x77fc, 0x77f9, 0x77fb, 0x77fa, 0x77f7,
00922 0x7942, 0x793f, 0x79c5, 0x7a78, 0x7a7b, 0x7afb, 0x7c75, 0x7ced,
00923 0x8035, 0x808f, 0x80ae, 0x80a3, 0x80b8, 0x80b5, 0x80ad, 0x8220,
00924 0x82a0, 0x82c0, 0x82ab, 0x829a, 0x8298, 0x829b, 0x82b5, 0x82a7,
00925 0x82ae, 0x82bc, 0x829e, 0x829e, 0x82ba, 0x82b4, 0x82a8, 0x82a9,
00926 0x82c2, 0x82a4, 0x82c3, 0x82b6, 0x82a2, 0x8670, 0x866f, 0x866d,
00927 0x866e, 0x8c56, 0x8fd2, 0x8fcb, 0x8fd3, 0x8fcd, 0x8fd6, 0x8fd5,
00928 0x8fd7, 0x90b2, 0x90b4, 0x90af, 0x90b3, 0x90b0, 0x9639, 0x963d,
00929 0x963c, 0x963a, 0x9643, 0x4fcd, 0x4fc5, 0x4fd3, 0x4fb2, 0x4fc9,
00930 0x4fcb, 0x4fc1, 0x4fd4, 0x4fdc, 0x4fd9, 0x4fbb, 0x4fb3, 0x4fdb,
00931 0x4fc7, 0x4fd6, 0x4fba, 0x4fc0, 0x4fb9, 0x4fec, 0x5244, 0x5249,
00932 0x52c0, 0x52c2, 0x533d, 0x537c, 0x5397, 0x5396, 0x5399, 0x5398,
00933 0x54ba, 0x54a1, 0x54ad, 0x54a5, 0x54cf,
00934 /* 0xce */
00935 0x54c3, 0x830d, 0x54b7, 0x54ae, 0x54d6, 0x54b6, 0x54c5, 0x54c6,
00936 0x54a0, 0x5470, 0x54bc, 0x54a2, 0x54be, 0x5472, 0x54de, 0x54b0,
00937 0x57b5, 0x579e, 0x579f, 0x57a4, 0x578c, 0x5797, 0x579d, 0x579b,
00938 0x5794, 0x5798, 0x578f, 0x5799, 0x57a5, 0x579a, 0x5795, 0x58f4,
00939 0x590d, 0x5953, 0x59e1, 0x59de, 0x59ee, 0x5a00, 0x59f1, 0x59dd,
00940 0x59fa, 0x59fd, 0x59fc, 0x59f6, 0x59e4, 0x59f2, 0x59f7, 0x59db,
00941 0x59e9, 0x59f3, 0x59f5, 0x59e0, 0x59fe, 0x59f4, 0x59ed, 0x5ba8,
00942 0x5c4c, 0x5cd0, 0x5cd8, 0x5ccc, 0x5cd7, 0x5ccb, 0x5cdb, 0x5cde,
00943 0x5cda, 0x5cc9, 0x5cc7, 0x5cca, 0x5cd6, 0x5cd3, 0x5cd4, 0x5ccf,
00944 0x5cc8, 0x5cce, 0x5cce, 0x5cdf, 0x5cf8, 0x5df9, 0x5e21, 0x5e22,
00945 0x5e23, 0x5e20, 0x5e24, 0x5eb0, 0x5ea4, 0x5ea2, 0x5e9b, 0x5ea3,
00946 0x5ea5, 0x5f07, 0x5f2e, 0x5f56, 0x5f86, 0x6037, 0x6039, 0x6054,
00947 0x6072, 0x605e, 0x6045, 0x6053, 0x6047, 0x6049, 0x605b, 0x604c,
00948 0x6040, 0x6042, 0x605f, 0x6024, 0x6044, 0x6058, 0x6066, 0x606e,
00949 0x6242, 0x6243, 0x62cf, 0x630d, 0x630b, 0x62f5, 0x630e, 0x6303,
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00950 0x62eb, 0x62f9, 0x630f, 0x630c, 0x62f8, 0x62f6, 0x6300, 0x6313,
00951 0x6314, 0x62fa, 0x6315, 0x62fb, 0x62f0, 0x6541, 0x6543, 0x65aa,
00952 0x65bf, 0x6636, 0x6621, 0x6632, 0x6635, 0x661c, 0x6626, 0x6622,
00953 0x6633, 0x662b, 0x663a, 0x661d, 0x6634, 0x6639, 0x662e, 0x670f,
00954 0x6710, 0x67c1, 0x67f2, 0x67c8, 0x67ba,
00955 /* 0xcf */
00956 0x67dc, 0x67bb, 0x67f8, 0x67d8, 0x67c0, 0x67b7, 0x67c5, 0x67eb,
00957 0x67e4, 0x67df, 0x67b5, 0x67cd, 0x67b3, 0x67f7, 0x67f6, 0x67ee,
00958 0x67e3, 0x67c2, 0x67b9, 0x67ce, 0x67e7, 0x67f0, 0x67b2, 0x67fc,
00959 0x67c6, 0x67ed, 0x67cc, 0x67ae, 0x67e6, 0x67db, 0x67fa, 0x67c9,
00960 0x67ca, 0x67c3, 0x67ea, 0x67cb, 0x6b28, 0x6b82, 0x6b84, 0x6bb6,
00961 0x6bd6, 0x6bd8, 0x6be0, 0x6c20, 0x6c21, 0x6d28, 0x6d34, 0x6d2d,
00962 0x6d1f, 0x6d3c, 0x6d3f, 0x6d12, 0x6d0a, 0x6cda, 0x6d33, 0x6d04,
00963 0x6d19, 0x6d3a, 0x6d1a, 0x6d11, 0x6d00, 0x6d1d, 0x6d42, 0x6d01,
00964 0x6d18, 0x6d37, 0x6d03, 0x6d0f, 0x6d40, 0x6d07, 0x6d20, 0x6d2c,
00965 0x6d08, 0x6d22, 0x6d09, 0x6d10, 0x70b7, 0x709f, 0x70be, 0x70b1,
00966 0x70b0, 0x70a1, 0x70b4, 0x70b5, 0x70a9, 0x7241, 0x7249, 0x724a,
00967 0x726c, 0x7270, 0x7273, 0x726e, 0x72ca, 0x72ea, 0x72eb,
00968 0x72df, 0x72ea, 0x72e6, 0x72e3, 0x7385, 0x73cc, 0x73c2, 0x73c8,
00969 0x73c5, 0x73b9, 0x73b6, 0x73b5, 0x73b4, 0x73eb, 0x73bf, 0x73c7,
00970 0x73be, 0x73c6, 0x73c6, 0x73b8, 0x73cb, 0x74ec, 0x74ee, 0x752e,
00971 0x7547, 0x7548, 0x75a7, 0x75aa, 0x7679, 0x76c4, 0x7708, 0x7703,
00972 0x7704, 0x7705, 0x770a, 0x76f7, 0x76fb, 0x76fa, 0x77e7, 0x77e8,
00973 0x7806, 0x7811, 0x7812, 0x7810, 0x7805, 0x7810, 0x780f, 0x780e, 0x7809,
00974 0x7803, 0x7813, 0x794a, 0x794c, 0x794b, 0x7945, 0x7944, 0x79d5,
00975 0x79cd, 0x79cf, 0x79d6, 0x79ce, 0x7a80,
00976 /* 0xd0 */
00977 0x7a7e, 0x7ad1, 0x7b00, 0x7b01, 0x7c7a, 0x7c78, 0x7c79, 0x7c7f,
00978 0x7c80, 0x7c81, 0x7d03, 0x7d08, 0x7d01, 0x7f58, 0x7f91, 0x7f8d,
00979 0x7fbe, 0x8007, 0x800e, 0x800f, 0x8014, 0x8037, 0x80d0, 0x80c7,
00980 0x80e0, 0x80d1, 0x80c8, 0x80c2, 0x80d0, 0x80c5, 0x80e3, 0x80d9,
00981 0x80dc, 0x80ca, 0x80d5, 0x80c9, 0x80cf, 0x80d7, 0x80e6, 0x80cd,
00982 0x81ff, 0x8221, 0x8294, 0x82d9, 0x82fe, 0x82f9, 0x8307, 0x82e8,
00983 0x8300, 0x82d5, 0x833a, 0x82eb, 0x82d6, 0x82f4, 0x82ec, 0x82e1,
00984 0x82f2, 0x82f5, 0x830c, 0x82fb, 0x82f6, 0x82f0, 0x82ea, 0x82e4,
00985 0x82e0, 0x82fa, 0x82f3, 0x82ed, 0x8677, 0x8674, 0x867c, 0x8673,
00986 0x8841, 0x884e, 0x8867, 0x886a, 0x8869, 0x89d3, 0x8a04, 0x8a07,
00987 0x8d72, 0x8fe3, 0x8fe1, 0x8fee, 0x8fe0, 0x90f1, 0x90bd, 0x90bf,
00988 0x90d5, 0x90c5, 0x90be, 0x90c7, 0x90cb, 0x90c8, 0x91d4, 0x91d3,
00989 0x9654, 0x964f, 0x9651, 0x9653, 0x964a, 0x964e, 0x501e, 0x5005,
00990 0x5007, 0x5013, 0x5022, 0x5030, 0x501b, 0x4ff5, 0x4ff4, 0x5033,
00991 0x5037, 0x502c, 0x4ff6, 0x4ff7, 0x5017, 0x501c, 0x5020, 0x5027,
00992 0x5035, 0x502f, 0x5031, 0x500e, 0x515a, 0x5194, 0x5193, 0x51ca,
00993 0x51c4, 0x51c5, 0x51c8, 0x51ce, 0x5261, 0x525a, 0x5252, 0x525e,
00994 0x525f, 0x5255, 0x5262, 0x52cd, 0x530e, 0x539e, 0x5526, 0x54e2,
00995 0x5517, 0x5512, 0x54e7, 0x54f3, 0x54e4, 0x551a, 0x54ff, 0x5504,
00996 0x5508, 0x54eb, 0x5511, 0x5505, 0x54f1,
00997 /* 0xd1 */
00998 0x550a, 0x54fb, 0x54f7, 0x54f8, 0x54e0, 0x550e, 0x5503, 0x550b,
00999 0x5701, 0x5702, 0x57cc, 0x5832, 0x57d5, 0x57d2, 0x57ba, 0x57c6,
01000 0x57bd, 0x57bc, 0x57b8, 0x57b6, 0x57bf, 0x57c7, 0x57d0, 0x57b9,
01001 0x57c1, 0x590e, 0x594a, 0x5a19, 0x5a16, 0x5a2d, 0x5a2e, 0x5a15,
01002 0x5a0f, 0x5a17, 0x5a0a, 0x5a1e, 0x5a33, 0x5b6c, 0x5b7a, 0x5bad,
01003 0x5bac, 0x5c03, 0x5c56, 0x5c54, 0x5cec, 0x5cff, 0x5cee, 0x5cf1,
01004 0x5cf7, 0x5d00, 0x5cf9, 0x5e29, 0x5e28, 0x5ea8, 0x5eae, 0x5eaa,
01005 0x5eac, 0x5f33, 0x5f30, 0x5f67, 0x605d, 0x605a, 0x6067, 0x6041,
01006 0x60a2, 0x6088, 0x6080, 0x6092, 0x6081, 0x609d, 0x6083, 0x6095,
01007 0x609b, 0x6097, 0x6087, 0x609c, 0x608e, 0x6219, 0x6246, 0x62f2,
01008 0x6310, 0x6356, 0x632c, 0x6344, 0x6345, 0x6336, 0x6343, 0x63e4,
01009 0x6339, 0x634b, 0x634a, 0x633c, 0x6329, 0x6341, 0x6334, 0x6358,
01010 0x6354, 0x6359, 0x632d, 0x6347, 0x6333, 0x635a, 0x6351, 0x6338,
01011 0x6357, 0x6340, 0x6348, 0x654a, 0x6546, 0x65c6, 0x65c3, 0x65c4,
01012 0x65c2, 0x664a, 0x6644, 0x6647, 0x6651, 0x6712, 0x6713, 0x681f,
01013 0x681a, 0x6849, 0x6832, 0x6833, 0x683b, 0x684b, 0x684f, 0x6816,
01014 0x6831, 0x681c, 0x6835, 0x682b, 0x682d, 0x682f, 0x684e, 0x6844,
01015 0x6834, 0x681d, 0x6812, 0x6814, 0x6826, 0x6828, 0x682e, 0x684d,
01016 0x683a, 0x6825, 0x6820, 0x6b2c, 0x6b2f, 0x6b2d, 0x6b31, 0x6b34,
01017 0x6b6d, 0x8082, 0x6b88, 0x6be6, 0x6be4,
01018 /* 0xd2 */
01019 0x6be8, 0x6be3, 0x6be2, 0x6be7, 0x6c25, 0x6d7a, 0x6d6d, 0x6d64,
01020 0x6d76, 0x6d0d, 0x6d61, 0x6d92, 0x6d58, 0x6d62, 0x6d6d, 0x6d6f,
01021 0x6d91, 0x6d8d, 0x6def, 0x6d7f, 0x6d86, 0x6d5e, 0x6d67, 0x6d60,
01022 0x6d97, 0x6d70, 0x6d7c, 0x6d5f, 0x6d82, 0x6d98, 0x6d2f, 0x6d68,
01023 0x6d8b, 0x6d7e, 0x6d80, 0x6d84, 0x6d16, 0x6d83, 0x6d7d, 0x6d77,
01024 0x6d75, 0x6d90, 0x70dc, 0x70d3, 0x70d1, 0x70dd, 0x70cb, 0x7f39,
01025 0x70e2, 0x70d7, 0x70d2, 0x70de, 0x70e0, 0x70d4, 0x70cd, 0x70c5,
01026 0x70c6, 0x70c7, 0x70da, 0x70ce, 0x70e1, 0x7242, 0x7278, 0x7277,
01027 0x7276, 0x7300, 0x72fa, 0x72f4, 0x72fe, 0x72f6, 0x72f3, 0x72fb,
01028 0x7301, 0x73d3, 0x73d9, 0x73e5, 0x73d6, 0x73bc, 0x73e7, 0x73e3,
01029 0x73e9, 0x73dc, 0x73d2, 0x73db, 0x73d4, 0x73dd, 0x73da, 0x73d7,
01030 0x73d8, 0x73e8, 0x74de, 0x74df, 0x74f4, 0x74f5, 0x7521, 0x755b,
01031 0x755f, 0x75b0, 0x75c1, 0x75bb, 0x75c4, 0x75c0, 0x75bf, 0x75b6,
01032 0x75ba, 0x768a, 0x76c9, 0x771d, 0x771b, 0x7710, 0x7713, 0x7712,
01033 0x7723, 0x7711, 0x7715, 0x7719, 0x771a, 0x7722, 0x7727, 0x7823,
01034 0x782c, 0x7822, 0x7835, 0x782f, 0x7828, 0x782e, 0x782b, 0x7821,
01035 0x7829, 0x7833, 0x782a, 0x7831, 0x7954, 0x795b, 0x794f, 0x795c,
01036 0x7953, 0x7952, 0x7951, 0x79eb, 0x79ec, 0x79e0, 0x79ee, 0x79ed,

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01037 0x79ea, 0x79dc, 0x79de, 0x79dd, 0x7a86, 0x7a89, 0x7a85, 0x7a8b,
01038 0x7a8c, 0x7a8a, 0x7a87, 0x7ad8, 0x7b10,
01039 /* 0xd3 */
01040 0x7b04, 0x7b13, 0x7b05, 0x7b0f, 0x7b08, 0x7b0a, 0x7b0e, 0x7b09,
01041 0x7b12, 0x7c84, 0x7c91, 0x7c8a, 0x7c8c, 0x7c88, 0x7c8d, 0x7c85,
01042 0x7d1e, 0x7d1d, 0x7d1d, 0x7d11, 0x7d0e, 0x7d18, 0x7d16, 0x7d13, 0x7d1f,
01043 0x7d12, 0x7d0f, 0x7d0c, 0x7f5c, 0x7f61, 0x7f5e, 0x7f60, 0x7f5d,
01044 0x7f5b, 0x7f96, 0x7f92, 0x7fc3, 0x7fc2, 0x7fc0, 0x8016, 0x803e,
01045 0x8039, 0x80fa, 0x80f2, 0x80f9, 0x80f5, 0x8101, 0x80fb, 0x8100,
01046 0x8201, 0x822f, 0x8225, 0x8333, 0x832d, 0x8344, 0x8319, 0x8351,
01047 0x8325, 0x8356, 0x833f, 0x8341, 0x8326, 0x831c, 0x8322, 0x8342,
01048 0x834e, 0x831b, 0x832a, 0x8308, 0x833c, 0x834d, 0x8316, 0x8324,
01049 0x8320, 0x8337, 0x832f, 0x8329, 0x8347, 0x8345, 0x834c, 0x8353,
01050 0x831e, 0x832c, 0x834b, 0x8327, 0x8348, 0x8653, 0x8652, 0x86a2,
01051 0x86a8, 0x8696, 0x8685, 0x86a5, 0x8699, 0x86a1, 0x86a7, 0x8695,
01052 0x868b, 0x869a, 0x8685, 0x86a5, 0x8699, 0x86a1, 0x86a7, 0x8695,
01053 0x8698, 0x868e, 0x869d, 0x8690, 0x8694, 0x8843, 0x8844, 0x886d,
01054 0x8875, 0x8876, 0x8872, 0x8880, 0x8871, 0x887f, 0x886f, 0x8883,
01055 0x887e, 0x8874, 0x887c, 0x8a12, 0x8c47, 0x8c57, 0x8c7b, 0x8ca4,
01056 0x8ca3, 0x8d76, 0x8d78, 0x8db5, 0x8db7, 0x8db6, 0x8ed1, 0x8ed3,
01057 0x8ffe, 0x8ff5, 0x9002, 0x8fff, 0x8ffb, 0x9004, 0x8ffc, 0x8ff6,
01058 0x90d6, 0x90e0, 0x90d9, 0x90da, 0x90e3, 0x90df, 0x90e5, 0x90d8,
01059 0x90db, 0x90d7, 0x90dc, 0x90e4, 0x9150,
01060 /* 0xd4 */
01061 0x914e, 0x914f, 0x91d5, 0x91e2, 0x91da, 0x965c, 0x965f, 0x96bc,
01062 0x98e3, 0x99ad, 0x9b2f, 0x4e7f, 0x5070, 0x506a, 0x5061, 0x505e,
01063 0x5060, 0x5053, 0x504b, 0x504b, 0x505d, 0x5072, 0x5048, 0x504d, 0x5041,
01064 0x505b, 0x504a, 0x5062, 0x5015, 0x5045, 0x505f, 0x5069, 0x506b,
01065 0x5063, 0x5064, 0x5046, 0x5040, 0x506e, 0x5073, 0x5057, 0x5051,
01066 0x51d0, 0x526b, 0x526d, 0x526c, 0x526e, 0x52d6, 0x52d3, 0x532d,
01067 0x539c, 0x5575, 0x5576, 0x553c, 0x554d, 0x5550, 0x5534, 0x552a,
01068 0x5551, 0x5562, 0x5536, 0x5535, 0x5530, 0x5552, 0x5545, 0x550c,
01069 0x5532, 0x5565, 0x554e, 0x5539, 0x5548, 0x552d, 0x553b, 0x5540,
01070 0x554b, 0x570a, 0x5707, 0x57fb, 0x5814, 0x57e2, 0x57f6, 0x57dc,
01071 0x57f4, 0x5800, 0x57ed, 0x57fd, 0x5808, 0x57f8, 0x580b, 0x57f3,
01072 0x57cf, 0x5807, 0x57ee, 0x57e3, 0x57f2, 0x57e5, 0x57ec, 0x57e1,
01073 0x580e, 0x57fc, 0x5810, 0x57e7, 0x5801, 0x580c, 0x57f1, 0x57e9,
01074 0x57f0, 0x580d, 0x5804, 0x595c, 0x5a60, 0x5a58, 0x5a55, 0x5a67,
01075 0x5a5e, 0x5a38, 0x5a35, 0x5a6d, 0x5a50, 0x5a5f, 0x5a65, 0x5a6c,
01076 0x5a53, 0x5a64, 0x5a57, 0x5a43, 0x5a5d, 0x5a52, 0x5a44, 0x5a5b,
01077 0x5a48, 0x5a8e, 0x5a3e, 0x5a4d, 0x5a39, 0x5a4c, 0x5a70, 0x5a69,
01078 0x5a47, 0x5a51, 0x5a56, 0x5a42, 0x5a5c, 0x5b72, 0x5b6e, 0x5bc1,
01079 0x5bc0, 0x5c59, 0x5d1e, 0x5d0b, 0x5d1d, 0x5d1a, 0x5d20, 0x5d0c,
01080 0x5d28, 0x5d0d, 0x5d26, 0x5d25, 0x5d0f,
01081 /* 0xd5 */
01082 0x5d30, 0x5d12, 0x5d23, 0x5d1f, 0x5d2e, 0x5e3e, 0x5e34, 0x5eb1,
01083 0x5eb4, 0x5eb9, 0x5eb2, 0x5eb3, 0x5f36, 0x5f38, 0x5f9b, 0x5f96,
01084 0x5f9f, 0x608a, 0x6090, 0x6086, 0x60be, 0x60b0, 0x60ba, 0x60d3,
01085 0x60d4, 0x60cf, 0x60e4, 0x60d9, 0x60dd, 0x60c8, 0x60b1, 0x60db,
01086 0x60b7, 0x60ca, 0x60bf, 0x60c3, 0x60cd, 0x60c0, 0x6332, 0x6365,
01087 0x638a, 0x6382, 0x637d, 0x63bd, 0x639e, 0x63ad, 0x639d, 0x6397,
01088 0x63ab, 0x638e, 0x636f, 0x6387, 0x6390, 0x636e, 0x63af, 0x6375,
01089 0x639c, 0x636d, 0x63ae, 0x637c, 0x63a4, 0x633b, 0x639f, 0x6378,
01090 0x6385, 0x6381, 0x6391, 0x638d, 0x6370, 0x6553, 0x65cd, 0x6665,
01091 0x6661, 0x665b, 0x6659, 0x665c, 0x6662, 0x6718, 0x6879, 0x6887,
01092 0x6890, 0x689c, 0x686d, 0x686e, 0x68ae, 0x68ab, 0x6956, 0x686f,
01093 0x68a3, 0x68ac, 0x68a9, 0x6875, 0x6874, 0x68b2, 0x688f, 0x6877,
01094 0x6892, 0x687c, 0x686b, 0x6872, 0x68aa, 0x6880, 0x6871, 0x687e,
01095 0x689b, 0x6896, 0x688b, 0x68a0, 0x6889, 0x68a4, 0x6878, 0x687b,
01096 0x6891, 0x688c, 0x688a, 0x687d, 0x6b36, 0x6b33, 0x6b37, 0x6b38,
01097 0x6b91, 0x6b8f, 0x6b8d, 0x6b8e, 0x6b8c, 0x6c2a, 0x6dc0, 0x6dab,
01098 0x6db4, 0x6db3, 0x6e74, 0x6dac, 0x6de9, 0x6de2, 0x6db7, 0x6df6,
01099 0x6dd4, 0x6e00, 0x6dc8, 0x6dc0, 0x6ddf, 0x6dd6, 0x6dbe, 0x6de5,
01100 0x6ddc, 0x6ddd, 0x6ddb, 0x6df4, 0x6dca, 0x6dbd, 0x6ded, 0x6df0,
01101 0x6dba, 0x6dd5, 0x6dc2, 0x6dcf, 0x6dc9,
01102 /* 0xd6 */
01103 0x6dd0, 0x6df2, 0x6dd3, 0x6dfd, 0x6dd7, 0x6dcd, 0x6de3, 0x6dbb,
01104 0x70fa, 0x710d, 0x70f7, 0x7117, 0x70f4, 0x710c, 0x70f0, 0x7104,
01105 0x70f3, 0x7110, 0x70fc, 0x70ff, 0x7106, 0x7113, 0x7100, 0x70f8,
01106 0x70f6, 0x710b, 0x7102, 0x710e, 0x727e, 0x727b, 0x727c, 0x727f,
01107 0x731d, 0x7317, 0x7307, 0x730f, 0x7311, 0x7318, 0x730a, 0x7308, 0x72ff,
01108 0x730f, 0x731e, 0x7388, 0x73f6, 0x73f8, 0x73f5, 0x7404, 0x7401,
01109 0x73fd, 0x7407, 0x7400, 0x73fa, 0x73fc, 0x73ff, 0x740c, 0x740b,
01110 0x73f4, 0x7408, 0x7564, 0x7563, 0x75ce, 0x75d2, 0x75cf, 0x75cb,
01111 0x75cc, 0x75d1, 0x75d0, 0x768f, 0x7689, 0x76d3, 0x7739, 0x772f,
01112 0x772d, 0x7731, 0x7732, 0x7734, 0x7733, 0x773d, 0x7725, 0x773b,
01113 0x7735, 0x7848, 0x7852, 0x7849, 0x784d, 0x784a, 0x784c, 0x7826,
01114 0x7845, 0x7850, 0x7964, 0x7967, 0x7969, 0x796a, 0x7963, 0x796b,
01115 0x7961, 0x79bb, 0x79fa, 0x79f8, 0x79f6, 0x79f7, 0x7a8f, 0x7a94,
01116 0x7a90, 0x7b35, 0x7b32, 0x7b34, 0x7b25, 0x7b30, 0x7b2d, 0x7b24,
01117 0x7b33, 0x7b18, 0x7b2a, 0x7b1d, 0x7b31, 0x7b2b, 0x7b2d, 0x7b2f,
01118 0x7b32, 0x7b38, 0x7b1a, 0x7b23, 0x7c94, 0x7c98, 0x7c96, 0x7ca3,
01119 0x7d35, 0x7d3d, 0x7d38, 0x7d36, 0x7d3a, 0x7d45, 0x7d2c, 0x7d29,
01120 0x7d41, 0x7d47, 0x7d3e, 0x7d3f, 0x7d4a, 0x7d3b, 0x7d28, 0x7f63,
01121 0x7f95, 0x7f9c, 0x7f9d, 0x7f9b, 0x7fca, 0x7fcb, 0x7fcd, 0x7fd0,
01122 0x7fd1, 0x7fc7, 0x7fcf, 0x7fc9, 0x801f,
01123 /* 0xd7 */
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01124 0x801e, 0x801b, 0x8047, 0x8043, 0x8048, 0x8118, 0x8125, 0x8119,
01125 0x811b, 0x812d, 0x811f, 0x812c, 0x811e, 0x8121, 0x8115, 0x8127,
01126 0x811d, 0x8122, 0x8211, 0x8238, 0x8233, 0x823a, 0x8234, 0x8232,
01127 0x8274, 0x8390, 0x83a3, 0x83a8, 0x838d, 0x837a, 0x8373, 0x83a4,
01128 0x8374, 0x838f, 0x8381, 0x8395, 0x8399, 0x8375, 0x8394, 0x83a9,
01129 0x837d, 0x8383, 0x838c, 0x839d, 0x839b, 0x83aa, 0x838b, 0x837e,
01130 0x83a5, 0x83af, 0x8388, 0x8397, 0x83b0, 0x837f, 0x83a6, 0x8387,
01131 0x83ae, 0x8376, 0x839a, 0x8659, 0x8656, 0x86bf, 0x86b7, 0x86c2,
01132 0x86c1, 0x86c5, 0x866a, 0x86b0, 0x86c8, 0x86b9, 0x86b3, 0x86b8,
01133 0x86cc, 0x86b4, 0x86bb, 0x86bc, 0x86c3, 0x86bd, 0x86be, 0x8852,
01134 0x8889, 0x8895, 0x88a8, 0x88a2, 0x88aa, 0x889a, 0x8891, 0x88a1,
01135 0x889f, 0x8898, 0x88a7, 0x8899, 0x889b, 0x8897, 0x88a4, 0x88ac,
01136 0x888c, 0x8893, 0x888e, 0x8982, 0x89d6, 0x89d9, 0x89d5, 0x8a30,
01137 0x8a27, 0x8a2c, 0x8a1e, 0x8c39, 0x8c3b, 0x8c5c, 0x8c5d, 0x8c7d,
01138 0x8ca5, 0x8d7d, 0x8d7a, 0x8d7b, 0x8d79, 0x8dbc, 0x8dc2, 0x8db9, 0x8dbf,
01139 0x8dc1, 0x8ed8, 0x8ede, 0x8edd, 0x8edc, 0x8ed7, 0x8ee0, 0x8ee1,
01140 0x9024, 0x900b, 0x9011, 0x901c, 0x900c, 0x9021, 0x90ef, 0x90ea,
01141 0x90f0, 0x90f4, 0x90f2, 0x90f3, 0x90d4, 0x90eb, 0x90ec, 0x90e9,
01142 0x9156, 0x9158, 0x915a, 0x9153, 0x9155, 0x91ec, 0x91f4, 0x91f1,
01143 0x91f3, 0x91f8, 0x91e4, 0x91f9, 0x91ea,
01144 /* 0xd8 */
01145 0x91eb, 0x91f7, 0x91e8, 0x91ee, 0x957a, 0x9586, 0x9588, 0x967c,
01146 0x966d, 0x966b, 0x9671, 0x966f, 0x96bf, 0x976a, 0x9804, 0x98e5,
01147 0x9997, 0x509b, 0x5095, 0x5094, 0x509e, 0x508b, 0x50a3, 0x5083,
01148 0x508c, 0x508e, 0x509d, 0x5068, 0x509c, 0x5092, 0x5082, 0x5087,
01149 0x515f, 0x51d4, 0x5312, 0x5311, 0x53a4, 0x53a7, 0x5591, 0x55a8,
01150 0x55a5, 0x55ad, 0x5577, 0x5645, 0x55a2, 0x5593, 0x5588, 0x558f,
01151 0x55b5, 0x5581, 0x55a3, 0x5592, 0x55a4, 0x557d, 0x558c, 0x55a6,
01152 0x557f, 0x5595, 0x55a1, 0x558e, 0x570c, 0x5829, 0x5837, 0x5819,
01153 0x581e, 0x5827, 0x5827, 0x5823, 0x5828, 0x57f5, 0x5848, 0x5825, 0x581c,
01154 0x581b, 0x5833, 0x583f, 0x5836, 0x582e, 0x5839, 0x5838, 0x582d,
01155 0x582c, 0x583b, 0x5961, 0x5aaf, 0x5a94, 0x5a9f, 0x5a7a, 0x5aa2,
01156 0x5a9e, 0x5a78, 0x5aa6, 0x5a7c, 0x5aa5, 0x5aa9, 0x5a95, 0x5aae,
01157 0x5a37, 0x5a84, 0x5a8a, 0x5a97, 0x5a83, 0x5a8b, 0x5aa9, 0x5a7b,
01158 0x5a7d, 0x5a8c, 0x5a9c, 0x5a8f, 0x5a93, 0x5a9d, 0x5bea, 0x5bcd,
01159 0x5bcb, 0x5bd4, 0x5bd1, 0x5bca, 0x5bce, 0x5c0c, 0x5c30, 0x5d37,
01160 0x5d43, 0x5d6b, 0x5d41, 0x5d4b, 0x5d3f, 0x5d35, 0x5d51, 0x5d4e,
01161 0x5d55, 0x5d33, 0x5d3a, 0x5d52, 0x5d3d, 0x5d31, 0x5d59, 0x5d42,
01162 0x5d39, 0x5d49, 0x5d38, 0x5d3c, 0x5d32, 0x5d36, 0x5d40, 0x5d45,
01163 0x5e44, 0x5e41, 0x5f58, 0x5fa6, 0x5fa5, 0x5fab, 0x60c9, 0x60b9,
01164 0x60cc, 0x60e2, 0x60ce, 0x60c4, 0x6114,
01165 /* 0xd9 */
01166 0x60f2, 0x610a, 0x6116, 0x6105, 0x60f5, 0x6113, 0x60f8, 0x60fc,
01167 0x60fe, 0x60c1, 0x6103, 0x6118, 0x611d, 0x6110, 0x60ff, 0x6104,
01168 0x610b, 0x624a, 0x6394, 0x63b1, 0x63b0, 0x63ce, 0x63e5, 0x63e8,
01169 0x63ef, 0x63c3, 0x649d, 0x63f3, 0x63ca, 0x63e0, 0x63f6, 0x63d5,
01170 0x63f2, 0x63f5, 0x6461, 0x63df, 0x63be, 0x63dd, 0x63dc, 0x63c4,
01171 0x63d8, 0x63d3, 0x63c2, 0x63c7, 0x63cc, 0x63cb, 0x63c8, 0x63f0,
01172 0x63d7, 0x63d9, 0x6532, 0x6567, 0x656a, 0x6564, 0x655c, 0x6568,
01173 0x6565, 0x658c, 0x659d, 0x659e, 0x65ae, 0x65d0, 0x65d2, 0x667c,
01174 0x666c, 0x667b, 0x6680, 0x6671, 0x6679, 0x666a, 0x6672, 0x6701,
01175 0x690c, 0x68d3, 0x6904, 0x68dc, 0x692a, 0x68ec, 0x68ea, 0x68f1,
01176 0x690f, 0x68d6, 0x68f7, 0x68eb, 0x68e4, 0x68f6, 0x6913, 0x6910,
01177 0x68f3, 0x68e1, 0x6907, 0x68cc, 0x6908, 0x6970, 0x68b4, 0x6911,
01178 0x68ef, 0x68c6, 0x6914, 0x68f8, 0x68d0, 0x68fd, 0x68fc, 0x68e8,
01179 0x690b, 0x690a, 0x6917, 0x68ce, 0x68c8, 0x68dd, 0x68de, 0x68e6,
01180 0x68f4, 0x68d1, 0x6906, 0x68d4, 0x68e9, 0x6915, 0x6925, 0x68c7,
01181 0x6b39, 0x6b3b, 0x6b3f, 0x6b3c, 0x6b94, 0x6b97, 0x6b99, 0x6b95,
01182 0x6bbd, 0x6bf0, 0x6bf2, 0x6bf3, 0x6c30, 0x6d6c, 0x6e46, 0x6e47,
01183 0x6e1f, 0x6e49, 0x6e88, 0x6e3c, 0x6e3d, 0x6e45, 0x6e62, 0x6e2b,
01184 0x6e3f, 0x6e41, 0x6e5d, 0x6e73, 0x6e1c, 0x6e33, 0x6e4b, 0x6e40,
01185 0x6e51, 0x6e3b, 0x6e03, 0x6e2e, 0x6e5e,
01186 /* 0xda */
01187 0x6e68, 0x6e5c, 0x6e61, 0x6e31, 0x6e28, 0x6e60, 0x6e71, 0x6e6b,
01188 0x6e39, 0x6e22, 0x6e30, 0x6e53, 0x6e65, 0x6e27, 0x6e78, 0x6e64,
01189 0x6e77, 0x6e55, 0x6e79, 0x6e52, 0x6e66, 0x6e35, 0x6e36, 0x6e5a,
01190 0x7120, 0x711e, 0x712f, 0x70fb, 0x712e, 0x7131, 0x7123, 0x7125,
01191 0x7122, 0x7132, 0x711f, 0x7128, 0x713a, 0x711b, 0x724b, 0x725a,
01192 0x7288, 0x7289, 0x7286, 0x7285, 0x728b, 0x7312, 0x730b, 0x7330,
01193 0x7322, 0x7331, 0x7333, 0x7327, 0x7332, 0x732d, 0x7326, 0x7323,
01194 0x7335, 0x730c, 0x742e, 0x742c, 0x7430, 0x742b, 0x741e, 0x741a,
01195 0x7421, 0x742d, 0x7431, 0x7424, 0x7423, 0x741d, 0x7429, 0x7420,
01196 0x7432, 0x74fb, 0x752f, 0x756f, 0x756c, 0x75e7, 0x75da, 0x75e1,
01197 0x75e6, 0x75dd, 0x75df, 0x75e4, 0x75d7, 0x7695, 0x7692, 0x76da,
01198 0x7746, 0x7747, 0x7744, 0x774d, 0x7745, 0x774a, 0x774e, 0x774b,
01199 0x774c, 0x77de, 0x77ec, 0x7860, 0x7864, 0x7865, 0x785c, 0x786d,
01200 0x7871, 0x786a, 0x786e, 0x7870, 0x7869, 0x7868, 0x785e, 0x7862,
01201 0x7974, 0x7973, 0x7972, 0x7970, 0x7a02, 0x7a0a, 0x7a03, 0x7a0c,
01202 0x7a04, 0x7a99, 0x7ae6, 0x7ae4, 0x7b4a, 0x7b3b, 0x7b48, 0x7b48,
01203 0x7b4c, 0x7b4e, 0x7b40, 0x7b58, 0x7b45, 0x7ca2, 0x7c9e, 0x7ca8,
01204 0x7ca1, 0x7d58, 0x7d6f, 0x7d63, 0x7d53, 0x7d56, 0x7d67, 0x7d6a,
01205 0x7d4f, 0x7d6d, 0x7d5c, 0x7d6b, 0x7d52, 0x7d54, 0x7d69, 0x7d51,
01206 0x7d5f, 0x7d4e, 0x7f3e, 0x7f3f, 0x7f65,
01207 /* 0xdb */
01208 0x7f66, 0x7fa2, 0x7fa0, 0x7fa1, 0x7fd7, 0x8051, 0x804f, 0x8050,
01209 0x80fe, 0x80d4, 0x8143, 0x814a, 0x8152, 0x814f, 0x8147, 0x813d,
01210 0x814d, 0x813a, 0x81e6, 0x81ee, 0x81f7, 0x81f8, 0x81f9, 0x8204,
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01212 0x83c0, 0x83e8, 0x8412, 0x83e7, 0x83e4, 0x83fc, 0x83f6, 0x8410,
01213 0x83c6, 0x83c8, 0x83eb, 0x83e3, 0x83bf, 0x8401, 0x83dd, 0x83e5,
01214 0x83d8, 0x83ff, 0x83e1, 0x83cb, 0x83ce, 0x83d6, 0x83f5, 0x83c9,
01215 0x8409, 0x840e, 0x83de, 0x8411, 0x8406, 0x83c2, 0x83f3, 0x83d5,
01216 0x83fa, 0x83c7, 0x83d1, 0x83ea, 0x8413, 0x83c3, 0x83ec, 0x83ee,
01217 0x83c4, 0x83fb, 0x83d7, 0x83e2, 0x841b, 0x83db, 0x83fe, 0x86d8,
01218 0x86e2, 0x86e6, 0x86d3, 0x86e3, 0x86da, 0x86ea, 0x86dd, 0x86eb,
01219 0x86dc, 0x86ec, 0x86e9, 0x86d7, 0x86e8, 0x86d1, 0x8848, 0x8856,
01220 0x8855, 0x88ba, 0x88d7, 0x88b9, 0x88b8, 0x88c0, 0x88be, 0x88b6,
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01223 0x8a40, 0x8a57, 0x8a58, 0x8a44, 0x8a45, 0x8a52, 0x8a48, 0x8a51,
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01227 0x8dd7, 0x8dc5, 0x8eef, 0x8ef7, 0x8efa,
01228 /* 0xdc */
01229 0x8ef9, 0x8ee6, 0x8eee, 0x8ee5, 0x8ef5, 0x8ee7, 0x8ee8, 0x8ef6,
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01231 0x9106, 0x912c, 0x9104, 0x90ff, 0x90fc, 0x9108, 0x90f9, 0x90fb,
01232 0x9101, 0x9100, 0x9107, 0x9105, 0x9103, 0x9161, 0x9164, 0x915f,
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01234 0x920f, 0x920c, 0x9200, 0x9212, 0x91ff, 0x91fd, 0x9206, 0x9204,
01235 0x9227, 0x9202, 0x921c, 0x9224, 0x9219, 0x9217, 0x9205, 0x9216,
01236 0x957b, 0x958d, 0x958c, 0x9590, 0x9687, 0x967e, 0x9688, 0x9689,
01237 0x9683, 0x9680, 0x96c2, 0x96c8, 0x96c3, 0x96f1, 0x96f0, 0x976c,
01238 0x9770, 0x976e, 0x9807, 0x98a9, 0x98eb, 0x9ce6, 0x9ef9, 0x4e83,
01239 0x4e84, 0x4eb6, 0x50bd, 0x50bf, 0x50c6, 0x50ae, 0x50c4, 0x50ca,
01240 0x50b4, 0x50c8, 0x50c2, 0x50b0, 0x50c1, 0x50ba, 0x50b1, 0x50cb,
01241 0x50c9, 0x50b6, 0x50b8, 0x51d7, 0x527a, 0x5278, 0x527b, 0x527c,
01242 0x55c3, 0x55db, 0x55cc, 0x55d0, 0x55cb, 0x55ca, 0x55dd, 0x55c0,
01243 0x55d4, 0x55c4, 0x55e9, 0x55bf, 0x55d2, 0x558d, 0x55cf, 0x55d5,
01244 0x55e2, 0x55d6, 0x55c8, 0x55f2, 0x55cd, 0x55d9, 0x55c2, 0x5714,
01245 0x5853, 0x5868, 0x5864, 0x584f, 0x584d, 0x5849, 0x586f, 0x5855,
01246 0x584e, 0x585d, 0x5859, 0x5859, 0x585b, 0x583d, 0x5863, 0x5871,
01247 0x58fc, 0x5ac7, 0x5ac4, 0x5acb, 0x5aba, 0x5ab8, 0x5ab1, 0x5ab5,
01248 0x5ab0, 0x5abf, 0x5ac8, 0x5abb, 0x5ac6,
01249 /* 0xdd */
01250 0x5ab7, 0x5ac0, 0x5aca, 0x5ab4, 0x5ab6, 0x5acd, 0x5ab9, 0x5a90,
01251 0x5bd6, 0x5bd8, 0x5bd9, 0x5c1f, 0x5c33, 0x5d71, 0x5d63, 0x5d4a,
01252 0x5d65, 0x5d72, 0x5d6c, 0x5d5e, 0x5d68, 0x5d67, 0x5d62, 0x5d0f,
01253 0x5e4f, 0x5e4e, 0x5e4a, 0x5e4d, 0x5e4b, 0x5e5c, 0x5ecc, 0x5ec6,
01254 0x5ecb, 0x5ec7, 0x5f40, 0x5faf, 0x5fad, 0x60f7, 0x6149, 0x614a,
01255 0x612b, 0x6145, 0x6136, 0x6132, 0x612e, 0x6146, 0x612f, 0x614f,
01256 0x6129, 0x6140, 0x6220, 0x9168, 0x6223, 0x6225, 0x6224, 0x63c5,
01257 0x63f1, 0x63eb, 0x6410, 0x6412, 0x6409, 0x6420, 0x6424, 0x6433,
01258 0x6443, 0x641f, 0x6415, 0x6418, 0x6439, 0x6437, 0x6422, 0x6423,
01259 0x640c, 0x6426, 0x6430, 0x6428, 0x6441, 0x6435, 0x642f, 0x640a,
01260 0x641a, 0x6440, 0x6425, 0x6427, 0x640b, 0x63e7, 0x641b, 0x642e,
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01262 0x6690, 0x668b, 0x668a, 0x6699, 0x6694, 0x6678, 0x6720, 0x6966,
01263 0x695f, 0x6938, 0x694e, 0x6962, 0x6971, 0x693f, 0x6945, 0x696a,
01264 0x6939, 0x6942, 0x6957, 0x6959, 0x697a, 0x6948, 0x6949, 0x6935,
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01266 0x6940, 0x696f, 0x6944, 0x6976, 0x6958, 0x6941, 0x6974, 0x694c,
01267 0x693b, 0x694b, 0x6937, 0x695c, 0x694f, 0x6951, 0x6932, 0x6952,
01268 0x692f, 0x697b, 0x693c, 0x6b46, 0x6b45, 0x6b43, 0x6b42, 0x6b48,
01269 0x6b41, 0x6b9b, 0xfa0d, 0x6bfb, 0x6bfc,
01270 /* 0xde */
01271 0x6bf9, 0x6bf7, 0x6bf8, 0x6e9b, 0x6ed6, 0x6ec8, 0x6e8f, 0x6ec0,
01272 0x6e9f, 0x6e93, 0x6e94, 0x6ea0, 0x6eb1, 0x6eb9, 0x6ec6, 0x6ed2,
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01277 0x7141, 0x715d, 0x7162, 0x7172, 0x7178, 0x716a, 0x7161, 0x7142,
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01279 0x714d, 0x715a, 0x724f, 0x728d, 0x728c, 0x7291, 0x7290, 0x728e,
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01281 0x744a, 0x744b, 0x7452, 0x7451, 0x7457, 0x7440, 0x744f, 0x7450,
01282 0x744e, 0x7442, 0x7446, 0x744d, 0x7454, 0x74e1, 0x74ff, 0x74fe,
01283 0x74fd, 0x751d, 0x7579, 0x7577, 0x6983, 0x75ef, 0x760f, 0x7603,
01284 0x75f7, 0x75fe, 0x75fc, 0x75f9, 0x75f8, 0x7610, 0x75fb, 0x75f6,
01285 0x75ed, 0x75f5, 0x75fd, 0x7699, 0x76b5, 0x76dd, 0x7755, 0x775f,
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01287 0x776d, 0x77e0, 0x7887, 0x7894, 0x7894, 0x788f, 0x7884, 0x7895,
01288 0x7885, 0x7886, 0x78a1, 0x7883, 0x7879, 0x7899, 0x7880, 0x7896,
01289 0x787b, 0x797c, 0x7982, 0x797d, 0x7979, 0x7a11, 0x7a18, 0x7a19,
01290 0x7a12, 0x7a17, 0x7a15, 0x7a22, 0x7a13,
01291 /* 0xdf */
01292 0x7a1b, 0x7a10, 0x7aa3, 0x7aa2, 0x7a9e, 0x7aeb, 0x7b66, 0x7b64,
01293 0x7b6d, 0x7b74, 0x7b69, 0x7b72, 0x7b65, 0x7b73, 0x7b71, 0x7b70,
01294 0x7b61, 0x7b78, 0x7b76, 0x7b63, 0x7cb2, 0x7cb4, 0x7caf, 0x7d88,
01295 0x7d86, 0x7d80, 0x7d8d, 0x7d7f, 0x7d85, 0x7d7a, 0x7d8e, 0x7d7b,
01296 0x7d83, 0x7d7c, 0x7d8c, 0x7d94, 0x7d84, 0x7d7d, 0x7d92, 0x7f6d,
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01299 0x8162, 0x8172, 0x6721, 0x815e, 0x8176, 0x8167, 0x816f, 0x8144,
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01301 0x843f, 0x8456, 0x8476, 0x8479, 0x848f, 0x848d, 0x8465, 0x8451,
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01309 0x86f8, 0x870e, 0x8709, 0x8701, 0x86f6, 0x870d, 0x8705, 0x88d6,
01310 0x88cb, 0x88cd, 0x88ce, 0x88de, 0x88db, 0x88da, 0x88cc, 0x88d0,
01311 0x8985, 0x899b, 0x89df, 0x89e5, 0x89e4,
01312 /* 0xe0 */
01313 0x89e1, 0x89e0, 0x89e2, 0x89dc, 0x89e6, 0x8a76, 0x8a86, 0x8a7f,
01314 0x8a61, 0x8a3f, 0x8a77, 0x8a82, 0x8a84, 0x8a75, 0x8a83, 0x8a81,
01315 0x8a74, 0x8a7a, 0x8c3c, 0x8c4b, 0x8c4a, 0x8c65, 0x8c64, 0x8c66,
01316 0x8c86, 0x8c84, 0x8c85, 0x8ccc, 0x8d68, 0x8d69, 0x8d91, 0x8d8c,
01317 0x8d8e, 0x8d8f, 0x8d8d, 0x8d93, 0x8d94, 0x8d90, 0x8d92, 0x8df0,
01318 0x8de0, 0x8dec, 0x8df1, 0x8dee, 0x8dd0, 0x8de9, 0x8de3, 0x8de2,
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01324 0x926d, 0x926c, 0x924f, 0x9260, 0x9267, 0x926f, 0x9236, 0x9261,
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01328 0x9773, 0x9777, 0x9778, 0x9772, 0x980f, 0x980d, 0x980e, 0x98ac,
01329 0x98f6, 0x98f9, 0x99af, 0x99b2, 0x99b0, 0x99b5, 0x99ad, 0x99ab,
01330 0x9b5b, 0x9cea, 0x9ced, 0x9ce7, 0x9e80, 0x9efd, 0x50e6, 0x50d4,
01331 0x50d7, 0x50e8, 0x50f3, 0x50db, 0x50ea, 0x50dd, 0x50e4, 0x50d3,
01332 0x50ec, 0x50f0, 0x50ef, 0x50e3, 0x50e0,
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01335 0x5615, 0x560c, 0x5612, 0x55fc, 0x560f, 0x561c, 0x5601, 0x5613,
01336 0x5602, 0x55fa, 0x561d, 0x5604, 0x55ff, 0x55f9, 0x5889, 0x587c,
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01339 0x588f, 0x5896, 0x589b, 0x589c, 0x589d, 0x589e, 0x589f, 0x589a,
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01343 0x5d8a, 0x5d89, 0x5d88, 0x5d7e, 0x5d7c, 0x5d8d, 0x5d79, 0x5d7f,
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01347 0x6172, 0x616c, 0x6180, 0x6174, 0x6154, 0x617a, 0x615b, 0x6165,
01348 0x613b, 0x616a, 0x6161, 0x6156, 0x6229, 0x6227, 0x622b, 0x642b,
01349 0x644d, 0x645b, 0x645d, 0x6474, 0x6476, 0x6472, 0x6473, 0x647d,
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01351 0x6453, 0x6460, 0x6450, 0x647f, 0x643f, 0x646c, 0x646b, 0x6459,
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01353 0x6704, 0x6722, 0x69b1, 0x69b6, 0x69c9,
01354 /* 0xe2 */
01355 0x69a0, 0x69ce, 0x6996, 0x69b0, 0x69ac, 0x69bc, 0x6991, 0x6999,
01356 0x698e, 0x69a7, 0x698d, 0x69a9, 0x69be, 0x69af, 0x69bf, 0x69c4,
01357 0x69bd, 0x69a4, 0x69d4, 0x69b9, 0x69ca, 0x699a, 0x69cf, 0x69b3,
01358 0x6993, 0x69aa, 0x69a1, 0x699e, 0x69d9, 0x6997, 0x6990, 0x69c2,
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01363 0x6f73, 0x6ef9, 0x6eee, 0x6f2d, 0x6f40, 0x6f30, 0x6f3c, 0x6f35,
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01369 0x7472, 0x7467, 0x746e, 0x7500, 0x7502, 0x7503, 0x757d, 0x7590,
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01372 0x7783, 0x78b2, 0x78aa, 0x78b4, 0x78ad, 0x78a8, 0x787e, 0x78ab,
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01377 0x7a28, 0x7a26, 0x7aa8, 0x7aab, 0x7aac, 0x7aee, 0x7b88, 0x7b9c,
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01387 0x84aa, 0x849a, 0x84b1, 0x84d0, 0x849d, 0x84a7, 0x84bb, 0x84a2,
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01394 0x871a, 0x8730, 0x8711, 0x88f7, 0x88e7, 0x88f1, 0x88f2, 0x88fa,
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01426 0x6193, 0x61af, 0x61ad, 0x619f, 0x6192, 0x61aa, 0x61a1, 0x618d,
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01495 0x9ab3, 0x9aec, 0x9aeb, 0x9af3, 0x9af2, 0x9af1, 0x9b46, 0x9b43,
01496 0x9b67, 0x9b74, 0x9b71, 0x9b66, 0x9b76, 0x9b75, 0x9b70, 0x9b68,
01497 0x9b64, 0x9b6c, 0x9cfc, 0x9cfa, 0x9cfd, 0x9cff, 0x9cf7, 0x9d07,
01498 0x9d00, 0x9cf9, 0x9cfb, 0x9d08, 0x9d05, 0x9d04, 0x9e83, 0x9ed3,
01499 0x9f0f, 0x9f10, 0x511c, 0x5113, 0x5117, 0x511a, 0x5111, 0x51de,
01500 0x5334, 0x53e1, 0x5670, 0x5660, 0x566e,
01501 /* 0xe9 */
01502 0x5673, 0x5666, 0x5663, 0x566d, 0x5672, 0x565e, 0x5677, 0x571c,
01503 0x571b, 0x58c8, 0x58bd, 0x58c9, 0x58bf, 0x58ba, 0x58c2, 0x58bc,
01504 0x58c6, 0x5b17, 0x5b19, 0x5b1b, 0x5b21, 0x5b14, 0x5b13, 0x5b10,
01505 0x5b16, 0x5b28, 0x5b1a, 0x5b20, 0x5b1e, 0x5bef, 0x5dac, 0x5db1,
01506 0x5da9, 0x5da7, 0x5db5, 0x5db0, 0x5dae, 0x5daa, 0x5da8, 0x5db2,
01507 0x5dad, 0x5daf, 0x5db4, 0x5db4, 0x5e67, 0x5e68, 0x5e6e, 0x5ee9,
01508 0x5ee7, 0x5ee6, 0x5ee8, 0x5ee5, 0x5f4b, 0x5fbc, 0x619d, 0x61a8,
01509 0x6196, 0x61c5, 0x61b4, 0x61c6, 0x61c1, 0x61cc, 0x61ba, 0x61bf,
01510 0x61b8, 0x618c, 0x64d7, 0x64d6, 0x64d0, 0x64cf, 0x64c9, 0x64bd,
01511 0x6489, 0x64c3, 0x64db, 0x64f3, 0x64d9, 0x6533, 0x657f, 0x657c,
01512 0x65a2, 0x66c8, 0x66be, 0x66c0, 0x66ca, 0x66cb, 0x66cf, 0x66bd,
01513 0x66bb, 0x66ba, 0x66cc, 0x6723, 0x6a34, 0x6a66, 0x6a49, 0x6a67,
01514 0x6a32, 0x6a68, 0x6a3e, 0x6a5d, 0x6a6d, 0x6a76, 0x6a5b, 0x6a51,
01515 0x6a28, 0x6a5a, 0x6a3b, 0x6a3f, 0x6a41, 0x6a6a, 0x6a64, 0x6a50,
01516 0x6a4f, 0x6a54, 0x6a6f, 0x6a69, 0x6a60, 0x6a3c, 0x6a5e, 0x6a56,
01517 0x6a55, 0x6a4d, 0x6a4e, 0x6a46, 0x6b55, 0x6b54, 0x6b56, 0x6b47,
01518 0x6baa, 0x6bab, 0x6bc8, 0x6bc7, 0x6c04, 0x6c03, 0x6c06, 0x6fad,
01519 0x6fcb, 0x6fa3, 0x6fc7, 0x6fbc, 0x6fce, 0x6fc8, 0x6f5e, 0x6fc4,
01520 0x6fbd, 0x6f9e, 0x6fca, 0x6fa8, 0x7004, 0x6fa5, 0x6fae, 0x6fba,
01521 0x6fac, 0x6faa, 0x6fcf, 0x6fbf, 0x6fb8,
01522 /* 0xea */
01523 0x6fa2, 0x6fc9, 0x6fab, 0x6fcd, 0x6faf, 0x6fb2, 0x6fb0, 0x71c5,
01524 0x71c2, 0x71bf, 0x71b8, 0x71d6, 0x71c0, 0x71c1, 0x71cb, 0x71d4,
01525 0x71ca, 0x71c7, 0x71cf, 0x71bd, 0x71d8, 0x71bc, 0x71c6, 0x71da,
01526 0x71db, 0x729d, 0x729e, 0x7369, 0x7366, 0x7367, 0x736c, 0x7365,
01527 0x736b, 0x736a, 0x747f, 0x749a, 0x74a0, 0x7494, 0x7492, 0x7495,
01528 0x74a1, 0x750b, 0x7580, 0x762f, 0x762d, 0x7631, 0x763d, 0x7633,
01529 0x763c, 0x7635, 0x7632, 0x7630, 0x76bb, 0x76e6, 0x779a, 0x779d,
01530 0x77a1, 0x779c, 0x779b, 0x77a2, 0x77a3, 0x7795, 0x7799, 0x7797,
01531 0x78dd, 0x78e9, 0x78e5, 0x78ea, 0x78de, 0x78e3, 0x78db, 0x78e1,
01532 0x78e2, 0x78ed, 0x78df, 0x78e0, 0x79a4, 0x7a44, 0x7a48, 0x7a47,
01533 0x7ab6, 0x7ab8, 0x7ab5, 0x7ab1, 0x7ab7, 0x7bde, 0x7be3, 0x7be7,
01534 0x7bdd, 0x7bd5, 0x7be5, 0x7bda, 0x7be8, 0x7bf9, 0x7bd4, 0x7bea,
01535 0x7be2, 0x7bdc, 0x7beb, 0x7bd8, 0x7bdf, 0x7cd2, 0x7cd4, 0x7cd7,
01536 0x7cd0, 0x7cd1, 0x7e12, 0x7e21, 0x7e17, 0x7e0c, 0x7e1f, 0x7e20,
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01538 0x7e16, 0x7e0d, 0x7e14, 0x7e25, 0x7e24, 0x7f43, 0x7f7b, 0x7f7c,
01539 0x7f7a, 0x7fb1, 0x7fef, 0x802a, 0x8029, 0x806c, 0x81b1, 0x81a6,
01540 0x81ae, 0x81b9, 0x81b5, 0x81ab, 0x81b0, 0x81ac, 0x81b4, 0x81b2,
01541 0x81b7, 0x81a7, 0x81f2, 0x8255, 0x8256, 0x8257, 0x8556, 0x8545,
01542 0x856b, 0x854d, 0x8553, 0x8561, 0x8558,
01543 /* 0xeb */
01544 0x8540, 0x8546, 0x8564, 0x8541, 0x8562, 0x8544, 0x8551, 0x8547,
01545 0x8563, 0x853e, 0x855b, 0x8571, 0x854e, 0x856e, 0x8575, 0x8555,
01546 0x8567, 0x8560, 0x858c, 0x8566, 0x855d, 0x8554, 0x8565, 0x856c,
01547 0x8663, 0x8665, 0x8664, 0x879b, 0x878f, 0x8797, 0x8793, 0x8792,
01548 0x8788, 0x8781, 0x8796, 0x8798, 0x8779, 0x8787, 0x87a3, 0x8785,
01549 0x8790, 0x8791, 0x879d, 0x8784, 0x8794, 0x879c, 0x879a, 0x8789,
01550 0x891e, 0x8926, 0x8930, 0x892d, 0x892e, 0x8927, 0x8931, 0x8922,
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01552 0x8af2, 0x8af4, 0x8af5, 0x8add, 0x8b14, 0x8ae4, 0x8adf, 0x8af0,
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01554 0x8c92, 0x8c90, 0x8cf5, 0x8cee, 0x8cf1, 0x8cf0, 0x8cf3, 0x8d6c,
01555 0x8d6e, 0x8da5, 0x8da7, 0x8e33, 0x8e3e, 0x8e38, 0x8e40, 0x8e45,
01556 0x8e36, 0x8e3c, 0x8e3d, 0x8e41, 0x8e30, 0x8e3f, 0x8ebd, 0x8f36,
01557 0x8f2e, 0x8f35, 0x8f32, 0x8f39, 0x8f37, 0x8f34, 0x9076, 0x9079,
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01560 0x930f, 0x937a, 0x9338, 0x933c, 0x931b, 0x9323, 0x9312, 0x9301,
01561 0x9346, 0x932d, 0x930e, 0x930d, 0x92cb, 0x931d, 0x92fa, 0x9325,
01562 0x9313, 0x92f9, 0x92f7, 0x9334, 0x9302, 0x9324, 0x92ff, 0x9329,
01563 0x9339, 0x9335, 0x932a, 0x9314, 0x930c,
01564 /* Oxec */
01565 0x930b, 0x92fe, 0x9309, 0x9300, 0x92fb, 0x9316, 0x95bc, 0x95cd,
01566 0x95be, 0x95b9, 0x95ba, 0x95b6, 0x95bf, 0x95b5, 0x95bd, 0x96a9,
01567 0x96d4, 0x970b, 0x9712, 0x9710, 0x9799, 0x9797, 0x9794, 0x97f0,
01568 0x97f8, 0x9835, 0x982f, 0x9832, 0x9924, 0x991f, 0x9927, 0x9929,
01569 0x999e, 0x99ee, 0x99ec, 0x99e5, 0x99e4, 0x99f0, 0x99e3, 0x99ea,
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01572 0x99b7b, 0x99b82, 0x99b93, 0x99b92, 0x99b90, 0x99b7a, 0x99b95, 0x99b7d,
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01577 0x568d, 0x5686, 0x5684, 0x5683, 0x567e, 0x5682, 0x567f, 0x5681,
01578 0x58d6, 0x58d4, 0x58cf, 0x58d2, 0x5b2d, 0x5b25, 0x5b32, 0x5b23,
01579 0x5b2c, 0x5b27, 0x5b26, 0x5b2f, 0x5b2e, 0x5b7b, 0x5bf1, 0x5bf2,
01580 0x5db7, 0x5e6c, 0x5e6a, 0x5fbe, 0x5fbb, 0x61c3, 0x61b5, 0x61bc,
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01583 0x66d2, 0x6a8d, 0x6a96, 0x6a81, 0x6aa5, 0x6a89, 0x6a9f, 0x6a9b,
01584 0x6aa1, 0x6a9e, 0x6a87, 0x6a93, 0x6a8e,
01585 /* Oxed */
01586 0x6a95, 0x6a83, 0x6aa8, 0x6aa4, 0x6a91, 0x6a7f, 0x6aa6, 0x6a9a,
01587 0x6a85, 0x6a8c, 0x6a92, 0x6b5b, 0x6bad, 0x6c09, 0x6fcc, 0x6fa9,
01588 0x6ff4, 0x6fd4, 0x6fe3, 0x6fdc, 0x6fed, 0x6fe7, 0x6fe6, 0x6fde,
01589 0x6ff2, 0x6fdd, 0x6fe2, 0x6fe8, 0x71e1, 0x71f1, 0x71e8, 0x71f2,
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01603 0x81cc, 0x81ca, 0x81c5, 0x81c7, 0x81bc, 0x81e9, 0x825b, 0x825a,
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01605 0x85a3, 0x857b, 0x85a4, 0x859a, 0x859e,
01606 /* Oxee */
01607 0x8577, 0x857c, 0x8589, 0x85a1, 0x857a, 0x8578, 0x8557, 0x858e,
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01611 0x87bc, 0x87ae, 0x87c9, 0x87c3, 0x87c2, 0x87cc, 0x87b7, 0x87af,
01612 0x87c4, 0x877a, 0x87b4, 0x87b6, 0x87bf, 0x87b8, 0x87bd, 0x87de,
01613 0x87b2, 0x8935, 0x8933, 0x893c, 0x893e, 0x8941, 0x8952, 0x8937,
01614 0x8942, 0x89ad, 0x89af, 0x89ae, 0x89f2, 0x89f3, 0x8b1e, 0x8b18,
01615 0x8b16, 0x8b11, 0x8b05, 0x8b0b, 0x8b22, 0x8b0f, 0x8b12, 0x8b15,
01616 0x8b07, 0x8b0d, 0x8b08, 0x8b06, 0x8b1c, 0x8b13, 0x8b1a, 0x8c4f,
01617 0x8c70, 0x8c72, 0x8c71, 0x8c6f, 0x8c95, 0x8c94, 0x8cf9, 0x8d6f,
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01619 0x9085, 0x907e, 0x9138, 0x919a, 0x91a2, 0x919b, 0x9199, 0x919f,
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01626 0x971d, 0x9719, 0x979a, 0x97a1, 0x979c,
01627 /* Oxef */
01628 0x979e, 0x979d, 0x97d5, 0x97d4, 0x97f1, 0x9841, 0x9844, 0x984a,
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01636 0x9d42, 0x9d43, 0x9d3e, 0x9d37, 0x9d40, 0x9d3d, 0x7ff5, 0x9d2d,
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01655 0x7e63, 0x7e58, 0x7e62, 0x7e5f, 0x7e51, 0x7e60, 0x7e57, 0x7e53,
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01658 0x85b5, 0x85bd, 0x85c7, 0x85c4, 0x85bf, 0x85cb, 0x85ce, 0x85c8,
01659 0x85c5, 0x85b1, 0x85b6, 0x85d2, 0x8624, 0x85b8, 0x85b7, 0x85be,
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01662 0x87e3, 0x87a4, 0x87d7, 0x87d9, 0x8801, 0x87f4, 0x87e8, 0x87dd,
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01666 0x8b24, 0x8b3b, 0x8b3d, 0x8b3a, 0x8c42, 0x8c75, 0x8c99, 0x8c98,
01667 0x8c97, 0x8cfe, 0x8d04, 0x8d02, 0x8d00, 0x8e5c, 0x8e62, 0x8e60,
01668 0x8e57, 0x8e56, 0x8e5e, 0x8e65, 0x8e67,
01669 /* 0xf1 */
01670 0x8e5b, 0x8e5a, 0x8e61, 0x8e5d, 0x8e69, 0x8e54, 0x8f46, 0x8f47,
01671 0x8f48, 0x8f4b, 0x9128, 0x913a, 0x913b, 0x913e, 0x91a8, 0x91a5,
01672 0x91a7, 0x91af, 0x91aa, 0x93b5, 0x938c, 0x93b7, 0x939b,
01673 0x939d, 0x9389, 0x93a7, 0x938e, 0x93aa, 0x939e, 0x93a6, 0x9395,
01674 0x9388, 0x9399, 0x939f, 0x938d, 0x93b1, 0x9391, 0x93b2, 0x93a4,
01675 0x93a8, 0x93b4, 0x93a3, 0x93a5, 0x95d2, 0x95d3, 0x95d1, 0x96b3,
01676 0x96d7, 0x96da, 0x5dc2, 0x96df, 0x96d8, 0x96dd, 0x9723, 0x9722,
01677 0x9725, 0x97ac, 0x97ae, 0x97a8, 0x97ab, 0x97a4, 0x97aa, 0x97a2,
01678 0x97a5, 0x97d7, 0x97d9, 0x97d6, 0x97d8, 0x97fa, 0x9850, 0x9851,
01679 0x9852, 0x98b8, 0x9941, 0x993c, 0x993a, 0x9a0f, 0x9a0b, 0x9a09,
01680 0x9a0d, 0x9a04, 0x9a11, 0x9a0a, 0x9a05, 0x9a07, 0x9a06, 0x9ac0,
01681 0x9adc, 0x9b08, 0x9b04, 0x9b05, 0x9b29, 0x9b35, 0x9b4a, 0x9b4c,
01682 0x9b4b, 0x9bc7, 0x9bc6, 0x9bc3, 0x9bbf, 0x9bc1, 0x9bb5, 0x9bb8,
01683 0x9bd3, 0x9bb6, 0x9bc4, 0x9bb9, 0x9bba, 0x9d5c, 0x9d53, 0x9d4f,
01684 0x9d4a, 0x9d5b, 0x9d4b, 0x9d59, 0x9d56, 0x9d4c, 0x9d52, 0x9d52,
01685 0x9d54, 0x9d5f, 0x9d58, 0x9d5a, 0x9e8e, 0x9e8c, 0x9edf, 0x9f01,
01686 0x9f00, 0x9f16, 0x9f25, 0x9f2b, 0x9f2a, 0x9f29, 0x9f28, 0x9f4c,
01687 0x9f55, 0x5134, 0x5135, 0x5296, 0x52f7, 0x53b4, 0x56ab, 0x56ad,
01688 0x56a6, 0x56a7, 0x56aa, 0x56ac, 0x58da, 0x58dd, 0x58db, 0x5912,
01689 0x5b3d, 0x5b3e, 0x5b3f, 0x5dc3, 0x5e70,
01690 /* 0xf2 */
01691 0x5fbf, 0x61fb, 0x6507, 0x6510, 0x650d, 0x6509, 0x650c, 0x650e,
01692 0x6584, 0x65de, 0x65dd, 0x66de, 0x6ae7, 0x6ae0, 0x6acc, 0x6ad1,
01693 0x6ad9, 0x6acb, 0x6adf, 0x6adc, 0x6ad0, 0x6aeb, 0x6acf, 0x6acd,
01694 0x6ade, 0x6b60, 0x6bb0, 0x6c0c, 0x7019, 0x7027, 0x7020, 0x7016,
01695 0x702b, 0x7021, 0x7022, 0x7023, 0x7029, 0x7017, 0x7024, 0x701c,
01696 0x702a, 0x720c, 0x720a, 0x7207, 0x7202, 0x7205, 0x72a5, 0x72a6,
01697 0x72a4, 0x72a3, 0x72a1, 0x74cb, 0x74c5, 0x74b7, 0x74c3, 0x7516,
01698 0x7660, 0x77c9, 0x77ca, 0x77c4, 0x77f1, 0x791d, 0x791b, 0x7921,
01699 0x791c, 0x7917, 0x791e, 0x791e, 0x79b0, 0x7a67, 0x7a68, 0x7c33, 0x7c3c,
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01701 0x7e70, 0x7e77, 0x7e6f, 0x7e7a, 0x7e72, 0x7e74, 0x7e68, 0x7f4b,
01702 0x7f4a, 0x7f83, 0x7f86, 0x7fb7, 0x7ffd, 0x7ffe, 0x8078, 0x81d7,
01703 0x81d5, 0x8264, 0x8261, 0x8263, 0x85eb, 0x85f1, 0x85ed, 0x85d9,
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01705 0x85df, 0x85e3, 0x85dc, 0x85d1, 0x85f0, 0x85e6, 0x85ef, 0x85de,
01706 0x85e2, 0x8800, 0x87fa, 0x8803, 0x87f6, 0x87f7, 0x8809, 0x880c,
01707 0x880b, 0x8806, 0x87fc, 0x8808, 0x87ff, 0x880a, 0x8802, 0x8962,
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01709 0x8988, 0x89b7, 0x89b6, 0x89f6, 0x8b50, 0x8b48, 0x8b4a, 0x8b40,
01710 0x8b53, 0x8b56, 0x8b54, 0x8b4b, 0x8b55,
01711 /* 0xf3 */
01712 0x8b51, 0x8b42, 0x8b52, 0x8b57, 0x8c43, 0x8c77, 0x8c76, 0x8c9a,
01713 0x8d06, 0x8d07, 0x8d09, 0x8dac, 0x8daa, 0x8dad, 0x8dab, 0x8e6d,
01714 0x8e78, 0x8e73, 0x8e6a, 0x8e6f, 0x8e7b, 0x8ec2, 0x8ef5, 0x8f51,
01715 0x8f4f, 0x8f50, 0x8f53, 0x8fb4, 0x9140, 0x913f, 0x91b0, 0x91ad,
01716 0x93de, 0x93c7, 0x93cf, 0x93c2, 0x93da, 0x93d0, 0x93f9, 0x93ec,
01717 0x93cc, 0x93d9, 0x93a9, 0x93e6, 0x93ca, 0x93d4, 0x93ee, 0x93e3,
01718 0x93d5, 0x93c4, 0x93ce, 0x93c0, 0x93d2, 0x93e7, 0x957d, 0x95da,
01719 0x95db, 0x96e1, 0x9729, 0x972b, 0x972c, 0x972e, 0x9726, 0x97b3,
01720 0x97b7, 0x97b6, 0x97dd, 0x97de, 0x97df, 0x985c, 0x9859, 0x985d,
01721 0x9857, 0x98bf, 0x98bd, 0x98bb, 0x98be, 0x9948, 0x9947, 0x9943,
01722 0x99a6, 0x99a7, 0x9a1a, 0x9a15, 0x9a25, 0x9a1d, 0x9a24, 0x9a1b,
01723 0x9a22, 0x9a20, 0x9a27, 0x9a23, 0x9a1e, 0x9a1c, 0x9a14, 0x9ac2,
01724 0x9b0b, 0x9b0a, 0x9b0e, 0x9b0c, 0x9b37, 0x9b9e, 0x9b9e, 0x9b9e,
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01726 0x9bdc, 0x9bd9, 0x9be5, 0x9bd5, 0x9be1, 0x9bda, 0x9d77, 0x9d81,
01727 0x9d8a, 0x9d84, 0x9d88, 0x9d71, 0x9d80, 0x9d78, 0x9d86, 0x9d8b,
01728 0x9d8c, 0x9d7d, 0x9d6b, 0x9d74, 0x9d75, 0x9d70, 0x9d89, 0x9d85,
01729 0x9d73, 0x9d7b, 0x9d82, 0x9d6f, 0x9d79, 0x9d7f, 0x9d87, 0x9d68,
01730 0x9e94, 0x9e91, 0x9ec0, 0x9efc, 0x9f2d, 0x9f40, 0x9f41, 0x9f4d,
01731 0x9f56, 0x9f57, 0x9f58, 0x5337, 0x56b2,
01732 /* 0xf4 */
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01733 0x56b5, 0x56b3, 0x58e3, 0x5b45, 0x5dc6, 0x5dc7, 0x5eee, 0x5eef,
01734 0x5fc0, 0x5fc1, 0x61f9, 0x6517, 0x6516, 0x6515, 0x6513, 0x65df,
01735 0x66e8, 0x66e3, 0x66e4, 0x6af3, 0x6af0, 0x6aea, 0x6ae8, 0x6af9,
01736 0x6af1, 0x6aee, 0x6aef, 0x703c, 0x7035, 0x702f, 0x7037, 0x7034,
01737 0x7031, 0x7042, 0x7038, 0x703f, 0x703a, 0x7039, 0x7040, 0x703b,
01738 0x7033, 0x7041, 0x7213, 0x7214, 0x72a8, 0x737d, 0x737c, 0x74ba,
01739 0x76ab, 0x76aa, 0x76be, 0x76ed, 0x77cc, 0x77ce, 0x77cf, 0x77cd,
01740 0x77f2, 0x7925, 0x7923, 0x7927, 0x7928, 0x7924, 0x7929, 0x79b2,
01741 0x7a6e, 0x7a6c, 0x7a6d, 0x7af7, 0x7c49, 0x7c48, 0x7c4a, 0x7c47,
01742 0x7c45, 0x7cee, 0x7e7b, 0x7e7e, 0x7e81, 0x7e80, 0x7fba, 0x7fff,
01743 0x8079, 0x81db, 0x81d9, 0x820b, 0x8268, 0x8269, 0x8622, 0x85ff,
01744 0x8601, 0x85fe, 0x861b, 0x8600, 0x85f6, 0x8604, 0x8609, 0x8605,
01745 0x860c, 0x85fd, 0x8819, 0x8810, 0x8811, 0x8817, 0x8813, 0x8816,
01746 0x8963, 0x8966, 0x89b9, 0x89f7, 0x8b60, 0x8b6a, 0x8b5d, 0x8b68,
01747 0x8b63, 0x8b65, 0x8b67, 0x8b6d, 0x8dae, 0x8e86, 0x8e88, 0x8e84,
01748 0x8f59, 0x8f56, 0x8f57, 0x8f55, 0x8f58, 0x8f5a, 0x908d, 0x9143,
01749 0x9141, 0x91b7, 0x91b5, 0x91b2, 0x91b3, 0x940b, 0x9413, 0x93fb,
01750 0x9420, 0x940f, 0x9414, 0x93fe, 0x9415, 0x9410, 0x9428, 0x9419,
01751 0x940d, 0x93f5, 0x9400, 0x93f7, 0x9407, 0x940e, 0x9416, 0x9412,
01752 0x93fa, 0x9409, 0x93f8, 0x940a, 0x93ff,
01753 /* 0xf5 */
01754 0x93fc, 0x940c, 0x93f6, 0x9411, 0x9406, 0x95de, 0x95e0, 0x95df,
01755 0x972e, 0x972f, 0x97b9, 0x97bb, 0x97fd, 0x97fe, 0x9860, 0x9862,
01756 0x9863, 0x985f, 0x98c1, 0x98c2, 0x9950, 0x994e, 0x9959, 0x994c,
01757 0x994b, 0x9953, 0x9a32, 0x9a34, 0x9a31, 0x9a2c, 0x9a2a, 0x9a36,
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01759 0x9b12, 0x9b11, 0x9c0b, 0x9c08, 0x9bf7, 0x9c05, 0x9c12, 0x9bf8,
01760 0x9c40, 0x9c07, 0x9c0e, 0x9c06, 0x9c17, 0x9c14, 0x9c09, 0x9d9f,
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01763 0x9d9e, 0x9da3, 0x9dbf, 0x9da9, 0x9d96, 0x9da6, 0x9da7, 0x9e99,
01764 0x9e9b, 0x9e9a, 0x9ee5, 0x9ee4, 0x9ee7, 0x9ee6, 0x9f30, 0x9f2e,
01765 0x9f5b, 0x9f60, 0x9f6d, 0x9f5e, 0x9f5d, 0x9f59, 0x9f91, 0x513a, 0x5139,
01766 0x5298, 0x5297, 0x56c3, 0x56bd, 0x56be, 0x5b48, 0x5b47, 0x5dcb,
01767 0x5dcf, 0x5ef1, 0x61fd, 0x651b, 0x6b02, 0x6afc, 0x6b03, 0x6af8,
01768 0x6b00, 0x7043, 0x7044, 0x704a, 0x7044, 0x7048, 0x7049, 0x7045, 0x7046,
01769 0x721d, 0x721a, 0x7219, 0x737e, 0x7517, 0x766a, 0x77d0, 0x792d,
01770 0x7931, 0x792f, 0x7c54, 0x7c53, 0x7cf2, 0x7e8a, 0x7e87, 0x7e88,
01771 0x7e8b, 0x7e86, 0x7e8d, 0x7f4d, 0x7fbb, 0x8030, 0x81dd, 0x8618,
01772 0x862a, 0x8626, 0x861f, 0x8623, 0x861c, 0x8619, 0x8627, 0x862e,
01773 0x8621, 0x8620, 0x8629, 0x861e, 0x8625,
01774 /* 0xf6 */
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01777 0x8b7a, 0x8b7b, 0x8d10, 0x8d14, 0x8daf, 0x8e8e, 0x8e8c, 0x8f5e,
01778 0x8f5b, 0x8f5d, 0x9146, 0x9144, 0x9145, 0x91b9, 0x943f, 0x943b,
01779 0x9436, 0x9429, 0x943d, 0x943c, 0x9430, 0x9439, 0x942a, 0x9437,
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01782 0x9a39, 0x9a3d, 0x9a46, 0x9a44, 0x9a42, 0x9a41, 0x9a3a, 0x9a3f,
01783 0x9acd, 0x9b15, 0x9b17, 0x9b18, 0x9b16, 0x9b3a, 0x9b52, 0x9c2b,
01784 0x9c1d, 0x9c1c, 0x9c2c, 0x9c23, 0x9c28, 0x9c29, 0x9c24, 0x9c21,
01785 0x9db7, 0x9db6, 0x9dbc, 0x9dc1, 0x9dc7, 0x9dca, 0x9dcf, 0x9dbe,
01786 0x9dc5, 0x9dc3, 0x9ddb, 0x9db5, 0x9dce, 0x9db9, 0x9dba, 0x9dac,
01787 0x9dc8, 0x9db1, 0x9dad, 0x9dcc, 0x9db3, 0x9dcd, 0x9db2, 0x9e7a,
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01789 0x9f4e, 0x9f65, 0x9f64, 0x9f92, 0x4eb9, 0x56c6, 0x56c5, 0x56cb,
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01793 0x74d9, 0x74d7, 0x766d, 0x76ad, 0x7935, 0x79b4, 0x7a70, 0x7a71,
01794 0x7c57, 0x7c5c, 0x7c59, 0x7c5b, 0x7c5a,
01795 /* 0xf7 */
01796 0x7cf4, 0x7cf1, 0x7e91, 0x7f4f, 0x7f87, 0x81de, 0x826b, 0x8634,
01797 0x8635, 0x8633, 0x862c, 0x8632, 0x8636, 0x882c, 0x8828, 0x8826,
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01799 0x8b82, 0x8b86, 0x8b85, 0x8b7f, 0x8d15, 0x8e95, 0x8e94, 0x8e9a,
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01805 0x9c46, 0x9c48, 0x9c3f, 0x9c44, 0x9c39, 0x9c33, 0x9c41, 0x9c3c,
01806 0x9c37, 0x9c3e, 0x9c32, 0x9c3d, 0x9c36, 0x9ddb, 0x9dd2, 0x9dde,
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01809 0x9f33, 0x9f32, 0x9f42, 0x9f6b, 0x9f95, 0x9fa2, 0x513d, 0x5299,
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01813 0x7670, 0x77d4, 0x7c67, 0x7c66, 0x7e95, 0x826c, 0x863a, 0x8640,
01814 0x8639, 0x863c, 0x8631, 0x863b, 0x863e, 0x8830, 0x8832, 0x882e,
01815 0x8833, 0x8976, 0x8974, 0x8973, 0x89fe,
01816 /* 0xf8 */
01817 0x8b8c, 0x8b8b, 0x8b8b, 0x8b88, 0x8c45, 0x8d19, 0x8e98, 0x8f64,
01818 0x8f63, 0x91bc, 0x9462, 0x9455, 0x945d, 0x9457, 0x945e, 0x97c4,
01819 0x97c5, 0x9800, 0x9a56, 0x9a59, 0x9b1e, 0x9b1f, 0x9b20, 0x9c52,
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01822 0x9df6, 0x9de1, 0x9dee, 0x9de6, 0x9df2, 0x9df0, 0x9de2, 0x9dec,
01823 0x9df4, 0x9df3, 0x9de8, 0x9ded, 0x9ec2, 0x9ed0, 0x9ef2, 0x9ef3,
01824 0x9f06, 0x9f1c, 0x9f38, 0x9f37, 0x9f36, 0x9f43, 0x9f4f, 0x9f71,
01825 0x9f70, 0x9f6e, 0x9f6f, 0x56d3, 0x56cd, 0x5b4e, 0x5c6d, 0x652d,
01826 0x66ed, 0x66ee, 0x6b13, 0x705f, 0x7061, 0x705d, 0x7060, 0x7223,
01827 0x74db, 0x74e5, 0x77d5, 0x7938, 0x79b7, 0x79b6, 0x7c6a, 0x7e97,
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01831 0x97e5, 0x9a5e, 0x9ad5, 0x9b59, 0x9c63, 0x9c67, 0x9c66, 0x9c62,
01832 0x9c5e, 0x9c60, 0x9e02, 0x9dfe, 0x9e07, 0x9e03, 0x9e06, 0x9e05,
01833 0x9e00, 0x9e01, 0x9e09, 0x9dff, 0x9dfd, 0x9e04, 0x9ea0, 0x9f1e,
01834 0x9f46, 0x9f74, 0x9f75, 0x9f76, 0x56d4, 0x652e, 0x65b8, 0x6b18,
01835 0x6b19, 0x6b17, 0x6b1a, 0x7062, 0x7226, 0x72aa, 0x77d8, 0x77d9,
01836 0x7939, 0x7c69, 0x7c6b, 0x7cf6, 0x7e9a,
01837 /* 0xf9 */
01838 0x7e98, 0x7e9b, 0x7e99, 0x81e0, 0x81e1, 0x8646, 0x8647, 0x8648,
01839 0x8979, 0x897a, 0x897c, 0x897b, 0x89ff, 0x8b98, 0x8b99, 0x8ea5,
01840 0x8ea4, 0x8ea3, 0x946e, 0x946d, 0x946f, 0x9471, 0x9473, 0x9749,
01841 0x9872, 0x995f, 0x9c68, 0x9c6e, 0x9c6d, 0x9e0b, 0x9e0d, 0x9e10,
01842 0x9e0f, 0x9e12, 0x9e11, 0x9ea1, 0x9ef5, 0x9f09, 0x9f47, 0x9f78,
01843 0x9f7b, 0x9f7a, 0x9f79, 0x571e, 0x7066, 0x7c6f, 0x883c, 0x8db2,
01844 0x8ea6, 0x91c3, 0x9474, 0x9478, 0x9476, 0x9475, 0x9a60, 0x9c74,
01845 0x9c73, 0x9c71, 0x9c75, 0x9e14, 0x9e13, 0x9ef6, 0x9f0a, 0x9fa4,
01846 0x7068, 0x7065, 0x7cf7, 0x866a, 0x883e, 0x883d, 0x883f, 0x8b9e,
01847 0x8c9c, 0x8ea9, 0x8ec9, 0x974b, 0x9873, 0x9874, 0x98cc, 0x9961,
01848 0x99ab, 0x9a64, 0x9a66, 0x9a67, 0x9b24, 0x9e15, 0x9e17, 0x9f48,
01849 0x6207, 0x6b1e, 0x7227, 0x864c, 0x8ea8, 0x9482, 0x9480, 0x9481,
01850 0x9a69, 0x9a68, 0x9b2e, 0x9e19, 0x7229, 0x864b, 0x8b9f, 0x9483,
01851 0x9c79, 0x9eb7, 0x7675, 0x9a6b, 0x9c7a, 0x9e1d, 0x7069, 0x706a,
01852 0x9ea4, 0x9f7e, 0x9f49, 0x9f98,
01853 };
01854
01855 static int
01856 big5_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
01857 {
01858     unsigned char c1 = s[0];
01859     if ((c1 >= 0xa1 && c1 <= 0xc7) || (c1 >= 0xc9 && c1 <= 0xf9)) {
01860         if (n >= 2) {
01861             unsigned char c2 = s[1];
01862             if ((c2 >= 0x40 && c2 < 0x7f) || (c2 >= 0xa1 && c2 < 0xff)) {
01863                 unsigned int i = 157 * (c1 - 0xa1) + (c2 - (c2 >= 0xa1 ? 0x62 : 0x40));
01864                 unsigned short wc = 0xffff;
01865                 if (i < 6280) {
01866                     if (i < 6121)
01867                         wc = big5_2uni_pagea1[i];
01868                     } else {
01869                         if (i < 13932)
01870                             wc = big5_2uni_pagec9[i-6280];
01871                     }
01872                     if (wc != 0xffff) {
01873                         *pwc = (ucs4_t) wc;
01874                         return 2;
01875                     }
01876                 }
01877                 return RET_ILSEQ;
01878             }
01879             return RET_TOOFEW(0);
01880         }
01881         return RET_ILSEQ;
01882     }
01883 #endif /* NEED_TOWC */
01884
01885 #ifdef NEED_TOMB
01886 static const unsigned short big5_2charset[13703] = {
01887     0xa246, 0xa247, 0xa244, 0xa1b1, 0xa258, 0xa1d3, 0xa150, 0xa1d1,
01888     0xa1d2, 0xa3be, 0xa3bc, 0xa3bd, 0xa3bf, 0xa3bb, 0xa344, 0xa345,
01889     0xa346, 0xa347, 0xa348, 0xa349, 0xa34a, 0xa34b, 0xa34c, 0xa34d,
01890     0xa34e, 0xa34f, 0xa350, 0xa351, 0xa352, 0xa353, 0xa354, 0xa355,
01891     0xa356, 0xa357, 0xa358, 0xa359, 0xa35a, 0xa35b, 0xa35c, 0xa35d,
01892     0xa35e, 0xa35f, 0xa360, 0xa361, 0xa362, 0xa363, 0xa364, 0xa365,
01893     0xa366, 0xa367, 0xa368, 0xa369, 0xa36a, 0xa36b, 0xa36c, 0xa36d,
01894     0xa36e, 0xa36f, 0xa370, 0xa371, 0xa372, 0xa373, 0xc7b3, 0xc7b1,
01895     0xc7b2, 0xc7b4, 0xc7b5, 0xc7b6, 0xc7b7, 0xc7b8, 0xc7b9, 0xc7ba,
01896     0xc7bb, 0xc7bc, 0xc7bd, 0xc7be, 0xc7bf, 0xc7c0, 0xc7c1, 0xc7c2,
01897     0xc7c3, 0xc7c4, 0xc7c5, 0xc7c6, 0xc7c7, 0xc7c8, 0xc7c9, 0xc7ca,
01898     0xc7cb, 0xc7cc, 0xc7cd, 0xc7cf, 0xc7d0, 0xc7d1, 0xc7d2, 0xc7d3,
01899     0xc7d4, 0xc7d5, 0xc7d6, 0xc7d7, 0xc7d8, 0xc7d9, 0xc7da, 0xc7db,
01900     0xc7dc, 0xc7dd, 0xc7de, 0xc7df, 0xc7e0, 0xc7e1, 0xc7e2, 0xc7e3,
01901     0xc7e4, 0xc7e5, 0xc7e6, 0xc7e7, 0xc7e8, 0xc7ce, 0xa156, 0xa158,
01902     0xa1a5, 0xa1a6, 0xa1a7, 0xa1a8, 0xa1a9, 0xa145, 0xa14c, 0xa14b, 0xa1ac,
01903     0xa1ab, 0xa1b0, 0xa1c2, 0xa24a, 0xa1c1, 0xa24b, 0xa2b9, 0xa2ba,
01904     0xa2bb, 0xa2bc, 0xa2bd, 0xa2be, 0xa2bf, 0xa2c0, 0xa2c1, 0xa2c2,
01905     0xa1f6, 0xa1f4, 0xa1f7, 0xa1f5, 0xa1f8, 0xa1f9, 0xa1fa,
01906     0xa1d4, 0xa1db, 0xa1e8, 0xa1e7, 0xa1fd, 0xa1fc, 0xa1e4, 0xa1e5,

```

01907 0xalec, 0xaled, 0xalef, 0xalee, 0xale3, 0xaldc, 0xalda, 0xaldd,
01908 0xald8, 0xald9, 0xale6, 0xale9, 0xc7e9, 0xc7ea, 0xc7eb, 0xc7ec,
01909 0xc7ed, 0xc7ee, 0xc7ef, 0xc7f0, 0xc7f1, 0xc7f3, 0xc7f4,
01910 0xc7f5, 0xc7f6, 0xc7f7, 0xc7f8, 0xc7f9, 0xc7fa, 0xc7fb, 0xc7fc,
01911 0xa277, 0xa278, 0xa27a, 0xa27b, 0xa27c, 0xa27d, 0xa275, 0xa274,
01912 0xa273, 0xa272, 0xa271, 0xa2a4, 0xa2a5, 0xa2a7, 0xa2a6, 0xa27e,
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01914 0xa264, 0xa265, 0xa266, 0xa267, 0xa268, 0xa269, 0xa270, 0xa26f,
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01916 0xalbc, 0xalb6, 0xalb5, 0xalbf, 0xalbe, 0xalbb, 0xalba, 0xalb3,
01917 0xalb7, 0xalb4, 0xa2a8, 0xa2a9, 0xa2ab, 0xa2aa, 0xalb9, 0xalb8,
01918 0xalf3, 0xalf0, 0xalf2, 0xalf1, 0xa140, 0xa142, 0xa143, 0xalb2,
01919 0xc6a4, 0xa171, 0xa172, 0xa16d, 0xa16e, 0xa175, 0xa176, 0xa179,
01920 0xa17a, 0xa169, 0xa16a, 0xa245, 0xa165, 0xa166, 0xa1a9, 0xa1aa,
01921 0xa2c3, 0xa2c4, 0xa2c5, 0xa2c6, 0xa2c7, 0xa2c8, 0xa2c9, 0xa2ca,
01922 0xa2cb, 0xc6a5, 0xc6a6, 0xc6a7, 0xc6a8, 0xc6a9, 0xc6aa, 0xc6ab,
01923 0xc6ac, 0xc6ad, 0xc6ae, 0xc6af, 0xc6b0, 0xc6b1, 0xc6b2, 0xc6b3,
01924 0xc6ba, 0xc6b5, 0xc6b6, 0xc6b7, 0xc6b8, 0xc6b9, 0xc6ba, 0xc6bb,
01925 0xc6bc, 0xc6bd, 0xc6be, 0xc6bf, 0xc6c0, 0xc6c1, 0xc6c2, 0xc6c3,
01926 0xc6c4, 0xc6c5, 0xc6c6, 0xc6c7, 0xc6c8, 0xc6c9, 0xc6ca, 0xc6cb,
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01928 0xc6d4, 0xc6d5, 0xc6d6, 0xc6d7, 0xc6d8, 0xc6d9, 0xc6da, 0xc6db,
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01930 0xc6e4, 0xc6e5, 0xc6e6, 0xc6e7, 0xc6e8, 0xc6e9, 0xc6ea, 0xc6eb,
01931 0xc6ec, 0xc6ed, 0xc6ee, 0xc6ef, 0xc6f0, 0xc6f1, 0xc6f2, 0xc6f3,
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01934 0xc743, 0xc744, 0xc745, 0xc746, 0xc747, 0xc748, 0xc749, 0xc74a,
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01936 0xc753, 0xc754, 0xc755, 0xc756, 0xc757, 0xc758, 0xc759, 0xc75a,
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01957 0xa446, 0xa4a9, 0xa8c6, 0xa447, 0xc948, 0xa45f, 0xa4aa, 0xa4ac,
01958 0xc951, 0xa4ad, 0xa4ab, 0xa5e5, 0xa8c7, 0xa8c8, 0xab45, 0xa460,
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01960 0xab47, 0xadbd, 0xdcbb3, 0xf6d6, 0xa448, 0xa4b0, 0xa4af, 0xc952,
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01971 0xa6ec, 0xa743, 0xa6ed, 0xa6f5, 0xa6f6, 0xca62, 0xca5e, 0xa6fb,
01972 0xa6f3, 0xca5a, 0xa6ef, 0xca65, 0xa745, 0xa748, 0xa6f2, 0xa740,
01973 0xa746, 0xa6f0, 0xca63, 0xa741, 0xca69, 0xca5c, 0xa6fe, 0xca5f,
01974 0xca61, 0xa8d8, 0xcbbf, 0xcbbc, 0xa8d0, 0xcbbc, 0xa8cb, 0xa8d5,
01975 0xa8ce, 0xcbb9, 0xa8d6, 0xcbb8, 0xcbbc, 0xcbc3, 0xcbc1, 0xa8de,
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02021 0xab61, 0xade0, 0xadde, 0xaddf, 0xbead, 0xa556, 0xa642, 0xc9bc,
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03609 static const Summary16 big5_uni2indx_page02[38] = {
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03620 /* 0x0400 */
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03622 { 101, 0xffff }, { 117, 0x0002 },
03623 };
03624 static const Summary16 big5_uni2indx_page20[44] = {
03625 /* 0x2000 */
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03639 };
03640 static const Summary16 big5_uni2indx_page24[37] = {
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03654 };
03655 static const Summary16 big5_uni2indx_page30[62] = {
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04015 { 11540, 0xffffb }, { 11555, 0x85ed }, { 11564, 0xd73f }, { 11576, 0x07bc },
04016 { 11584, 0xaeff }, { 11597, 0xfe0f }, { 11608, 0xfdaf }, { 11621, 0x76bf },
04017 { 11633, 0xfaef }, { 11646, 0x37bb }, { 11657, 0x7fdc }, { 11669, 0xa3ba },
04018 /* 0x9200 */
04019 { 11678, 0xb6ff }, { 11691, 0x56f7 }, { 11702, 0x60f8 }, { 11709, 0xe7df },
04020 { 11722, 0xff61 }, { 11733, 0x4cdf }, { 11743, 0xb0fb }, { 11753, 0xff45 },
04021 { 11764, 0x7ded }, { 11776, 0x3ffa }, { 11788, 0x1fff }, { 11801, 0x18fc },
04022 { 11809, 0xffff }, { 11825, 0xe3af }, { 11836, 0xc7d3 }, { 11846, 0xdf83 },
04023 /* 0x9300 */
04024 { 11856, 0xfb57 }, { 11868, 0xef7d }, { 11881, 0xefff }, { 11896, 0x1378 },
04025 { 11903, 0xfec0 }, { 11912, 0x5ff7 }, { 11925, 0x34bb }, { 11934, 0x5ee3 },
04026 { 11944, 0xf70d }, { 11954, 0xefff6 }, { 11967, 0xd7fe }, { 11980, 0x00bf },
04027 { 11987, 0xf59d }, { 11998, 0xf7f7 }, { 12012, 0x51de }, { 12021, 0xffe0 },
04028 /* 0x9400 */
04029 { 12032, 0xfec9 }, { 12043, 0x037f }, { 12052, 0x5f01 }, { 12059, 0xbfef },
04030 { 12073, 0x9ff1 }, { 12084, 0x60a7 }, { 12091, 0xef1d }, { 12102, 0xf1ff },
04031 { 12115, 0x000f }, { 12119, 0x0000 }, { 12119, 0x0000 }, { 12119, 0x0000 },
04032 { 12119, 0x0000 }, { 12119, 0x0000 }, { 12119, 0x0000 }, { 12119, 0x0000 },
04033 /* 0x9500 */
04034 { 12119, 0x0000 }, { 12119, 0x0000 }, { 12119, 0x0000 }, { 12119, 0x0000 },
04035 { 12119, 0x0000 }, { 12119, 0x0000 }, { 12119, 0x0000 }, { 12119, 0x3c80 },
04036 { 12124, 0xfb4d }, { 12135, 0xd91f }, { 12145, 0x7b3a }, { 12155, 0xfef3 },
04037 { 12167, 0x3fe9 }, { 12178, 0xdc7f }, { 12190, 0x003f }, { 12196, 0x0000 },
04038 /* 0x9600 */
04039 { 12196, 0x0000 }, { 12196, 0x5000 }, { 12198, 0xf51f }, { 12209, 0xbe07 },
04040 { 12218, 0xfc1d }, { 12228, 0xf91b }, { 12238, 0xbc1e }, { 12247, 0x71ff },
04041 { 12259, 0x6ff9 }, { 12271, 0x5bbe }, { 12282, 0x579e }, { 12291, 0x9b1b },
04042 { 12300, 0x7fff }, { 12315, 0xffffc }, { 12329, 0x872e }, { 12337, 0xafef },
04043 /* 0x9700 */
04044 { 12349, 0xebf5 }, { 12361, 0xf34f }, { 12372, 0xdfdf }, { 12386, 0xe725 },
04045 { 12395, 0x0bdc }, { 12403, 0x5d44 }, { 12410, 0x5747 }, { 12419, 0xfddd },
04046 { 12432, 0xed3f }, { 12444, 0x7790 }, { 12452, 0x7d7f }, { 12465, 0x8ac8 },
04047 { 12471, 0xfafa }, { 12483, 0xf3f9 }, { 12495, 0x202a }, { 12499, 0xef4b },
04048 /* 0x9800 */
04049 { 12510, 0xf5ff }, { 12524, 0x79cf }, { 12535, 0xabd3 }, { 12545, 0x0ba5 },
04050 { 12552, 0xf77a }, { 12564, 0xfb8f }, { 12576, 0x8ebd }, { 12586, 0x001f },
04051 { 12591, 0x0000 }, { 12591, 0x0000 }, { 12591, 0xf300 }, { 12597, 0xfd4e },
04052 { 12608, 0x1a57 }, { 12616, 0x8800 }, { 12618, 0xaeac }, { 12627, 0x7654 },
04053 /* 0x9900 */
04054 { 12635, 0x17ad }, { 12644, 0xcdff }, { 12657, 0xffb2 }, { 12669, 0xf42f },
04055 { 12679, 0x5baa }, { 12688, 0xdbff }, { 12702, 0x0002 }, { 12703, 0x0000 },
04056 { 12703, 0x0000 }, { 12703, 0x73c0 }, { 12710, 0xf9ea }, { 12721, 0x2e3f },
04057 { 12731, 0xfa8e }, { 12741, 0xbfff }, { 12755, 0x76bc }, { 12765, 0xffd3 },
04058 /* 0x9a00 */
04059 { 12778, 0xeefe }, { 12791, 0x7e72 }, { 12801, 0x7ebd }, { 12813, 0xe7f7 },
04060 { 12826, 0xf77f }, { 12840, 0xcefd }, { 12852, 0x0ff5 }, { 12862, 0x0000 },
04061 { 12862, 0x0000 }, { 12862, 0x0000 }, { 12862, 0xa900 }, { 12866, 0xdb9b },
04062 { 12877, 0xa4c7 }, { 12885, 0x917f }, { 12895, 0xf8ca }, { 12904, 0x7ece },
04063 /* 0x9b00 */
04064 { 12915, 0x7d7a }, { 12926, 0xc7e7 }, { 12937, 0xcbbd }, { 12948, 0xdcae },
04065 { 12958, 0xfd7e }, { 12971, 0x8f76 }, { 12981, 0x91d3 }, { 12989, 0x7cf3 },
04066 { 13000, 0x01e5 }, { 13006, 0x4c2f }, { 13014, 0xed77 }, { 13026, 0xa360 },
04067 { 13032, 0x07db }, { 13041, 0x5ef8 }, { 13051, 0x1df7 }, { 13062, 0x2181 },
04068 /* 0x9c00 */
04069 { 13066, 0x6be0 }, { 13074, 0x309c }, { 13080, 0x3b3a }, { 13089, 0xfade },
04070 { 13101, 0x7f53 }, { 13112, 0xc3f5 }, { 13122, 0x61cd }, { 13130, 0x07ba },
04071 { 13138, 0x0000 }, { 13138, 0x0000 }, { 13138, 0x0000 }, { 13138, 0x0000 },
04072 { 13138, 0x0000 }, { 13138, 0x0000 }, { 13138, 0x26e0 }, { 13144, 0xbefe },
04073 /* 0x9d00 */
04074 { 13157, 0x03f9 }, { 13165, 0xebb5 }, { 13176, 0xe36d }, { 13186, 0xe9cb },
04075 { 13196, 0x9c2f }, { 13205, 0xbfde }, { 13218, 0x9f83 }, { 13227, 0xabbf },
04076 { 13239, 0x1ff7 }, { 13251, 0xffd5 }, { 13264, 0xb7df }, { 13277, 0xdffe },
04077 { 13291, 0xfdae }, { 13303, 0xfefef }, { 13318, 0xfb7e }, { 13331, 0xfffd },
04078 /* 0x9e00 */
04079 { 13345, 0xaaff }, { 13357, 0x6ebf }, { 13369, 0x0000 }, { 13369, 0x0000 },
04080 { 13369, 0x0000 }, { 13369, 0x0000 }, { 13369, 0x0000 }, { 13369, 0xb620 },
04081 { 13375, 0x7fcd }, { 13387, 0xbe9e }, { 13398, 0x62b3 }, { 13406, 0x58f1 },
```

```

04082 { 13414, 0xf10d }, { 13422, 0xfd7b }, { 13435, 0xe9f1 }, { 13445, 0xbefd },
04083 /* 0x9f00 */
04084 { 13458, 0xc6c3 }, { 13466, 0x5f6d }, { 13477, 0xff3d }, { 13490, 0x69ff },
04085 { 13502, 0xffcf }, { 13516, 0xfbf4 }, { 13528, 0xdcfb }, { 13540, 0x4ff7 },
04086 { 13552, 0x2000 }, { 13553, 0x1137 }, { 13560, 0x0015 },
04087 };
04088 static const Summary16 big5_uni2indx_pagefa[1] = {
04089 /* 0xfa00 */
04090 { 13563, 0x3000 },
04091 };
04092 static const Summary16 big5_uni2indx_pagefe[23] = {
04093 /* 0xfe00 */
04094 { 13565, 0x0000 }, { 13565, 0x0000 }, { 13565, 0x0000 }, { 13565, 0xffff },
04095 { 13580, 0xfelf }, { 13592, 0xfef5 }, { 13605, 0x0e7f }, { 13615, 0x0000 },
04096 { 13615, 0x0000 }, { 13615, 0x0000 }, { 13615, 0x0000 }, { 13615, 0x0000 },
04097 { 13615, 0x0000 }, { 13615, 0x0000 }, { 13615, 0x0000 }, { 13615, 0x0000 },
04098 /* 0xff00 */
04099 { 13615, 0xff7a }, { 13628, 0xffff }, { 13644, 0xffff }, { 13660, 0x97ff },
04100 { 13673, 0xfffe }, { 13688, 0x3fff }, { 13702, 0x0010 },
04101 };
04102
04103 static int
04104 big5_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
04105 {
04106     (void)conv;
04107     if (n >= 2) {
04108         const Summary16 *summary = NULL;
04109         if (wc < 0x0100)
04110             summary = &big5_uni2indx_page00[(wc>>4)];
04111         else if (wc >= 0x0200 && wc < 0x0460)
04112             summary = &big5_uni2indx_page02[(wc>>4)-0x020];
04113         else if (wc >= 0x2000 && wc < 0x22c0)
04114             summary = &big5_uni2indx_page20[(wc>>4)-0x200];
04115         else if (wc >= 0x2400 && wc < 0x2650)
04116             summary = &big5_uni2indx_page24[(wc>>4)-0x240];
04117         else if (wc >= 0x3000 && wc < 0x33e0)
04118             summary = &big5_uni2indx_page30[(wc>>4)-0x300];
04119         else if (wc >= 0x4e00 && wc < 0x9fb0)
04120             summary = &big5_uni2indx_page4e[(wc>>4)-0x4e0];
04121         else if (wc >= 0xfa00 && wc < 0xfal0)
04122             summary = &big5_uni2indx_pagefa[(wc>>4)-0xfa0];
04123         else if (wc >= 0xfe00 && wc < 0xff70)
04124             summary = &big5_uni2indx_pagefe[(wc>>4)-0xfe0];
04125         if (summary) {
04126             unsigned short used = summary->used;
04127             unsigned int i = wc & 0xf;
04128             if (used & ((unsigned short) 1 << i)) {
04129                 unsigned short c;
04130                 /* Keep in `used' only the bits 0..i-1. */
04131                 used &= ((unsigned short) 1 << i) - 1;
04132                 /* Add `summary->indx' and the number of bits set in `used'. */
04133                 used = (used & 0x5555) + ((used & 0xaaaa) >> 1);
04134                 used = (used & 0x3333) + ((used & 0xcccc) >> 2);
04135                 used = (used & 0x0f0f) + ((used & 0xf0f0) >> 4);
04136                 used = (used & 0x00ff) + (used >> 8);
04137                 c = big5_2charset[summary->indx + used];
04138                 r[0] = (c >> 8); r[1] = (c & 0xff);
04139                 return 2;
04140             }
04141         }
04142         return RET_ILSEQ;
04143     }
04144     return RET_TOOSMALL;
04145 }
04146 #endif /* NEED_TOMB */

```

13.261 big5_emacs.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/big5_emacs.h,v 1.1 2000/11/28 18:50:06 dawes Exp $ */
00002
00003 /*
00004  * BIG5-0 and BIG5-1
00005  */
00006
00007 /*
00008  * BIG5 with its 13494 characters doesn't fit in a single 94x94 or 96x96
00009  * block. Therefore Emacs/Mule developers, in a typically Japanese way of
00010  * thinking, have developed an alternative encoding of BIG5 in two 94x94
00011  * planes, very similar to the SHIFT_JIS encoding for JISX0208.
00012
00013  * Conversion between BIG5 codes (s1,s2) and BIG5-0 codes (c1,c2):
00014  * Example. (s1,s2) = 0xA140, (c1,c2) = 0x2121.
00015  * 0xA1 <= s1 <= 0xC7, 0x40 <= s2 <= 0x7E || 0xA1 <= s2 <= 0xFE,
00016  * 0x21 <= c1 <= 0x62, 0x21 <= c2 <= 0x7E.
00017  * Invariant:

```



```

00018     157*(s1-0xA1) + (s2 < 0x80 ? s2-0x40 : s2-0x62)
00019     = 94*(c1-0x21)+(c2-0x21)
00020 Conversion (s1,s2) -> (c1,c2):
00021     t := 157*(s1-0xA1) + (s2 < 0x80 ? s2-0x40 : s2-0x62)
00022     c1 := (t div 94) + 0x21
00023     c2 := (t mod 94) + 0x21
00024 Conversion (c1,c2) -> (s1,s2):
00025     t := 94*(c1-0x21)+(c2-0x21)
00026     t2 := t mod 157
00027     s1 := (t div 157) + 0xA1
00028     s2 := (t2 < 0x3F ? t2+0x40 : t2+0x62)
00029
00030 Conversion between BIG5 codes (s1,s2) and BIG5-1 codes (c1,c2):
00031 Example. (s1,s2) = 0xC940, (c1,c2) = 0x2121.
00032 0xC9 <= s1 <= 0xF9, 0x40 <= s2 <= 0x7E || 0xA1 <= s2 <= 0xFE,
00033 0x21 <= c1 <= 0x72, 0x21 <= c2 <= 0x7E.
00034 Invariant:
00035     157*(s1-0xC9) + (s2 < 0x80 ? s2-0x40 : s2-0x62)
00036     = 94*(c1-0x21)+(c2-0x21)
00037 Conversion (s1,s2) -> (c1,c2):
00038     t := 157*(s1-0xC9) + (s2 < 0x80 ? s2-0x40 : s2-0x62)
00039     c1 := (t div 94) + 0x21
00040     c2 := (t mod 94) + 0x21
00041 Conversion (c1,c2) -> (s1,s2):
00042     t := 94*(c1-0x21)+(c2-0x21)
00043     t2 := t mod 157
00044     s1 := (t div 157) + 0xC9
00045     s2 := (t2 < 0x3F ? t2+0x40 : t2+0x62)
00046 */
00047
00048 static int
00049 big5_0_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00050 {
00051     unsigned char c1 = s[0];
00052     if (c1 >= 0x21 && c1 <= 0x62) {
00053         if (n >= 2) {
00054             unsigned char c2 = s[1];
00055             if (c2 >= 0x21 && c2 <= 0x7e) {
00056                 unsigned int i = 94 * (c1 - 0x21) + (c2 - 0x21);
00057                 if (0) {
00058                     /* Unoptimized. */
00059                     unsigned char buf[2];
00060                     buf[0] = (i / 157) + 0xA1;
00061                     i = i % 157;
00062                     buf[1] = i + (i < 0x3f ? 0x40 : 0x62);
00063                     return big5_mbtowc(conv,pwc,buf,2);
00064                 } else {
00065                     /* Inline the implementation of big5_mbtowc. */
00066                     if (i < 6121) {
00067                         unsigned short wc = big5_2uni_pagea1[i];
00068                         if (wc != 0xffffd) {
00069                             *pwc = (ucs4_t) wc;
00070                             return 2;
00071                         }
00072                     }
00073                 }
00074             }
00075             return RET_ILSEQ;
00076         }
00077         return RET_TOOFEW(0);
00078     }
00079     return RET_ILSEQ;
00080 }
00081
00082 static int
00083 big5_1_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00084 {
00085     unsigned char c1 = s[0];
00086     if (c1 >= 0x21 && c1 <= 0x72) {
00087         if (n >= 2) {
00088             unsigned char c2 = s[1];
00089             if (c2 >= 0x21 && c2 <= 0x7e) {
00090                 unsigned int i = 94 * (c1 - 0x21) + (c2 - 0x21);
00091                 if (0) {
00092                     /* Unoptimized. */
00093                     unsigned char buf[2];
00094                     buf[0] = (i / 157) + 0xC9;
00095                     i = i % 157;
00096                     buf[1] = i + (i < 0x3f ? 0x40 : 0x62);
00097                     return big5_mbtowc(conv,pwc,buf,2);
00098                 } else {
00099                     /* Inline the implementation of big5_mbtowc. */
00100                     if (i < 7652) {
00101                         unsigned short wc = big5_2uni_pagec9[i];
00102                         if (wc != 0xffffd) {
00103                             *pwc = (ucs4_t) wc;
00104                             return 2;

```

```

00105     }
00106     }
00107     }
00108     }
00109     return RET_ILSEQ;
00110     }
00111     return RET_TOOFEW(0);
00112     }
00113     return RET_ILSEQ;
00114 }
00115
00116 static int
00117 big5_0_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00118 {
00119     if (n >= 2) {
00120         unsigned char buf[2];
00121         int ret = big5_wctomb(conv,buf,wc,2);
00122         if (ret != RET_ILSEQ) {
00123             unsigned char s1, s2;
00124             if (ret != 2) abort();
00125             s1 = buf[0];
00126             s2 = buf[1];
00127             if (!(s1 >= 0xa1)) abort();
00128             if (!(s2 >= 0x40 && s2 <= 0x7e) || (s2 >= 0xa1 && s2 <= 0xfe)) abort();
00129             if (s1 < 0xc9) {
00130                 unsigned int t = 157 * (s1 - 0xa1) + s2 - (s2 < 0x80 ? 0x40 : 0x62);
00131                 r[0] = (t / 94) + 0x21;
00132                 r[1] = (t % 94) + 0x21;
00133                 return 2;
00134             }
00135         }
00136         return RET_ILSEQ;
00137     }
00138     return RET_TOOSMALL;
00139 }
00140
00141 static int
00142 big5_1_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00143 {
00144     if (n >= 2) {
00145         unsigned char buf[2];
00146         int ret = big5_wctomb(conv,buf,wc,2);
00147         if (ret != RET_ILSEQ) {
00148             unsigned char s1, s2;
00149             if (ret != 2) abort();
00150             s1 = buf[0];
00151             s2 = buf[1];
00152             if (!(s1 <= 0xf9)) abort();
00153             if (!(s2 >= 0x40 && s2 <= 0x7e) || (s2 >= 0xa1 && s2 <= 0xfe)) abort();
00154             if (s1 >= 0xc9) {
00155                 unsigned int t = 157 * (s1 - 0xc9) + s2 - (s2 < 0x80 ? 0x40 : 0x62);
00156                 r[0] = (t / 94) + 0x21;
00157                 r[1] = (t % 94) + 0x21;
00158                 return 2;
00159             }
00160         }
00161         return RET_ILSEQ;
00162     }
00163     return RET_TOOSMALL;
00164 }

```

13.262 cp1133.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/cp1133.h,v 1.3 2000/11/29 17:40:28 dawes Exp $ */
00002
00003 /*
00004  * IBM-CP1133
00005  */
00006
00007 static const unsigned short cp1133_2uni_1[64] = {
00008     /* 0xa0 */
00009     0x00a0, 0x0e81, 0x0e82, 0x0e84, 0x0e87, 0x0e88, 0x0eaa, 0x0e8a,
00010     0x0e8d, 0x0e94, 0x0e95, 0x0e96, 0x0e97, 0x0e99, 0x0e9a, 0x0e9b,
00011     /* 0xb0 */
00012     0x0e9c, 0x0e9d, 0x0e9e, 0x0e9f, 0x0ea1, 0x0ea2, 0x0ea3, 0x0ea5,
00013     0x0ea7, 0x0eab, 0x0ead, 0x0eae, 0xfffd, 0xfffd, 0xfffd, 0xeaf,
00014     /* 0xc0 */
00015     0x0eb0, 0x0eb2, 0x0eb3, 0x0eb4, 0x0eb5, 0x0eb6, 0x0eb7, 0x0eb8,
00016     0x0eb9, 0x0ebc, 0x0eb1, 0x0ebb, 0x0ebd, 0xfffd, 0xfffd, 0xfffd,
00017     /* 0xd0 */
00018     0x0ec0, 0x0ec1, 0x0ec2, 0x0ec3, 0x0ec4, 0x0ec8, 0x0ec9, 0x0eca,
00019     0x0ecb, 0x0ecc, 0x0ecd, 0x0ec6, 0xfffd, 0x0edc, 0x0edd, 0x20ad,
00020 };
00021 static const unsigned short cp1133_2uni_2[16] = {
00022     /* 0xf0 */

```

```

00023 0x0ed0, 0x0ed1, 0x0ed2, 0x0ed3, 0x0ed4, 0x0ed5, 0x0ed6, 0x0ed7,
00024 0x0ed8, 0x0ed9, 0xffff, 0xffff, 0x00a2, 0x00ac, 0x00a6, 0xffff,
00025 };
00026
00027 static int
00028 cp1133_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00029 {
00030     unsigned char c = *s;
00031     if (c < 0xa0) {
00032         *pwc = (ucs4_t) c;
00033         return 1;
00034     }
00035     else if (c < 0xe0) {
00036         unsigned short wc = cp1133_2uni_1[c-0xa0];
00037         if (wc != 0xffffd) {
00038             *pwc = (ucs4_t) wc;
00039             return 1;
00040         }
00041     }
00042     else if (c < 0xf0) {
00043     }
00044     else {
00045         unsigned short wc = cp1133_2uni_2[c-0xf0];
00046         if (wc != 0xffffd) {
00047             *pwc = (ucs4_t) wc;
00048             return 1;
00049         }
00050     }
00051     return RET_ILSEQ;
00052 }
00053
00054 static const unsigned char cp1133_page00[16] = {
00055     0xa0, 0x00, 0xfc, 0x00, 0x00, 0x00, 0x00, 0xfe, 0x00, /* 0xa0-0xa7 */
00056     0x00, 0x00, 0x00, 0x00, 0xfd, 0x00, 0x00, 0x00, /* 0xa8-0xaf */
00057 };
00058 static const unsigned char cp1133_page0e[96] = {
00059     0x00, 0xa1, 0xa2, 0x00, 0xa3, 0x00, 0x00, 0xa4, /* 0x80-0x87 */
00060     0xa5, 0x00, 0xa7, 0x00, 0x00, 0xa8, 0x00, 0x00, /* 0x88-0x8f */
00061     0x00, 0x00, 0x00, 0x00, 0xa9, 0xaa, 0xab, 0xac, /* 0x90-0x97 */
00062     0x00, 0xad, 0xae, 0xaf, 0xb0, 0xb1, 0xb2, 0xb3, /* 0x98-0x9f */
00063     0x00, 0xb4, 0xb5, 0xb6, 0x00, 0xb7, 0x00, 0xb8, /* 0xa0-0xa7 */
00064     0x00, 0x00, 0xa6, 0xb9, 0x00, 0xba, 0xbb, 0xbf, /* 0xa8-0xaf */
00065     0xc0, 0xca, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, /* 0xb0-0xb7 */
00066     0xc7, 0xc8, 0x00, 0xcb, 0xc9, 0xcc, 0x00, 0x00, /* 0xb8-0xbf */
00067     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0x00, 0xdb, 0x00, /* 0xc0-0xc7 */
00068     0xd5, 0xd6, 0xd7, 0xd8, 0xd9, 0xda, 0x00, 0x00, /* 0xc8-0xcf */
00069     0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0xd0-0xd7 */
00070     0xf8, 0xf9, 0x00, 0x00, 0xdd, 0xde, 0x00, 0x00, /* 0xd8-0xdf */
00071 };
00072
00073 static int
00074 cp1133_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00075 {
00076     unsigned char c = 0;
00077     if (wc < 0x00a0) {
00078         *r = wc;
00079         return 1;
00080     }
00081     else if (wc >= 0x00a0 && wc < 0x00b0)
00082         c = cp1133_page00[wc-0x00a0];
00083     else if (wc >= 0x00e0 && wc < 0x00ee0)
00084         c = cp1133_page0e[wc-0x00e80];
00085     else if (wc == 0x20ad)
00086         c = 0xdf;
00087     if (c != 0) {
00088         *r = c;
00089         return 1;
00090     }
00091     return RET_ILSEQ;
00092 }

```

13.263 cp1251.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/cp1251.h,v 1.1 2000/12/04 18:49:32 dawes Exp $ */
00002
00003 /*
00004  * CP1251
00005  */
00006 #ifndef NEED_TOWC
00007
00008 static const unsigned short cp1251_2uni[128] = {
00009     /* 0x80 */
00010     0x0402, 0x0403, 0x201a, 0x0453, 0x201e, 0x2026, 0x2020, 0x2021,
00011     0x20ac, 0x2030, 0x0409, 0x2039, 0x040a, 0x040c, 0x040b, 0x040f,
00012     /* 0x90 */

```

```

00013 0x0452, 0x2018, 0x2019, 0x201c, 0x201d, 0x2022, 0x2013, 0x2014,
00014 0xffffd, 0x2122, 0x0459, 0x203a, 0x045a, 0x045c, 0x045b, 0x045f,
00015 /* 0xa0 */
00016 0x00a0, 0x040e, 0x045e, 0x0408, 0x00a4, 0x0490, 0x00a6, 0x00a7,
00017 0x0401, 0x00a9, 0x0404, 0x00ab, 0x00ac, 0x00ad, 0x00ae, 0x0407,
00018 /* 0xb0 */
00019 0x00b0, 0x00b1, 0x0406, 0x0456, 0x0491, 0x00b5, 0x00b6, 0x00b7,
00020 0x0451, 0x2116, 0x0454, 0x00bb, 0x0458, 0x0405, 0x0455, 0x0457,
00021 /* 0xc0 */
00022 0x0410, 0x0411, 0x0412, 0x0413, 0x0414, 0x0415, 0x0416, 0x0417,
00023 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e, 0x041f,
00024 /* 0xd0 */
00025 0x0420, 0x0421, 0x0422, 0x0423, 0x0424, 0x0425, 0x0426, 0x0427,
00026 0x0428, 0x0429, 0x042a, 0x042b, 0x042c, 0x042d, 0x042e, 0x042f,
00027 /* 0xe0 */
00028 0x0430, 0x0431, 0x0432, 0x0433, 0x0434, 0x0435, 0x0436, 0x0437,
00029 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e, 0x043f,
00030 /* 0xf0 */
00031 0x0440, 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446, 0x0447,
00032 0x0448, 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e, 0x044f,
00033 };
00034
00035 static int
00036 cp1251_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00037 {
00038     unsigned char c = *s;
00039     if (c < 0x80) {
00040         *pwc = (ucs4_t) c;
00041         return 1;
00042     }
00043     else {
00044         unsigned short wc = cp1251_2uni[c-0x80];
00045         if (wc != 0xffffd) {
00046             *pwc = (ucs4_t) wc;
00047             return 1;
00048         }
00049     }
00050     return RET_ILSEQ;
00051 }
00052 #endif /* NEED_TOWC */
00053
00054 #ifdef NEED_TOMB
00055 static const unsigned char cp1251_page00[32] = {
00056     0xa0, 0x00, 0x00, 0x00, 0xa4, 0x00, 0xa6, 0xa7, /* 0xa0-0xa7 */
00057     0x00, 0xa9, 0x00, 0xab, 0xac, 0xad, 0xae, 0x00, /* 0xa8-0xaf */
00058     0xb0, 0xb1, 0x00, 0x00, 0x00, 0xb5, 0xb6, 0xb7, /* 0xb0-0xb7 */
00059     0x00, 0x00, 0x00, 0xbb, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00060 };
00061 static const unsigned char cp1251_page04[152] = {
00062     0x00, 0xa8, 0x80, 0x81, 0xaa, 0xbd, 0xb2, 0xaf, /* 0x00-0x07 */
00063     0xa3, 0x8a, 0x8c, 0x8e, 0x8d, 0x00, 0xa1, 0x8f, /* 0x08-0x0f */
00064     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x10-0x17 */
00065     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x18-0x1f */
00066     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0x20-0x27 */
00067     0xd8, 0xd9, 0xda, 0xdb, 0xdc, 0xdd, 0xde, 0xdf, /* 0x28-0x2f */
00068     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0x30-0x37 */
00069     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0x38-0x3f */
00070     0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0x40-0x47 */
00071     0xf8, 0xf9, 0xfa, 0xfb, 0xfc, 0xfd, 0xfe, 0xff, /* 0x48-0x4f */
00072     0x00, 0xb8, 0x90, 0x83, 0xba, 0xbe, 0xb3, 0xbf, /* 0x50-0x57 */
00073     0xbc, 0x9a, 0x9c, 0x9e, 0x9d, 0x00, 0xa2, 0x9f, /* 0x58-0x5f */
00074     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00075     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00076     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00077     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00078     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00079     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00080     0xa5, 0xb4, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00081 };
00082 static const unsigned char cp1251_page20[48] = {
00083     0x00, 0x00, 0x00, 0x96, 0x97, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00084     0x91, 0x92, 0x82, 0x00, 0x93, 0x94, 0x84, 0x00, /* 0x18-0x1f */
00085     0x86, 0x87, 0x95, 0x00, 0x00, 0x00, 0x85, 0x00, /* 0x20-0x27 */
00086     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00087     0x89, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00088     0x00, 0x8b, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00089 };
00090
00091 static int
00092 cp1251_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00093 {
00094     (void) conv; (void) n;
00095     unsigned char c = 0;
00096     if (wc < 0x0080) {
00097         *r = wc;
00098         return 1;
00099     }

```

```

00100     else if (wc >= 0x00a0 && wc < 0x00c0)
00101         c = cp1251_page00[wc-0x00a0];
00102     else if (wc >= 0x0400 && wc < 0x0498)
00103         c = cp1251_page04[wc-0x0400];
00104     else if (wc >= 0x2010 && wc < 0x2040)
00105         c = cp1251_page20[wc-0x2010];
00106     else if (wc == 0x20ac)
00107         c = 0x88;
00108     else if (wc == 0x2116)
00109         c = 0xb9;
00110     else if (wc == 0x2122)
00111         c = 0x99;
00112     if (c != 0) {
00113         *r = c;
00114         return 1;
00115     }
00116     return RET_ILSEQ;
00117 }
00118 #endif /* NEED_TOMB */

```

13.264 cp1255.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/cp1255.h,v 1.1 2000/12/04 18:49:33 dawes Exp $ */
00002
00003 /*
00004  * CP1255
00005  */
00006
00007 static const unsigned short cp1255_2uni[128] = {
00008     /* 0x80 */
00009     0x20ac, 0xffffd, 0x201a, 0x0192, 0x201e, 0x2026, 0x2020, 0x2021,
00010     0x02c6, 0x2030, 0xffffd, 0x2039, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
00011     /* 0x90 */
00012     0xffffd, 0x2018, 0x2019, 0x201c, 0x201d, 0x2022, 0x2013, 0x2014,
00013     0x02dc, 0x2122, 0xffffd, 0x203a, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
00014     /* 0xa0 */
00015     0x00a0, 0x00a1, 0x00a2, 0x00a3, 0x20aa, 0x00a5, 0x00a6, 0x00a7,
00016     0x00a8, 0x00a9, 0x00d7, 0x00ab, 0x00ac, 0x00ad, 0x00ae, 0x00af,
00017     /* 0xb0 */
00018     0x00b0, 0x00b1, 0x00b2, 0x00b3, 0x00b4, 0x00b5, 0x00b6, 0x00b7,
00019     0x00b8, 0x00b9, 0x00f7, 0x00bb, 0x00bc, 0x00bd, 0x00be, 0x00bf,
00020     /* 0xc0 */
00021     0x05b0, 0x05b1, 0x05b2, 0x05b3, 0x05b4, 0x05b5, 0x05b6, 0x05b7,
00022     0x05b8, 0x05b9, 0xffffd, 0x05bb, 0x05bc, 0x05bd, 0x05be, 0x05bf,
00023     /* 0xd0 */
00024     0x05c0, 0x05c1, 0x05c2, 0x05c3, 0x05f0, 0x05f1, 0x05f2, 0x05f3,
00025     0x05f4, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
00026     /* 0xe0 */
00027     0x05d0, 0x05d1, 0x05d2, 0x05d3, 0x05d4, 0x05d5, 0x05d6, 0x05d7,
00028     0x05d8, 0x05d9, 0x05da, 0x05db, 0x05dc, 0x05dd, 0x05de, 0x05df,
00029     /* 0xf0 */
00030     0x05e0, 0x05e1, 0x05e2, 0x05e3, 0x05e4, 0x05e5, 0x05e6, 0x05e7,
00031     0x05e8, 0x05e9, 0x05ea, 0xffffd, 0xffffd, 0x200e, 0x200f, 0xffffd,
00032 };
00033
00034 static int
00035 cp1255_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00036 {
00037     unsigned char c = *s;
00038     if (c < 0x80) {
00039         *pwc = (ucs4_t) c;
00040         return 1;
00041     }
00042     else {
00043         unsigned short wc = cp1255_2uni[c-0x80];
00044         if (wc != 0xffffd) {
00045             *pwc = (ucs4_t) wc;
00046             return 1;
00047         }
00048     }
00049     return RET_ILSEQ;
00050 }
00051
00052 static const unsigned char cp1255_page00[88] = {
00053     0xa0, 0xa1, 0xa2, 0xa3, 0x00, 0xa5, 0xa6, 0xa7, /* 0xa0-0xa7 */
00054     0xa8, 0xa9, 0x00, 0xab, 0xac, 0xad, 0xae, 0xaf, /* 0xa8-0xaf */
00055     0xb0, 0xb1, 0xb2, 0xb3, 0xb4, 0xb5, 0xb6, 0xb7, /* 0xb0-0xb7 */
00056     0xb8, 0xb9, 0x00, 0xbb, 0xbc, 0xbd, 0xbe, 0xbf, /* 0xb8-0xbf */
00057     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00058     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00059     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xaa, /* 0xd0-0xd7 */
00060     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00061     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe0-0xe7 */
00062     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe8-0xef */
00063     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xba, /* 0xf0-0xf7 */

```

```

00064 };
00065 static const unsigned char cp1255_page02[32] = {
00066 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00067 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00068 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00069 0x00, 0x00, 0x00, 0x00, 0x98, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00070 };
00071 static const unsigned char cp1255_page05[72] = {
00072 0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0xb0-0xb7 */
00073 0xc8, 0xc9, 0x00, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0xb8-0xbf */
00074 0xd0, 0xd1, 0xd2, 0xd3, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00075 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00076 0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0xd0-0xd7 */
00077 0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xd8-0xdf */
00078 0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0xe0-0xe7 */
00079 0xf8, 0xf9, 0xfa, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe8-0xef */
00080 0xd4, 0xd5, 0xd6, 0xd7, 0xd8, 0x00, 0x00, 0x00, /* 0xf0-0xf7 */
00081 };
00082 static const unsigned char cp1255_page20[56] = {
00083 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xfd, 0xfe, /* 0x08-0x0f */
00084 0x00, 0x00, 0x00, 0x00, 0x96, 0x97, 0x00, 0x00, /* 0x10-0x17 */
00085 0x91, 0x92, 0x82, 0x00, 0x93, 0x94, 0x84, 0x00, /* 0x18-0x1f */
00086 0x86, 0x87, 0x95, 0x00, 0x00, 0x00, 0x85, 0x00, /* 0x20-0x27 */
00087 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00088 0x89, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00089 0x00, 0x8b, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00090 };
00091
00092 static int
00093 cp1255_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00094 {
00095     unsigned char c = 0;
00096     if (wc < 0x0080) {
00097         *r = wc;
00098         return 1;
00099     }
00100     else if (wc >= 0x00a0 && wc < 0x00f8)
00101         c = cp1255_page00[wc-0x00a0];
00102     else if (wc == 0x0192)
00103         c = 0x83;
00104     else if (wc >= 0x02c0 && wc < 0x02e0)
00105         c = cp1255_page02[wc-0x02c0];
00106     else if (wc >= 0x05b0 && wc < 0x05f8)
00107         c = cp1255_page05[wc-0x05b0];
00108     else if (wc >= 0x2008 && wc < 0x2040)
00109         c = cp1255_page20[wc-0x2008];
00110     else if (wc == 0x20aa)
00111         c = 0xa4;
00112     else if (wc == 0x20ac)
00113         c = 0x80;
00114     else if (wc == 0x2122)
00115         c = 0x99;
00116     if (c != 0) {
00117         *r = c;
00118         return 1;
00119     }
00120     return RET_ILSEQ;
00121 }

```

13.265 cp1256.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/cp1256.h,v 1.1 2000/12/04 18:49:34 dawes Exp $ */
00002
00003 /*
00004  * CP1256
00005  */
00006
00007 static const unsigned short cp1256_2uni[128] = {
00008     /* 0x80 */
00009     0x20ac, 0x067e, 0x201a, 0x0192, 0x201e, 0x2026, 0x2020, 0x2021,
00010     0x02c6, 0x2030, 0x0679, 0x2039, 0x0152, 0x0686, 0x0698, 0x0688,
00011     /* 0x90 */
00012     0x06af, 0x2018, 0x2019, 0x201c, 0x201d, 0x2022, 0x2013, 0x2014,
00013     0x06a9, 0x2122, 0x0691, 0x203a, 0x0153, 0x200c, 0x200d, 0x06ba,
00014     /* 0xa0 */
00015     0x00a0, 0x060c, 0x00a2, 0x00a3, 0x00a4, 0x00a5, 0x00a6, 0x00a7,
00016     0x00a8, 0x00a9, 0x06be, 0x00ab, 0x00ac, 0x00ad, 0x00ae, 0x00af,
00017     /* 0xb0 */
00018     0x00b0, 0x00b1, 0x00b2, 0x00b3, 0x00b4, 0x00b5, 0x00b6, 0x00b7,
00019     0x00b8, 0x00b9, 0x061b, 0x00bb, 0x00bc, 0x00bd, 0x00be, 0x061f,
00020     /* 0xc0 */
00021     0x06c1, 0x0621, 0x0622, 0x0623, 0x0624, 0x0625, 0x0626, 0x0627,
00022     0x0628, 0x0629, 0x062a, 0x062b, 0x062c, 0x062d, 0x062e, 0x062f,
00023     /* 0xd0 */
00024     0x0630, 0x0631, 0x0632, 0x0633, 0x0634, 0x0635, 0x0636, 0x00d7,

```

```

00025 0x0637, 0x0638, 0x0639, 0x063a, 0x0640, 0x0641, 0x0642, 0x0643,
00026 /* 0xe0 */
00027 0x00e0, 0x0644, 0x00e2, 0x0645, 0x0646, 0x0647, 0x0648, 0x00e7,
00028 0x00e8, 0x00e9, 0x00ea, 0x00eb, 0x0649, 0x064a, 0x00ee, 0x00ef,
00029 /* 0xf0 */
00030 0x064b, 0x064c, 0x064d, 0x064e, 0x00f4, 0x064f, 0x0650, 0x00f7,
00031 0x0651, 0x00f9, 0x0652, 0x00fb, 0x00fc, 0x200e, 0x200f, 0x06d2,
00032 };
00033
00034 static int
00035 cp1256_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00036 {
00037     unsigned char c = *s;
00038     if (c < 0x80)
00039         *pwc = (ucs4_t) c;
00040     else
00041         *pwc = (ucs4_t) cp1256_2uni[c-0x80];
00042     return 1;
00043 }
00044
00045 static const unsigned char cp1256_page00[96] = {
00046     0xa0, 0x00, 0xa2, 0xa3, 0xa4, 0xa5, 0xa6, 0xa7, /* 0xa0-0xa7 */
00047     0xa8, 0xa9, 0x00, 0xab, 0xac, 0xad, 0xae, 0xaf, /* 0xa8-0xaf */
00048     0xb0, 0xb1, 0xb2, 0xb3, 0xb4, 0xb5, 0xb6, 0xb7, /* 0xb0-0xb7 */
00049     0xb8, 0xb9, 0x00, 0xbb, 0xbc, 0xbd, 0xbe, 0x00, /* 0xb8-0xbf */
00050     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00051     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00052     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xd7, /* 0xd0-0xd7 */
00053     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00054     0xe0, 0x00, 0xe2, 0x00, 0x00, 0x00, 0x00, 0xe7, /* 0xe0-0xe7 */
00055     0xe8, 0xe9, 0xea, 0xeb, 0x00, 0x00, 0xee, 0xef, /* 0xe8-0xef */
00056     0x00, 0x00, 0x00, 0x00, 0xf4, 0x00, 0x00, 0xf7, /* 0xf0-0xf7 */
00057     0x00, 0xf9, 0x00, 0xfb, 0xfc, 0x00, 0x00, 0x00, /* 0xf8-0xff */
00058 };
00059 static const unsigned char cp1256_page01[72] = {
00060     0x00, 0x00, 0x8c, 0x9c, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00061     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00062     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00063     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00064     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00065     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00066     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00067     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00068     0x00, 0x00, 0x83, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00069 };
00070 static const unsigned char cp1256_page06[208] = {
00071     0x00, 0x00, 0x00, 0x00, 0xa1, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00072     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00073     0x00, 0x00, 0x00, 0xba, 0x00, 0x00, 0x00, 0xbf, /* 0x18-0x1f */
00074     0x00, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x20-0x27 */
00075     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x28-0x2f */
00076     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd8, /* 0x30-0x37 */
00077     0xd9, 0xda, 0xdb, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00078     0xdc, 0xdd, 0xde, 0xdf, 0xe1, 0xe3, 0xe4, 0xe5, /* 0x40-0x47 */
00079     0xe6, 0xec, 0xed, 0xf0, 0xf1, 0xf2, 0xf3, 0xf5, /* 0x48-0x4f */
00080     0xf6, 0xf8, 0xfa, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00081     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00082     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00083     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00084     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00085     0x00, 0x8a, 0x00, 0x00, 0x00, 0x00, 0x81, 0x00, /* 0x78-0x7f */
00086     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x8d, 0x00, /* 0x80-0x87 */
00087     0x8e, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00088     0x00, 0x9a, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00089     0x8e, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x98-0x9f */
00090     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00091     0x00, 0x98, 0x00, 0x00, 0x00, 0x00, 0x00, 0x90, /* 0xa8-0xaf */
00092     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb0-0xb7 */
00093     0x00, 0x00, 0x9f, 0x00, 0x00, 0x00, 0xaa, 0x00, /* 0xb8-0xbf */
00094     0x00, 0xc0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00095     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00096     0x00, 0x00, 0xff, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00097 };
00098 static const unsigned char cp1256_page20[56] = {
00099     0x00, 0x00, 0x00, 0x00, 0x9d, 0x9e, 0xfd, 0xfe, /* 0x08-0x0f */
00100     0x00, 0x00, 0x00, 0x96, 0x97, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00101     0x91, 0x92, 0x82, 0x00, 0x93, 0x94, 0x84, 0x00, /* 0x18-0x1f */
00102     0x86, 0x87, 0x95, 0x00, 0x00, 0x00, 0x85, 0x00, /* 0x20-0x27 */
00103     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00104     0x89, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00105     0x00, 0x8b, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00106 };
00107
00108 static int
00109 cp1256_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00110 {
00111     unsigned char c = 0;

```

```

00112     if (wc < 0x0080) {
00113         *r = wc;
00114         return 1;
00115     }
00116     else if (wc >= 0x00a0 && wc < 0x0100)
00117         c = cp1256_page00[wc-0x00a0];
00118     else if (wc >= 0x0150 && wc < 0x0198)
00119         c = cp1256_page01[wc-0x0150];
00120     else if (wc == 0x02c6)
00121         c = 0x88;
00122     else if (wc >= 0x0608 && wc < 0x06d8)
00123         c = cp1256_page06[wc-0x0608];
00124     else if (wc >= 0x2008 && wc < 0x2040)
00125         c = cp1256_page20[wc-0x2008];
00126     else if (wc == 0x20ac)
00127         c = 0x80;
00128     else if (wc == 0x2122)
00129         c = 0x99;
00130     if (c != 0) {
00131         *r = c;
00132         return 1;
00133     }
00134     return RET_ILSEQ;
00135 }

```

13.266 cp936ext.h

```

00001 /*
00002  * Character encoding support for the Fast Light Tool Kit (FLTK).
00003  *
00004  * Copyright 1998-2018 by Bill Spitzak and others.
00005  *
00006  * This library is free software. Distribution and use rights are outlined in
00007  * the file "COPYING" which should have been included with this file. If this
00008  * file is missing or damaged, see the license at:
00009  *
00010  *     https://www.fltk.org/COPYING.php
00011  *
00012  * Please see the following page on how to report bugs and issues:
00013  *
00014  *     https://www.fltk.org/bugs.php
00015  */
00016
00017 #if defined(_WIN32) || defined(__APPLE__) /* PORTME: is this really needed? It's huge! */
00018
00019     /* not needed */
00020
00021 #else
00022
00023 #ifndef CP936
00024 #ifdef NEED_TOWC
00025     static int
00026     cp936ext_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00027     {
00028         return 0;
00029     }
00030 #endif /* NEED_TOWC */
00031
00032 #ifdef NEED_TOMB
00033     static int
00034     cp936ext_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00035     {
00036         (void)conv; (void)r; (void)wc; (void)n;
00037         return 0;
00038     }
00039 #endif /* NEED_TOMB */
00040
00041 #else
00042 /*
00043  * CP936EXT
00044  */
00045 #ifdef NEED_TOWC
00046
00047     static const unsigned short cp936ext_2uni_page81[23766] = {
00048         /* 0x81 */
00049         0x4e02, 0x4e04, 0x4e05, 0x4e06, 0x4e0f, 0x4e12, 0x4e17, 0x4e1f,
00050         0x4e20, 0x4e21, 0x4e23, 0x4e26, 0x4e29, 0x4e2e, 0x4e2f, 0x4e31,
00051         0x4e33, 0x4e35, 0x4e37, 0x4e3c, 0x4e40, 0x4e41, 0x4e42, 0x4e44,
00052         0x4e46, 0x4e4a, 0x4e51, 0x4e55, 0x4e57, 0x4e5a, 0x4e5b, 0x4e62,
00053         0x4e63, 0x4e64, 0x4e65, 0x4e67, 0x4e68, 0x4e6a, 0x4e6b, 0x4e6c,
00054         0x4e6d, 0x4e6e, 0x4e6f, 0x4e72, 0x4e74, 0x4e75, 0x4e76, 0x4e77,
00055         0x4e78, 0x4e79, 0x4e7a, 0x4e7b, 0x4e7c, 0x4e7d, 0x4e7f, 0x4e80,
00056         0x4e81, 0x4e82, 0x4e83, 0x4e84, 0x4e85, 0x4e87, 0x4e8a, 0x4e90,
00057         0x4e96, 0x4e97, 0x4e99, 0x4e9c, 0x4e9d, 0x4e9e, 0x4ea3, 0x4eaa,
00058         0x4eaf, 0x4eb0, 0x4eb1, 0x4eb4, 0x4eb6, 0x4eb7, 0x4eb8, 0x4eb9,

```



```
00059 0x4ebc, 0x4ebd, 0x4ebe, 0x4ec8, 0x4ecc, 0x4ecf, 0x4ed0, 0x4ed2,
00060 0x4eda, 0x4edb, 0x4edc, 0x4ee0, 0x4ee2, 0x4ee6, 0x4ee7, 0x4ee9,
00061 0x4eed, 0x4eee, 0x4eef, 0x4ef1, 0x4ef4, 0x4ef8, 0x4ef9, 0x4efa,
00062 0x4efc, 0x4efe, 0x4f00, 0x4f02, 0x4f03, 0x4f04, 0x4f05, 0x4f06,
00063 0x4f07, 0x4f08, 0x4f0b, 0x4f0c, 0x4f12, 0x4f13, 0x4f14, 0x4f15,
00064 0x4f16, 0x4f1c, 0x4f1d, 0x4f21, 0x4f23, 0x4f28, 0x4f29, 0x4f2c,
00065 0x4f2d, 0x4f2e, 0x4f31, 0x4f33, 0x4f35, 0x4f37, 0x4f39, 0x4f3b,
00066 0x4f3e, 0x4f3f, 0x4f40, 0x4f41, 0x4f42, 0x4f44, 0x4f45, 0x4f47,
00067 0x4f48, 0x4f49, 0x4f4a, 0x4f4b, 0x4f4c, 0x4f52, 0x4f54, 0x4f56,
00068 0x4f61, 0x4f62, 0x4f66, 0x4f68, 0x4f6a, 0x4f6b, 0x4f6d, 0x4f6e,
00069 0x4f71, 0x4f72, 0x4f75, 0x4f77, 0x4f78, 0x4f79, 0x4f7a, 0x4f7d,
00070 0x4f80, 0x4f81, 0x4f82, 0x4f85, 0x4f86, 0x4f87, 0x4f8a, 0x4f8c,
00071 0x4f8e, 0x4f90, 0x4f92, 0x4f93, 0x4f95, 0x4f96, 0x4f98, 0x4f99,
00072 0x4f9a, 0x4f9c, 0x4f9e, 0x4f9f, 0x4fa1, 0x4fa2,
00073 /* 0x82 */
00074 0x4fa4, 0x4fab, 0x4fad, 0x4fb0, 0x4fb1, 0x4fb2, 0x4fb3, 0x4fb4,
00075 0x4fb6, 0x4fb7, 0x4fb8, 0x4fb9, 0x4fba, 0x4fbb, 0x4fbc, 0x4fbd,
00076 0x4fbe, 0x4fcb, 0x4fc1, 0x4fc2, 0x4fc6, 0x4fc7, 0x4fc8, 0x4fc9,
00077 0x4fcb, 0x4fcc, 0x4fcd, 0x4fd2, 0x4fd3, 0x4fd4, 0x4fd5, 0x4fd6,
00078 0x4fd9, 0x4fdb, 0x4fe0, 0x4fe2, 0x4fe4, 0x4fe5, 0x4fe7, 0x4feb,
00079 0x4fec, 0x4ff0, 0x4ff1, 0x4ff2, 0x4ff4, 0x4ff5, 0x4ff6, 0x4ff7, 0x4ff9,
00080 0x4ffb, 0x4ffc, 0x4ffd, 0x4fff, 0x5000, 0x5001, 0x5002, 0x5003,
00081 0x5004, 0x5005, 0x5006, 0x5007, 0x5008, 0x5009, 0x500a, 0x500b,
00082 0x500e, 0x5010, 0x5011, 0x5013, 0x5015, 0x5016, 0x5017, 0x501b,
00083 0x501d, 0x501e, 0x5020, 0x5022, 0x5023, 0x5024, 0x5027, 0x502b,
00084 0x502f, 0x5030, 0x5031, 0x5032, 0x5033, 0x5034, 0x5035, 0x5036,
00085 0x5037, 0x5038, 0x5039, 0x503b, 0x503d, 0x503f, 0x5040, 0x5041,
00086 0x5042, 0x5044, 0x5045, 0x5046, 0x5049, 0x504a, 0x504b, 0x504d,
00087 0x5050, 0x5051, 0x5052, 0x5053, 0x5054, 0x5056, 0x5057, 0x5058,
00088 0x5059, 0x505b, 0x505d, 0x505e, 0x505f, 0x5060, 0x5061, 0x5062,
00089 0x5063, 0x5064, 0x5066, 0x5067, 0x5068, 0x5069, 0x506a, 0x506b,
00090 0x506d, 0x506e, 0x506f, 0x5070, 0x5071, 0x5072, 0x5073, 0x5074,
00091 0x5075, 0x5078, 0x5079, 0x507a, 0x507c, 0x507d, 0x5081, 0x5082,
00092 0x5083, 0x5084, 0x5086, 0x5087, 0x5089, 0x508a, 0x508b, 0x508c,
00093 0x508e, 0x508f, 0x5090, 0x5091, 0x5092, 0x5093, 0x5094, 0x5095,
00094 0x5096, 0x5097, 0x5098, 0x5099, 0x509a, 0x509b, 0x509c, 0x509d,
00095 0x509e, 0x509f, 0x50a0, 0x50a1, 0x50a2, 0x50a4, 0x50a6, 0x50aa,
00096 0x50ab, 0x50ad, 0x50ae, 0x50af, 0x50b0, 0x50b1, 0x50b3, 0x50b4,
00097 0x50b5, 0x50b6, 0x50b7, 0x50b8, 0x50b9, 0x50bc,
00098 /* 0x83 */
00099 0x50bd, 0x50be, 0x50bf, 0x50c0, 0x50c1, 0x50c2, 0x50c3, 0x50c4,
00100 0x50c5, 0x50c6, 0x50c7, 0x50c8, 0x50c9, 0x50ca, 0x50cb, 0x50cc,
00101 0x50cd, 0x50ce, 0x50d0, 0x50d1, 0x50d2, 0x50d3, 0x50d4, 0x50d5,
00102 0x50d7, 0x50d8, 0x50d9, 0x50db, 0x50dc, 0x50dd, 0x50de, 0x50df,
00103 0x50e0, 0x50e1, 0x50e2, 0x50e3, 0x50e4, 0x50e5, 0x50e8, 0x50e9,
00104 0x50ea, 0x50eb, 0x50ef, 0x50f0, 0x50f1, 0x50f2, 0x50f4, 0x50f6,
00105 0x50f7, 0x50f8, 0x50f9, 0x50fa, 0x50fc, 0x50fd, 0x50fe, 0x50ff,
00106 0x5100, 0x5101, 0x5102, 0x5103, 0x5104, 0x5105, 0x5108, 0x5109,
00107 0x510a, 0x510c, 0x510d, 0x510e, 0x510f, 0x5110, 0x5111, 0x5113,
00108 0x5114, 0x5115, 0x5116, 0x5117, 0x5118, 0x5119, 0x511a, 0x511b,
00109 0x511c, 0x511d, 0x511e, 0x511f, 0x5120, 0x5122, 0x5123, 0x5124,
00110 0x5125, 0x5126, 0x5127, 0x5128, 0x5129, 0x512a, 0x512b, 0x512c,
00111 0x512d, 0x512e, 0x512f, 0x5130, 0x5131, 0x5132, 0x5133, 0x5134,
00112 0x5135, 0x5136, 0x5137, 0x5138, 0x5139, 0x513a, 0x513b, 0x513c,
00113 0x513d, 0x513e, 0x5142, 0x5147, 0x514a, 0x514c, 0x514e, 0x514f,
00114 0x5150, 0x5152, 0x5153, 0x5157, 0x5158, 0x5159, 0x515b, 0x515d,
00115 0x515e, 0x515f, 0x5160, 0x5161, 0x5163, 0x5164, 0x5166, 0x5167,
00116 0x5169, 0x516a, 0x516f, 0x5172, 0x517a, 0x517e, 0x517f, 0x5183,
00117 0x5184, 0x5186, 0x5187, 0x518a, 0x518b, 0x518e, 0x518f, 0x5190,
00118 0x5191, 0x5193, 0x5194, 0x5198, 0x5199, 0x519d, 0x519e, 0x519f,
00119 0x51a1, 0x51a3, 0x51a6, 0x51a7, 0x51a8, 0x51a9, 0x51aa, 0x51ad,
00120 0x51ae, 0x51b4, 0x51b8, 0x51b9, 0x51ba, 0x51be, 0x51bf, 0x51c1,
00121 0x51c2, 0x51c3, 0x51c5, 0x51c8, 0x51ca, 0x51cd, 0x51ce, 0x51d0,
00122 0x51d2, 0x51d3, 0x51d4, 0x51d5, 0x51d6, 0x51d7,
00123 /* 0x84 */
00124 0x51d8, 0x51d9, 0x51da, 0x51dc, 0x51de, 0x51df, 0x51e2, 0x51e3,
00125 0x51e5, 0x51e6, 0x51e7, 0x51e8, 0x51e9, 0x51ea, 0x51ec, 0x51ee,
00126 0x51f1, 0x51f2, 0x51f4, 0x51f7, 0x51fe, 0x5204, 0x5205, 0x5209,
00127 0x520b, 0x520c, 0x520f, 0x5210, 0x5213, 0x5214, 0x5215, 0x521c,
00128 0x521e, 0x521f, 0x5221, 0x5222, 0x5223, 0x5225, 0x5226, 0x5227,
00129 0x522a, 0x522c, 0x522f, 0x5231, 0x5232, 0x5234, 0x5235, 0x523c,
00130 0x523e, 0x5244, 0x5245, 0x5246, 0x5247, 0x5248, 0x5249, 0x524b,
00131 0x524e, 0x524f, 0x5252, 0x5253, 0x5255, 0x5257, 0x5258, 0x5259,
00132 0x525a, 0x525b, 0x525d, 0x525f, 0x5260, 0x5262, 0x5263, 0x5264,
00133 0x5266, 0x5268, 0x526b, 0x526c, 0x526d, 0x526e, 0x5270, 0x5271,
00134 0x5273, 0x5274, 0x5275, 0x5276, 0x5277, 0x5278, 0x5279, 0x527a,
00135 0x527b, 0x527c, 0x527e, 0x5280, 0x5283, 0x5284, 0x5285, 0x5286,
00136 0x5287, 0x5289, 0x528a, 0x528b, 0x528c, 0x528d, 0x528e, 0x528f,
00137 0x5291, 0x5292, 0x5294, 0x5295, 0x5296, 0x5297, 0x5298, 0x5299,
00138 0x529a, 0x529c, 0x52a4, 0x52a5, 0x52a6, 0x52a7, 0x52ae, 0x52af,
00139 0x52b0, 0x52b4, 0x52b5, 0x52b6, 0x52b7, 0x52b8, 0x52b9, 0x52ba,
00140 0x52bb, 0x52bc, 0x52bd, 0x52c0, 0x52c1, 0x52c2, 0x52c5, 0x52c6,
00141 0x52c8, 0x52c9, 0x52ca, 0x52cc, 0x52cd, 0x52ce, 0x52cf, 0x52d1,
00142 0x52d3, 0x52d4, 0x52d5, 0x52d7, 0x52d9, 0x52da, 0x52db, 0x52dc,
00143 0x52dd, 0x52de, 0x52e0, 0x52e1, 0x52e2, 0x52e3, 0x52e6, 0x52e7,
00144 0x52e9, 0x52ea, 0x52eb, 0x52ec, 0x52ed, 0x52ee, 0x52ef,
00145 0x52f1, 0x52f2, 0x52f3, 0x52f4, 0x52f5, 0x52f6, 0x52f7,
```

```
00146 0x52f8, 0x52fb, 0x52fc, 0x52fd, 0x5301, 0x5302, 0x5303, 0x5304,
00147 0x5307, 0x5309, 0x530a, 0x530b, 0x530c, 0x530e,
00148 /* 0x85 */
00149 0x5311, 0x5312, 0x5313, 0x5314, 0x5318, 0x531b, 0x531c, 0x531e,
00150 0x531f, 0x5322, 0x5324, 0x5325, 0x5327, 0x5328, 0x5329, 0x532b,
00151 0x532c, 0x532d, 0x532f, 0x5330, 0x5331, 0x5332, 0x5333, 0x5334,
00152 0x5335, 0x5336, 0x5337, 0x5338, 0x533c, 0x533d, 0x5340, 0x5342,
00153 0x5344, 0x5346, 0x534b, 0x534c, 0x534d, 0x5350, 0x5354, 0x5358,
00154 0x5359, 0x535b, 0x535d, 0x535e, 0x5365, 0x5368, 0x536a, 0x536c,
00155 0x5372, 0x5376, 0x5379, 0x537b, 0x537c, 0x537d, 0x537e, 0x5380,
00156 0x5381, 0x5383, 0x5387, 0x5388, 0x538a, 0x538e, 0x538f, 0x5390,
00157 0x5391, 0x5392, 0x5393, 0x5394, 0x5396, 0x5397, 0x5399, 0x539b,
00158 0x539c, 0x539e, 0x53a0, 0x53a1, 0x53a4, 0x53a7, 0x53aa, 0x53ab,
00159 0x53ac, 0x53ad, 0x53af, 0x53b0, 0x53b1, 0x53b2, 0x53b3, 0x53b4,
00160 0x53b5, 0x53b7, 0x53b8, 0x53b9, 0x53ba, 0x53bc, 0x53bd, 0x53be,
00161 0x53c0, 0x53c3, 0x53c4, 0x53c5, 0x53c6, 0x53c7, 0x53ce, 0x53cf,
00162 0x53d0, 0x53d2, 0x53d3, 0x53d5, 0x53da, 0x53dc, 0x53dd, 0x53de,
00163 0x53e1, 0x53e2, 0x53e7, 0x53f4, 0x53fa, 0x53fe, 0x53ff, 0x5400,
00164 0x5402, 0x5405, 0x5407, 0x540b, 0x5414, 0x5418, 0x5419, 0x541a,
00165 0x541c, 0x5422, 0x5424, 0x5425, 0x542a, 0x5430, 0x5433, 0x5436,
00166 0x5437, 0x543a, 0x543d, 0x543f, 0x5441, 0x5442, 0x5444, 0x5445,
00167 0x5447, 0x5449, 0x544c, 0x544d, 0x544e, 0x544f, 0x5451, 0x545a,
00168 0x545d, 0x545e, 0x545f, 0x5460, 0x5461, 0x5463, 0x5465, 0x5467,
00169 0x5469, 0x546a, 0x546b, 0x546c, 0x546d, 0x546e, 0x546f, 0x5470,
00170 0x5474, 0x5479, 0x547a, 0x547e, 0x547f, 0x5481, 0x5483, 0x5485,
00171 0x5487, 0x5488, 0x5489, 0x548a, 0x548d, 0x5491, 0x5493, 0x5497,
00172 0x5498, 0x549c, 0x549e, 0x549f, 0x54a0, 0x54a1,
00173 /* 0x86 */
00174 0x54a2, 0x54a5, 0x54ae, 0x54b0, 0x54b2, 0x54b5, 0x54b6, 0x54b7,
00175 0x54b9, 0x54ba, 0x54bc, 0x54be, 0x54c3, 0x54c5, 0x54ca, 0x54cb,
00176 0x54d6, 0x54d8, 0x54db, 0x54e0, 0x54e1, 0x54e2, 0x54e3, 0x54e4,
00177 0x54eb, 0x54ec, 0x54ef, 0x54f0, 0x54f1, 0x54f4, 0x54f5, 0x54f6,
00178 0x54f7, 0x54f8, 0x54f9, 0x54fb, 0x54fe, 0x5500, 0x5502, 0x5503,
00179 0x5504, 0x5505, 0x5508, 0x550a, 0x550b, 0x550c, 0x550d, 0x550e,
00180 0x5512, 0x5513, 0x5515, 0x5516, 0x5517, 0x5518, 0x5519, 0x551a,
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00182 0x5529, 0x552b, 0x552d, 0x5532, 0x5534, 0x5535, 0x5536, 0x5538,
00183 0x5539, 0x553a, 0x553b, 0x553d, 0x5540, 0x5542, 0x5545, 0x5547,
00184 0x5548, 0x554b, 0x554c, 0x554d, 0x554e, 0x554f, 0x5551, 0x5552,
00185 0x5553, 0x5554, 0x5557, 0x5558, 0x5559, 0x555a, 0x555b, 0x555d,
00186 0x555e, 0x555f, 0x5560, 0x5562, 0x5563, 0x5568, 0x5569, 0x556b,
00187 0x556f, 0x5570, 0x5571, 0x5572, 0x5573, 0x5574, 0x5579, 0x557a,
00188 0x557d, 0x557f, 0x5585, 0x5586, 0x558c, 0x558d, 0x558e, 0x5590,
00189 0x5592, 0x5593, 0x5595, 0x5596, 0x5597, 0x559a, 0x559b, 0x559e,
00190 0x55a0, 0x55a1, 0x55a2, 0x55a3, 0x55a4, 0x55a5, 0x55a6, 0x55a8,
00191 0x55a9, 0x55aa, 0x55ab, 0x55ac, 0x55ad, 0x55ae, 0x55af, 0x55b0,
00192 0x55b2, 0x55b4, 0x55b6, 0x55b8, 0x55ba, 0x55bc, 0x55bd, 0x55c0,
00193 0x55c1, 0x55c2, 0x55c3, 0x55c6, 0x55c7, 0x55c8, 0x55ca, 0x55cb,
00194 0x55ce, 0x55cf, 0x55d0, 0x55d5, 0x55d7, 0x55d8, 0x55d9, 0x55da,
00195 0x55db, 0x55de, 0x55e0, 0x55e2, 0x55e7, 0x55e9, 0x55ed, 0x55ee,
00196 0x55f0, 0x55f1, 0x55f4, 0x55f6, 0x55f8, 0x55f9, 0x55fa, 0x55fb,
00197 0x55fc, 0x55ff, 0x5602, 0x5603, 0x5604, 0x5605,
00198 /* 0x87 */
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00201 0x561d, 0x5620, 0x5621, 0x5622, 0x5625, 0x5626, 0x5628, 0x5629,
00202 0x562a, 0x562b, 0x562e, 0x562f, 0x5630, 0x5633, 0x5635, 0x5637,
00203 0x5638, 0x563a, 0x563c, 0x563d, 0x563e, 0x5640, 0x5641, 0x5642,
00204 0x5643, 0x5644, 0x5645, 0x5646, 0x5647, 0x5648, 0x5649, 0x564a,
00205 0x564b, 0x564f, 0x5650, 0x5651, 0x5652, 0x5653, 0x5655, 0x5656,
00206 0x565a, 0x565b, 0x565d, 0x565e, 0x565f, 0x5660, 0x5661, 0x5663,
00207 0x5665, 0x5666, 0x5667, 0x566d, 0x566e, 0x566f, 0x5670, 0x5672,
00208 0x5673, 0x5674, 0x5675, 0x5677, 0x5678, 0x5679, 0x567a, 0x567d,
00209 0x567e, 0x567f, 0x5680, 0x5681, 0x5682, 0x5683, 0x5684, 0x5687,
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00211 0x5692, 0x5694, 0x5695, 0x5696, 0x5697, 0x5698, 0x5699, 0x569a,
00212 0x569b, 0x569c, 0x569d, 0x569e, 0x569f, 0x56a0, 0x56a1, 0x56a2,
00213 0x56a4, 0x56a5, 0x56a6, 0x56a7, 0x56a8, 0x56a9, 0x56aa, 0x56ab,
00214 0x56ac, 0x56ad, 0x56ae, 0x56b0, 0x56b1, 0x56b2, 0x56b3, 0x56b4,
00215 0x56b5, 0x56b6, 0x56b8, 0x56b9, 0x56ba, 0x56bb, 0x56bd, 0x56be,
00216 0x56bf, 0x56c0, 0x56c1, 0x56c2, 0x56c3, 0x56c4, 0x56c5, 0x56c6,
00217 0x56c7, 0x56c8, 0x56c9, 0x56cb, 0x56cc, 0x56cd, 0x56ce, 0x56cf,
00218 0x56d0, 0x56d1, 0x56d2, 0x56d3, 0x56d5, 0x56d6, 0x56d8, 0x56d9,
00219 0x56dc, 0x56de, 0x56e3, 0x56e5, 0x56e6, 0x56e7, 0x56e8, 0x56e9, 0x56ea,
00220 0x56ec, 0x56ee, 0x56ef, 0x56f2, 0x56f3, 0x56f6, 0x56f7, 0x56f8,
00221 0x56fb, 0x56fc, 0x5700, 0x5701, 0x5702, 0x5705, 0x5707, 0x570b,
00222 0x570c, 0x570d, 0x570e, 0x570f, 0x5710, 0x5711,
00223 /* 0x88 */
00224 0x5712, 0x5713, 0x5714, 0x5715, 0x5716, 0x5717, 0x5718, 0x5719,
00225 0x571a, 0x571b, 0x571d, 0x571e, 0x5720, 0x5721, 0x5722, 0x5724,
00226 0x5725, 0x5726, 0x5727, 0x572b, 0x5731, 0x5732, 0x5734, 0x5735,
00227 0x5736, 0x5737, 0x5738, 0x573c, 0x573d, 0x573f, 0x5741, 0x5743,
00228 0x5744, 0x5745, 0x5746, 0x5748, 0x5749, 0x574b, 0x5752, 0x5753,
00229 0x5754, 0x5755, 0x5756, 0x5758, 0x5759, 0x5762, 0x5763, 0x5765,
00230 0x5767, 0x576c, 0x576e, 0x5770, 0x5771, 0x5772, 0x5774, 0x5775,
00231 0x5778, 0x5779, 0x577a, 0x577d, 0x577e, 0x577f, 0x5780, 0x5781,
00232 0x5787, 0x5788, 0x5789, 0x578a, 0x578d, 0x578e, 0x578f, 0x5790,
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00235 0x57af, 0x57b0, 0x57b1, 0x57b3, 0x57b5, 0x57b6, 0x57b7, 0x57b9,
00236 0x57ba, 0x57bb, 0x57bc, 0x57bd, 0x57be, 0x57bf, 0x57c0, 0x57c1,
00237 0x57c4, 0x57c5, 0x57c6, 0x57c7, 0x57c8, 0x57c9, 0x57ca, 0x57cc,
00238 0x57cd, 0x57d0, 0x57d1, 0x57d3, 0x57d6, 0x57d7, 0x57db, 0x57dc,
00239 0x57de, 0x57e1, 0x57e2, 0x57e3, 0x57e5, 0x57e6, 0x57e7, 0x57e8,
00240 0x57e9, 0x57ea, 0x57eb, 0x57ec, 0x57ee, 0x57f0, 0x57f1, 0x57f2,
00241 0x57f3, 0x57f5, 0x57f6, 0x57f7, 0x57fb, 0x57fc, 0x57fe, 0x57ff,
00242 0x5801, 0x5803, 0x5804, 0x5805, 0x5808, 0x5809, 0x580a, 0x580c,
00243 0x580e, 0x580f, 0x5810, 0x5812, 0x5813, 0x5814, 0x5816, 0x5817,
00244 0x5818, 0x581a, 0x581b, 0x581c, 0x581d, 0x581f, 0x5822, 0x5823,
00245 0x5825, 0x5826, 0x5827, 0x5828, 0x5829, 0x582b, 0x582c, 0x582d,
00246 0x582e, 0x582f, 0x5831, 0x5832, 0x5833, 0x5834, 0x5836, 0x5837,
00247 0x5838, 0x5839, 0x583a, 0x583b, 0x583c, 0x583d,
00248 /* 0x89 */
00249 0x583e, 0x583f, 0x5840, 0x5841, 0x5842, 0x5843, 0x5845, 0x5846,
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00253 0x5866, 0x5867, 0x5868, 0x5869, 0x586a, 0x586d, 0x586e, 0x586f,
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00255 0x5878, 0x5879, 0x587a, 0x587b, 0x587c, 0x587d, 0x587f, 0x5882,
00256 0x5884, 0x5886, 0x5887, 0x5888, 0x588a, 0x588b, 0x588c, 0x588d,
00257 0x588e, 0x588f, 0x5890, 0x5891, 0x5894, 0x5895, 0x5896, 0x5897,
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00259 0x58a4, 0x58a5, 0x58a6, 0x58a7, 0x58aa, 0x58ab, 0x58ac, 0x58ad,
00260 0x58ae, 0x58af, 0x58b0, 0x58b1, 0x58b2, 0x58b3, 0x58b4, 0x58b5,
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00262 0x58bf, 0x58c0, 0x58c2, 0x58c3, 0x58c4, 0x58c6, 0x58c7, 0x58c8,
00263 0x58c9, 0x58ca, 0x58cb, 0x58cc, 0x58cd, 0x58ce, 0x58cf, 0x58d0,
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00266 0x58e3, 0x58e5, 0x58e6, 0x58e7, 0x58e8, 0x58e9, 0x58ea, 0x58ed,
00267 0x58ef, 0x58f1, 0x58f2, 0x58f4, 0x58f5, 0x58f7, 0x58f8, 0x58fa,
00268 0x58fb, 0x58fc, 0x58fd, 0x58fe, 0x58ff, 0x5900, 0x5901, 0x5903,
00269 0x5905, 0x5906, 0x5908, 0x5909, 0x590a, 0x590b, 0x590c, 0x590e,
00270 0x5910, 0x5911, 0x5912, 0x5913, 0x5917, 0x5918, 0x591b, 0x591d,
00271 0x591e, 0x5920, 0x5921, 0x5922, 0x5923, 0x5926, 0x5928, 0x592c,
00272 0x5930, 0x5932, 0x5933, 0x5935, 0x5936, 0x593b,
00273 /* 0x8a */
00274 0x593d, 0x593e, 0x593f, 0x5940, 0x5943, 0x5945, 0x5946, 0x594a,
00275 0x594c, 0x594d, 0x5950, 0x5952, 0x5953, 0x5959, 0x595b, 0x595c,
00276 0x595d, 0x595e, 0x595f, 0x5961, 0x5963, 0x5964, 0x5966, 0x5967,
00277 0x5968, 0x5969, 0x596a, 0x596b, 0x596c, 0x596d, 0x596e, 0x596f,
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00279 0x597e, 0x597f, 0x5980, 0x5985, 0x5989, 0x598b, 0x598c, 0x598e,
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00281 0x599c, 0x599d, 0x599f, 0x59a0, 0x59a1, 0x59a2, 0x59a6, 0x59a7,
00282 0x59ac, 0x59ad, 0x59b0, 0x59b1, 0x59b3, 0x59b4, 0x59b5, 0x59b6,
00283 0x59b7, 0x59b8, 0x59ba, 0x59bc, 0x59bd, 0x59bf, 0x59c0, 0x59c1,
00284 0x59c2, 0x59c3, 0x59c4, 0x59c5, 0x59c7, 0x59c8, 0x59c9, 0x59cc,
00285 0x59cd, 0x59ce, 0x59cf, 0x59d5, 0x59d6, 0x59d9, 0x59db, 0x59de,
00286 0x59df, 0x59e0, 0x59e1, 0x59e2, 0x59e4, 0x59e6, 0x59e7, 0x59e9,
00287 0x59ea, 0x59eb, 0x59ed, 0x59ee, 0x59ef, 0x59f0, 0x59f1, 0x59f2,
00288 0x59f3, 0x59f4, 0x59f5, 0x59f6, 0x59f7, 0x59f8, 0x59fa, 0x59fc,
00289 0x59fd, 0x59fe, 0x5a00, 0x5a02, 0x5a0a, 0x5a0b, 0x5a0d, 0x5a0e,
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00293 0x5a30, 0x5a33, 0x5a35, 0x5a37, 0x5a38, 0x5a39, 0x5a3a, 0x5a3b,
00294 0x5a3d, 0x5a3e, 0x5a3f, 0x5a41, 0x5a42, 0x5a43, 0x5a44, 0x5a45,
00295 0x5a47, 0x5a48, 0x5a4b, 0x5a4c, 0x5a4d, 0x5a4e, 0x5a4f, 0x5a50,
00296 0x5a51, 0x5a52, 0x5a53, 0x5a54, 0x5a56, 0x5a57, 0x5a58, 0x5a59,
00297 0x5a5b, 0x5a5c, 0x5a5d, 0x5a5e, 0x5a5f, 0x5a60,
00298 /* 0x8b */
00299 0x5a61, 0x5a63, 0x5a64, 0x5a65, 0x5a66, 0x5a68, 0x5a69, 0x5a6b,
00300 0x5a6c, 0x5a6d, 0x5a6e, 0x5a6f, 0x5a70, 0x5a71, 0x5a72, 0x5a73,
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00306 0x5aa5, 0x5aa6, 0x5aa7, 0x5aa8, 0x5aa9, 0x5aab, 0x5aac, 0x5aad,
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00308 0x5aba, 0x5abb, 0x5abc, 0x5abd, 0x5abf, 0x5ac0, 0x5ac3, 0x5ac4,
00309 0x5ac5, 0x5ac6, 0x5ac7, 0x5ac8, 0x5aca, 0x5acb, 0x5acd, 0x5ace,
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00312 0x5ae8, 0x5aea, 0x5aeb, 0x5aec, 0x5aed, 0x5aee, 0x5aef, 0x5af0, 0x5af2,
00313 0x5af3, 0x5af4, 0x5af5, 0x5af6, 0x5af7, 0x5af8, 0x5af9, 0x5afa,
00314 0x5afb, 0x5afc, 0x5afd, 0x5afe, 0x5aff, 0x5b00, 0x5b01, 0x5b02,
00315 0x5b03, 0x5b04, 0x5b05, 0x5b06, 0x5b07, 0x5b08, 0x5b0a, 0x5b0b,
00316 0x5b0c, 0x5b0d, 0x5b0e, 0x5b0f, 0x5b10, 0x5b11, 0x5b12, 0x5b13,
00317 0x5b14, 0x5b15, 0x5b18, 0x5b19, 0x5b1a, 0x5b1b, 0x5b1c, 0x5b1d,
00318 0x5b1e, 0x5b1f, 0x5b20, 0x5b21, 0x5b22, 0x5b23, 0x5b24, 0x5b25,
00319 0x5b26, 0x5b27, 0x5b28, 0x5b29, 0x5b2a, 0x5b2b, 0x5b2c, 0x5b2d,
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00321 0x5b39, 0x5b3a, 0x5b3b, 0x5b3c, 0x5b3d, 0x5b3e, 0x5b3f, 0x5b41,
00322 0x5b42, 0x5b43, 0x5b44, 0x5b45, 0x5b46, 0x5b47,
00323 /* 0x8c */
00324 0x5b48, 0x5b49, 0x5b4a, 0x5b4b, 0x5b4c, 0x5b4d, 0x5b4e, 0x5b4f,
00325 0x5b52, 0x5b56, 0x5b5e, 0x5b60, 0x5b61, 0x5b67, 0x5b68, 0x5b6b,
00326 0x5b6d, 0x5b6e, 0x5b6f, 0x5b72, 0x5b74, 0x5b76, 0x5b77, 0x5b78,
00327 0x5b79, 0x5b7b, 0x5b7c, 0x5b7e, 0x5b7f, 0x5b82, 0x5b86, 0x5b8a,
00328 0x5b8d, 0x5b8e, 0x5b90, 0x5b91, 0x5b92, 0x5b94, 0x5b96, 0x5b9f,
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00334 0x5beb, 0x5bec, 0x5bed, 0x5bef, 0x5bf1, 0x5bf2, 0x5bf3, 0x5bf4,
00335 0x5bf5, 0x5bf6, 0x5bf7, 0x5bfd, 0x5bfe, 0x5c00, 0x5c02, 0x5c03,
00336 0x5c05, 0x5c07, 0x5c08, 0x5c0b, 0x5c0c, 0x5c0d, 0x5c0e, 0x5c10,
00337 0x5c12, 0x5c13, 0x5c17, 0x5c19, 0x5c1b, 0x5c1e, 0x5c1f, 0x5c20,
00338 0x5c21, 0x5c23, 0x5c26, 0x5c28, 0x5c29, 0x5c2a, 0x5c2b, 0x5c2d,
00339 0x5c2e, 0x5c2f, 0x5c30, 0x5c32, 0x5c33, 0x5c35, 0x5c36, 0x5c37,
00340 0x5c43, 0x5c44, 0x5c46, 0x5c47, 0x5c4c, 0x5c4d, 0x5c52, 0x5c53,
00341 0x5c54, 0x5c56, 0x5c57, 0x5c58, 0x5c5a, 0x5c5b, 0x5c5c, 0x5c5d,
00342 0x5c5f, 0x5c62, 0x5c64, 0x5c67, 0x5c68, 0x5c69, 0x5c6a, 0x5c6b,
00343 0x5c6c, 0x5c6d, 0x5c70, 0x5c72, 0x5c73, 0x5c74, 0x5c75, 0x5c76,
00344 0x5c77, 0x5c78, 0x5c7b, 0x5c7c, 0x5c7d, 0x5c7e, 0x5c80, 0x5c83,
00345 0x5c84, 0x5c85, 0x5c86, 0x5c87, 0x5c89, 0x5c8a, 0x5c8b, 0x5c8e,
00346 0x5c8f, 0x5c92, 0x5c93, 0x5c95, 0x5c9d, 0x5c9e, 0x5ca0,
00347 0x5ca1, 0x5ca4, 0x5ca5, 0x5ca6, 0x5ca7, 0x5ca8,
00348 /* 0x8d */
00349 0x5caa, 0x5cae, 0x5caf, 0x5cb0, 0x5cb2, 0x5cb4, 0x5cb6, 0x5cb9,
00350 0x5cba, 0x5cbb, 0x5cbc, 0x5cbe, 0x5cc0, 0x5cc2, 0x5cc3, 0x5cc5,
00351 0x5cc6, 0x5cc7, 0x5cc8, 0x5cc9, 0x5cca, 0x5ccc, 0x5ccd, 0x5cce,
00352 0x5ccf, 0x5cd0, 0x5cd1, 0x5cd3, 0x5cd4, 0x5cd5, 0x5cd6, 0x5cd7,
00353 0x5cd8, 0x5cda, 0x5cdb, 0x5cdc, 0x5cdd, 0x5cde, 0x5cdf, 0x5ce0,
00354 0x5ce2, 0x5ce3, 0x5ce7, 0x5ce9, 0x5ceb, 0x5cec, 0x5cee, 0x5cef,
00355 0x5cf1, 0x5cf2, 0x5cf3, 0x5cf4, 0x5cf5, 0x5cf6, 0x5cf7, 0x5cf8,
00356 0x5cf9, 0x5cfa, 0x5cfc, 0x5cfd, 0x5cfe, 0x5cff, 0x5d00, 0x5d01,
00357 0x5d04, 0x5d05, 0x5d08, 0x5d09, 0x5d0a, 0x5d0b, 0x5d0c, 0x5d0d,
00358 0x5d0f, 0x5d10, 0x5d11, 0x5d12, 0x5d13, 0x5d15, 0x5d17, 0x5d18,
00359 0x5d19, 0x5d1a, 0x5d1c, 0x5d1d, 0x5d1f, 0x5d20, 0x5d21, 0x5d22,
00360 0x5d23, 0x5d25, 0x5d28, 0x5d2a, 0x5d2b, 0x5d2c, 0x5d2f, 0x5d30,
00361 0x5d31, 0x5d32, 0x5d33, 0x5d35, 0x5d36, 0x5d37, 0x5d38, 0x5d39,
00362 0x5d3a, 0x5d3b, 0x5d3c, 0x5d3f, 0x5d40, 0x5d41, 0x5d42, 0x5d43,
00363 0x5d44, 0x5d45, 0x5d46, 0x5d48, 0x5d49, 0x5d4d, 0x5d4e, 0x5d4f,
00364 0x5d50, 0x5d51, 0x5d52, 0x5d53, 0x5d54, 0x5d55, 0x5d56, 0x5d57,
00365 0x5d59, 0x5d5a, 0x5d5c, 0x5d5e, 0x5d5f, 0x5d60, 0x5d61, 0x5d62,
00366 0x5d63, 0x5d64, 0x5d65, 0x5d66, 0x5d67, 0x5d68, 0x5d6a, 0x5d6d,
00367 0x5d6e, 0x5d70, 0x5d71, 0x5d72, 0x5d73, 0x5d75, 0x5d76, 0x5d77,
00368 0x5d78, 0x5d79, 0x5d7a, 0x5d7b, 0x5d7c, 0x5d7d, 0x5d7e, 0x5d7f,
00369 0x5d80, 0x5d81, 0x5d83, 0x5d84, 0x5d85, 0x5d86, 0x5d87, 0x5d88,
00370 0x5d89, 0x5d8a, 0x5d8b, 0x5d8c, 0x5d8d, 0x5d8e, 0x5d8f, 0x5d90,
00371 0x5d91, 0x5d92, 0x5d93, 0x5d94, 0x5d95, 0x5d96, 0x5d97, 0x5d98,
00372 0x5d9a, 0x5d9b, 0x5d9c, 0x5d9e, 0x5d9f, 0x5da0,
00373 /* 0x8e */
00374 0x5da1, 0x5da2, 0x5da3, 0x5da4, 0x5da5, 0x5da6, 0x5da7, 0x5da8,
00375 0x5da9, 0x5daa, 0x5dab, 0x5dac, 0x5dad, 0x5dae, 0x5daf, 0x5db0,
00376 0x5db1, 0x5dba, 0x5db2, 0x5db3, 0x5db4, 0x5db5, 0x5db6, 0x5db8, 0x5db9,
00377 0x5dba, 0x5dbb, 0x5dbc, 0x5dbd, 0x5dbe, 0x5dbf, 0x5dc0, 0x5dc1,
00378 0x5dc2, 0x5dc3, 0x5dc4, 0x5dc6, 0x5dc7, 0x5dc8, 0x5dc9, 0x5dca,
00379 0x5dcb, 0x5dcc, 0x5dce, 0x5dcf, 0x5dd0, 0x5dd1, 0x5dd2, 0x5dd3,
00380 0x5dd4, 0x5dd5, 0x5dd6, 0x5dd7, 0x5dd8, 0x5dd9, 0x5dda, 0x5ddc,
00381 0x5ddf, 0x5de0, 0x5de3, 0x5de4, 0x5dea, 0x5dec, 0x5ded, 0x5df0,
00382 0x5df5, 0x5df6, 0x5df8, 0x5df9, 0x5dfa, 0x5dfb, 0x5dfc, 0x5dff,
00383 0x5e00, 0x5e04, 0x5e07, 0x5e09, 0x5e0a, 0x5e0b, 0x5e0d, 0x5e0e,
00384 0x5e12, 0x5e13, 0x5e17, 0x5e1e, 0x5e1f, 0x5e20, 0x5e21, 0x5e22,
00385 0x5e23, 0x5e24, 0x5e25, 0x5e28, 0x5e29, 0x5e2a, 0x5e2b, 0x5e2c,
00386 0x5e2f, 0x5e30, 0x5e32, 0x5e33, 0x5e34, 0x5e35, 0x5e36, 0x5e39,
00387 0x5e3a, 0x5e3e, 0x5e3f, 0x5e40, 0x5e41, 0x5e43, 0x5e46, 0x5e47,
00388 0x5e48, 0x5e49, 0x5e4a, 0x5e4b, 0x5e4d, 0x5e4e, 0x5e4f, 0x5e50,
00389 0x5e51, 0x5e52, 0x5e53, 0x5e56, 0x5e57, 0x5e58, 0x5e59, 0x5e5a,
00390 0x5e5c, 0x5e5d, 0x5e5f, 0x5e60, 0x5e63, 0x5e64, 0x5e65, 0x5e66,
00391 0x5e67, 0x5e68, 0x5e69, 0x5e6a, 0x5e6b, 0x5e6c, 0x5e6d, 0x5e6e,
00392 0x5e6f, 0x5e70, 0x5e71, 0x5e75, 0x5e77, 0x5e79, 0x5e7e, 0x5e81,
00393 0x5e82, 0x5e83, 0x5e85, 0x5e88, 0x5e89, 0x5e8c, 0x5e8d, 0x5e8e,
00394 0x5e92, 0x5e98, 0x5e9b, 0x5e9d, 0x5ea1, 0x5ea2, 0x5ea3, 0x5ea4,
00395 0x5ea8, 0x5ea9, 0x5eaa, 0x5eab, 0x5eac, 0x5eae, 0x5eaf, 0x5eb0,
00396 0x5eb1, 0x5eb2, 0x5eb4, 0x5eba, 0x5ebb, 0x5ebc, 0x5ebd, 0x5ebf,
00397 0x5ec0, 0x5ec1, 0x5ec2, 0x5ec3, 0x5ec4, 0x5ec5,
00398 /* 0x8f */
00399 0x5ec6, 0x5ec7, 0x5ec8, 0x5ecb, 0x5ecc, 0x5ecd, 0x5ece, 0x5ecf,
00400 0x5ed0, 0x5ed4, 0x5ed5, 0x5ed7, 0x5ed8, 0x5ed9, 0x5eda, 0x5edc,
00401 0x5edd, 0x5ede, 0x5edf, 0x5ee0, 0x5ee1, 0x5ee2, 0x5ee3, 0x5ee4,
00402 0x5ee5, 0x5ee6, 0x5ee7, 0x5ee9, 0x5eeb, 0x5eec, 0x5eed, 0x5eee,
00403 0x5eef, 0x5ef0, 0x5ef1, 0x5ef2, 0x5ef3, 0x5ef5, 0x5ef8, 0x5ef9,
00404 0x5efb, 0x5efc, 0x5efd, 0x5f05, 0x5f06, 0x5f07, 0x5f09, 0x5f0c,
00405 0x5f0d, 0x5f0e, 0x5f10, 0x5f12, 0x5f14, 0x5f16, 0x5f19, 0x5f1a,
00406 0x5f1c, 0x5f1d, 0x5f1e, 0x5f21, 0x5f22, 0x5f23, 0x5f24, 0x5f28,
```

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00407 0x5f2b, 0x5f2c, 0x5f2e, 0x5f30, 0x5f32, 0x5f33, 0x5f34, 0x5f35,
00408 0x5f36, 0x5f37, 0x5f38, 0x5f3b, 0x5f3d, 0x5f3e, 0x5f3f, 0x5f41,
00409 0x5f42, 0x5f43, 0x5f44, 0x5f45, 0x5f46, 0x5f48, 0x5f49,
00410 0x5f4a, 0x5f4b, 0x5f4c, 0x5f4d, 0x5f4e, 0x5f4f, 0x5f51, 0x5f54,
00411 0x5f59, 0x5f5a, 0x5f5b, 0x5f5c, 0x5f5e, 0x5f5f, 0x5f60, 0x5f63,
00412 0x5f65, 0x5f67, 0x5f68, 0x5f6b, 0x5f6e, 0x5f72, 0x5f74,
00413 0x5f75, 0x5f76, 0x5f78, 0x5f7a, 0x5f7d, 0x5f7e, 0x5f7f, 0x5f83,
00414 0x5f86, 0x5f8d, 0x5f8e, 0x5f8f, 0x5f91, 0x5f93, 0x5f94, 0x5f96,
00415 0x5f9a, 0x5f9b, 0x5f9d, 0x5f9e, 0x5f9f, 0x5fa0, 0x5fa2, 0x5fa3,
00416 0x5fa4, 0x5fa5, 0x5fa6, 0x5fa7, 0x5fa9, 0x5fab, 0x5fac, 0x5faf,
00417 0x5fb0, 0x5fb1, 0x5fb2, 0x5fb3, 0x5fb4, 0x5fb6, 0x5fb8, 0x5fb9,
00418 0x5fba, 0x5fbb, 0x5fbe, 0x5fbf, 0x5fc0, 0x5fc1, 0x5fc2, 0x5fc7,
00419 0x5fc8, 0x5fca, 0x5fcb, 0x5fce, 0x5fd3, 0x5fd4, 0x5fd5, 0x5fda,
00420 0x5fdb, 0x5fdc, 0x5fde, 0x5fdf, 0x5fe2, 0x5fe3, 0x5fe5, 0x5fe6,
00421 0x5fe8, 0x5fe9, 0x5fec, 0x5fef, 0x5ff0, 0x5ff2, 0x5ff3, 0x5ffa4,
00422 0x5ff6, 0x5ff7, 0x5ff9, 0x5ffa, 0x5ffc, 0x6007,
00423 /* 0x90 */
00424 0x6008, 0x6009, 0x600b, 0x600c, 0x6010, 0x6011, 0x6013, 0x6017,
00425 0x6018, 0x601a, 0x601e, 0x601f, 0x6022, 0x6023, 0x6024, 0x602c,
00426 0x602d, 0x602e, 0x6030, 0x6031, 0x6032, 0x6033, 0x6034, 0x6036,
00427 0x6037, 0x6038, 0x6039, 0x603a, 0x603d, 0x603e, 0x6040, 0x6044,
00428 0x6045, 0x6046, 0x6047, 0x6048, 0x6049, 0x604a, 0x604c, 0x604e,
00429 0x604f, 0x6051, 0x6053, 0x6054, 0x6056, 0x6057, 0x6058, 0x605b,
00430 0x605c, 0x605e, 0x605f, 0x6060, 0x6061, 0x6065, 0x6066, 0x606e,
00431 0x6071, 0x6072, 0x6074, 0x6075, 0x6077, 0x607e, 0x6080, 0x6081,
00432 0x6082, 0x6085, 0x6086, 0x6087, 0x6088, 0x608a, 0x608b, 0x608e,
00433 0x608f, 0x6090, 0x6091, 0x6093, 0x6095, 0x6097, 0x6098, 0x6099,
00434 0x609c, 0x609e, 0x60a1, 0x60a2, 0x60a4, 0x60a5, 0x60a7, 0x60a9,
00435 0x60aa, 0x60ae, 0x60b0, 0x60b3, 0x60b5, 0x60b6, 0x60b7, 0x60b9,
00436 0x60ba, 0x60bd, 0x60be, 0x60bf, 0x60c0, 0x60c1, 0x60c2, 0x60c3,
00437 0x60c4, 0x60c7, 0x60c8, 0x60c9, 0x60cc, 0x60cd, 0x60ce, 0x60cf,
00438 0x60d0, 0x60d2, 0x60d3, 0x60d4, 0x60d6, 0x60d7, 0x60d9, 0x60db,
00439 0x60de, 0x60e1, 0x60e2, 0x60e3, 0x60e4, 0x60e5, 0x60ea, 0x60f1,
00440 0x60f2, 0x60f5, 0x60f7, 0x60f8, 0x60fb, 0x60fc, 0x60fd, 0x60fe,
00441 0x60ff, 0x6102, 0x6103, 0x6104, 0x6105, 0x6107, 0x610a, 0x610b,
00442 0x610c, 0x6110, 0x6111, 0x6112, 0x6113, 0x6114, 0x6116, 0x6117,
00443 0x6118, 0x6119, 0x611b, 0x611c, 0x611d, 0x611e, 0x6121, 0x6122,
00444 0x6125, 0x6128, 0x6129, 0x612a, 0x612c, 0x612d, 0x612e, 0x612f,
00445 0x6130, 0x6131, 0x6132, 0x6133, 0x6134, 0x6135, 0x6136, 0x6137,
00446 0x6138, 0x6139, 0x613a, 0x613b, 0x613c, 0x613d, 0x613e, 0x6140,
00447 0x6141, 0x6142, 0x6143, 0x6144, 0x6145, 0x6146,
00448 /* 0x91 */
00449 0x6147, 0x6149, 0x614b, 0x614d, 0x614f, 0x6150, 0x6152, 0x6153,
00450 0x6154, 0x6156, 0x6157, 0x6158, 0x6159, 0x615a, 0x615b, 0x615c,
00451 0x615e, 0x615f, 0x6160, 0x6161, 0x6163, 0x6164, 0x6165, 0x6166,
00452 0x6169, 0x616a, 0x616b, 0x616c, 0x616d, 0x616e, 0x616f, 0x6171,
00453 0x6172, 0x6173, 0x6174, 0x6176, 0x6178, 0x6179, 0x617a, 0x617b,
00454 0x617c, 0x617d, 0x617e, 0x617f, 0x6180, 0x6181, 0x6182, 0x6183,
00455 0x6184, 0x6185, 0x6186, 0x6187, 0x6188, 0x6189, 0x618a, 0x618c,
00456 0x618d, 0x618f, 0x6190, 0x6191, 0x6192, 0x6193, 0x6195, 0x6196,
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00458 0x61a0, 0x61a1, 0x61a2, 0x61a3, 0x61a4, 0x61a5, 0x61a6, 0x61aa,
00459 0x61ab, 0x61ad, 0x61ae, 0x61af, 0x61b0, 0x61b1, 0x61b2, 0x61b3,
00460 0x61b4, 0x61b5, 0x61b6, 0x61b8, 0x61b9, 0x61ba, 0x61bb, 0x61bc,
00461 0x61bd, 0x61bf, 0x61c0, 0x61c1, 0x61c3, 0x61c4, 0x61c5, 0x61c6,
00462 0x61c7, 0x61c9, 0x61cc, 0x61cd, 0x61ce, 0x61cf, 0x61d0, 0x61d3,
00463 0x61d5, 0x61d6, 0x61d7, 0x61d8, 0x61d9, 0x61da, 0x61db, 0x61dc,
00464 0x61dd, 0x61de, 0x61df, 0x61e0, 0x61e1, 0x61e2, 0x61e3, 0x61e4,
00465 0x61e5, 0x61e7, 0x61e8, 0x61e9, 0x61ea, 0x61eb, 0x61ec, 0x61ed,
00466 0x61ee, 0x61ef, 0x61f0, 0x61f1, 0x61f2, 0x61f3, 0x61f4, 0x61f6,
00467 0x61f7, 0x61f8, 0x61f9, 0x61fa, 0x61fb, 0x61fc, 0x61fd, 0x61fe,
00468 0x6200, 0x6201, 0x6202, 0x6203, 0x6204, 0x6205, 0x6207, 0x6209,
00469 0x6213, 0x6214, 0x6219, 0x621c, 0x621d, 0x621e, 0x6220, 0x6223,
00470 0x6226, 0x6227, 0x6228, 0x6229, 0x622b, 0x622d, 0x622f, 0x6230,
00471 0x6231, 0x6232, 0x6235, 0x6236, 0x6238, 0x6239, 0x623a, 0x623b,
00472 0x623c, 0x6242, 0x6244, 0x6245, 0x6246, 0x624a,
00473 /* 0x92 */
00474 0x624f, 0x6250, 0x6255, 0x6256, 0x6257, 0x6259, 0x625a, 0x625c,
00475 0x625d, 0x625e, 0x625f, 0x6260, 0x6261, 0x6262, 0x6264, 0x6265,
00476 0x6268, 0x6271, 0x6272, 0x6274, 0x6275, 0x6277, 0x6278, 0x627a,
00477 0x627b, 0x627d, 0x6281, 0x6282, 0x6283, 0x6285, 0x6286, 0x6287,
00478 0x6288, 0x628b, 0x628c, 0x628d, 0x628e, 0x628f, 0x6290, 0x6294,
00479 0x6299, 0x629c, 0x629d, 0x629e, 0x62a3, 0x62a6, 0x62a7, 0x62a9,
00480 0x62aa, 0x62ad, 0x62ae, 0x62af, 0x62b0, 0x62b2, 0x62b3, 0x62b4,
00481 0x62b6, 0x62b7, 0x62b8, 0x62ba, 0x62be, 0x62c0, 0x62c1, 0x62c3,
00482 0x62cb, 0x62cf, 0x62d1, 0x62d5, 0x62dd, 0x62de, 0x62e0, 0x62e1,
00483 0x62e4, 0x62ea, 0x62eb, 0x62ef, 0x62f0, 0x62f2, 0x62f5, 0x62f8, 0x62f9,
00484 0x62fa, 0x62fb, 0x6300, 0x6303, 0x6304, 0x6305, 0x6306, 0x630a,
00485 0x630b, 0x630c, 0x630d, 0x630f, 0x6310, 0x6312, 0x6313, 0x6314,
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00487 0x632c, 0x632d, 0x632e, 0x6330, 0x6331, 0x6333, 0x6334, 0x6335,
00488 0x6336, 0x6337, 0x6338, 0x633b, 0x633c, 0x633e, 0x633f, 0x6340,
00489 0x6341, 0x6344, 0x6347, 0x6348, 0x634a, 0x6351, 0x6352, 0x6353,
00490 0x6354, 0x6356, 0x6357, 0x6358, 0x6359, 0x635a, 0x635b, 0x635c,
00491 0x635d, 0x6360, 0x6364, 0x6365, 0x6366, 0x6368, 0x636a, 0x636b,
00492 0x636c, 0x636f, 0x6370, 0x6372, 0x6373, 0x6374, 0x6375, 0x6378,
00493 0x6379, 0x637c, 0x637d, 0x637e, 0x637f, 0x6381, 0x6383, 0x6384,
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00494 0x6385, 0x6386, 0x638b, 0x638d, 0x6391, 0x6393, 0x6394, 0x6395,
00495 0x6397, 0x6399, 0x639a, 0x639b, 0x639c, 0x639d, 0x639e, 0x639f,
00496 0x63a1, 0x63a4, 0x63a6, 0x63ab, 0x63af, 0x63b1, 0x63b2, 0x63b5,
00497 0x63b6, 0x63b9, 0x63bb, 0x63bd, 0x63bf, 0x63c0,
00498 /* 0x93 */
00499 0x63c1, 0x63c2, 0x63c3, 0x63c5, 0x63c7, 0x63c8, 0x63ca, 0x63cb,
00500 0x63cc, 0x63d1, 0x63d3, 0x63d4, 0x63d5, 0x63d7, 0x63d8, 0x63d9,
00501 0x63da, 0x63db, 0x63dc, 0x63dd, 0x63df, 0x63e2, 0x63e4, 0x63e5,
00502 0x63e6, 0x63e7, 0x63e8, 0x63eb, 0x63ec, 0x63ee, 0x63ef, 0x63f0,
00503 0x63f1, 0x63f3, 0x63f5, 0x63f7, 0x63f9, 0x63fa, 0x63fb, 0x63fc,
00504 0x63fe, 0x6403, 0x6404, 0x6406, 0x6407, 0x6408, 0x6409, 0x640a,
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00682 0x6b8e, 0x6b8f, 0x6b90, 0x6b91, 0x6b94, 0x6b95, 0x6b97, 0x6b98,
00683 0x6b99, 0x6b9c, 0x6b9d, 0x6b9e, 0x6b9f, 0x6ba0, 0x6ba2, 0x6ba3,
00684 0x6ba4, 0x6ba5, 0x6ba6, 0x6ba7, 0x6ba8, 0x6ba9, 0x6bab, 0x6bac,
00685 0x6bad, 0x6bae, 0x6baf, 0x6bb0, 0x6bb1, 0x6bb2, 0x6bb6, 0x6bb8,
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00687 0x6bc4, 0x6bc6, 0x6bc7, 0x6bc8, 0x6bc9, 0x6bca, 0x6bcc, 0x6bce,
00688 0x6bd0, 0x6bd1, 0x6bd4, 0x6bd8, 0x6bda, 0x6bdc, 0x6bde, 0x6bdf,
00689 0x6be0, 0x6be2, 0x6be3, 0x6be4, 0x6be5, 0x6be6, 0x6be7, 0x6be8,
00690 0x6be9, 0x6bec, 0x6bed, 0x6bee, 0x6bf0, 0x6bf1, 0x6bf4, 0x6bf5,
00691 0x6bf6, 0x6bff, 0x6bff7, 0x6bff8, 0x6bfa, 0x6bfb, 0x6bfc, 0x6bfe,
00692 0x6c00, 0x6c01, 0x6c02, 0x6c03, 0x6c04, 0x6c08, 0x6c09, 0x6c0a,
00693 0x6c0b, 0x6c0c, 0x6c0e, 0x6c12, 0x6c17, 0x6c1c, 0x6c1d, 0x6c1e,
00694 0x6c20, 0x6c23, 0x6c25, 0x6c2b, 0x6c2c, 0x6c2d, 0x6c31, 0x6c33,
00695 0x6c36, 0x6c37, 0x6c39, 0x6c3a, 0x6c3b, 0x6c3c, 0x6c3e, 0x6c3f,
00696 0x6c43, 0x6c44, 0x6c45, 0x6c48, 0x6c4b, 0x6c4c, 0x6c4d, 0x6c4e,
00697 0x6c4f, 0x6c51, 0x6c52, 0x6c53, 0x6c55, 0x6c58,
00698 /* 0x9b */
00699 0x6c59, 0x6c5a, 0x6c62, 0x6c63, 0x6c65, 0x6c66, 0x6c67, 0x6c6b,
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00701 0x6c78, 0x6c7a, 0x6c7b, 0x6c7c, 0x6c7f, 0x6c80, 0x6c84, 0x6c87,
00702 0x6c8a, 0x6c8b, 0x6c8d, 0x6c8e, 0x6c91, 0x6c92, 0x6c95, 0x6c96,
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00705 0x6cba, 0x6ccb, 0x6ccc, 0x6ccc2, 0x6ccc3, 0x6ccc6, 0x6ccc7, 0x6ccc8,
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00715 0x6d5f, 0x6d61, 0x6d62, 0x6d64, 0x6d65, 0x6d67, 0x6d68, 0x6d6b,
00716 0x6d6c, 0x6d6d, 0x6d70, 0x6d71, 0x6d72, 0x6d73, 0x6d75, 0x6d76,
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00718 0x6d83, 0x6d84, 0x6d86, 0x6d87, 0x6d8a, 0x6d8d, 0x6d8f,
00719 0x6d90, 0x6d92, 0x6d96, 0x6d97, 0x6d98, 0x6d99, 0x6d9a, 0x6d9c,
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00721 0x6db6, 0x6db7, 0x6db9, 0x6dba, 0x6dbb, 0x6dbc, 0x6dbd, 0x6dbe,
00722 0x6dc1, 0x6dc2, 0x6dc3, 0x6dc8, 0x6dc9, 0x6dca,
00723 /* 0x9c */
00724 0x6dcd, 0x6dce, 0x6dcf, 0x6dd0, 0x6dd2, 0x6dd3, 0x6dd4, 0x6dd5,
00725 0x6dd7, 0x6dda, 0x6ddb, 0x6ddc, 0x6ddf, 0x6de2, 0x6de3, 0x6de5,
00726 0x6de7, 0x6de8, 0x6de9, 0x6dea, 0x6ded, 0x6def, 0x6df0, 0x6df2,
00727 0x6df4, 0x6df5, 0x6df6, 0x6df8, 0x6dfa, 0x6dfd, 0x6dfe, 0x6dff,
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00731 0x6e2a, 0x6e2c, 0x6e2e, 0x6e30, 0x6e31, 0x6e33, 0x6e35, 0x6e36,
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00734 0x6e4b, 0x6e4c, 0x6e4f, 0x6e50, 0x6e51, 0x6e52, 0x6e55, 0x6e57,
00735 0x6e59, 0x6e5a, 0x6e5c, 0x6e5d, 0x6e5e, 0x6e60, 0x6e61, 0x6e62,
00736 0x6e63, 0x6e64, 0x6e65, 0x6e66, 0x6e67, 0x6e68, 0x6e69, 0x6e6a,
00737 0x6e6c, 0x6e6d, 0x6e6f, 0x6e70, 0x6e71, 0x6e72, 0x6e73, 0x6e74,
00738 0x6e75, 0x6e76, 0x6e77, 0x6e78, 0x6e79, 0x6e7a, 0x6e7b, 0x6e7c,
00739 0x6e7d, 0x6e80, 0x6e81, 0x6e82, 0x6e84, 0x6e87, 0x6e88, 0x6e8a,
00740 0x6e8b, 0x6e8c, 0x6e8d, 0x6e8e, 0x6e91, 0x6e92, 0x6e93, 0x6e94,
00741 0x6e95, 0x6e96, 0x6e97, 0x6e99, 0x6e9a, 0x6e9b, 0x6e9d, 0x6e9e,
00742 0x6ea0, 0x6ea1, 0x6ea3, 0x6ea4, 0x6ea6, 0x6ea8, 0x6ea9, 0x6eab,
00743 0x6eac, 0x6ead, 0x6eae, 0x6eb0, 0x6eb3, 0x6eb5, 0x6eb8, 0x6eb9,
00744 0x6ebc, 0x6ebd, 0x6ebf, 0x6ec0, 0x6ec3, 0x6ec4, 0x6ec5, 0x6ec6,
00745 0x6ec8, 0x6ec9, 0x6eca, 0x6ecc, 0x6ecd, 0x6ece, 0x6ed0, 0x6ed2,
00746 0x6ed6, 0x6ed8, 0x6ed9, 0x6edb, 0x6edc, 0x6edd, 0x6ee3, 0x6ee7,
00747 0x6eea, 0x6eeb, 0x6eec, 0x6eed, 0x6eee, 0x6eef,
00748 /* 0x9d */
00749 0x6ef0, 0x6ef1, 0x6ef2, 0x6ef3, 0x6ef5, 0x6ef6, 0x6ef7, 0x6ef8,
00750 0x6efa, 0x6efb, 0x6efc, 0x6efd, 0x6efe, 0x6eff, 0x6f00, 0x6f01,
00751 0x6f03, 0x6f04, 0x6f05, 0x6f07, 0x6f08, 0x6f0a, 0x6f0b, 0x6f0c,
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00756 0x6f3b, 0x6f3c, 0x6f3d, 0x6f3f, 0x6f40, 0x6f41, 0x6f42, 0x6f43,
00757 0x6f44, 0x6f45, 0x6f48, 0x6f49, 0x6f4a, 0x6f4c, 0x6f4e, 0x6f4f,
00758 0x6f50, 0x6f51, 0x6f52, 0x6f53, 0x6f54, 0x6f55, 0x6f56, 0x6f57,
00759 0x6f59, 0x6f5a, 0x6f5b, 0x6f5d, 0x6f5f, 0x6f60, 0x6f61, 0x6f63,
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00762 0x6f7b, 0x6f7d, 0x6f7e, 0x6f7f, 0x6f80, 0x6f81, 0x6f82, 0x6f83,
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00766 0x6fa4, 0x6fa5, 0x6fa6, 0x6fa8, 0x6fa9, 0x6faa, 0x6fab, 0x6fac,
00767 0x6fad, 0x6fae, 0x6faf, 0x6fb0, 0x6fb1, 0x6fb2, 0x6fb4, 0x6fb5,
00768 0x6fb7, 0x6fb8, 0x6fba, 0x6fbb, 0x6fbc, 0x6fbd, 0x6fbe, 0x6fbf,
00769 0x6fc1, 0x6fc3, 0x6fc4, 0x6fc5, 0x6fc6, 0x6fc7, 0x6fc8, 0x6fca,
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00771 0x6fd5, 0x6fd6, 0x6fd7, 0x6fd8, 0x6fd9, 0x6fda, 0x6fdb, 0x6fdc,
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00773 /* 0x9e */
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00778 0x7008, 0x7009, 0x700a, 0x700b, 0x700c, 0x700d, 0x700e, 0x700f,
00779 0x7010, 0x7012, 0x7013, 0x7014, 0x7015, 0x7016, 0x7017, 0x7018,
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00785 0x7046, 0x7047, 0x7048, 0x7049, 0x704a, 0x704b, 0x704d, 0x704e,
00786 0x7050, 0x7051, 0x7052, 0x7053, 0x7054, 0x7055, 0x7056, 0x7057,
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00790 0x7079, 0x707a, 0x707b, 0x707d, 0x7081, 0x7082, 0x7083, 0x7084,
00791 0x7086, 0x7087, 0x7088, 0x708b, 0x708c, 0x708d, 0x708f, 0x7090,
00792 0x7091, 0x7093, 0x7097, 0x7098, 0x709a, 0x709b, 0x709e, 0x709f,
00793 0x70a0, 0x70a1, 0x70a2, 0x70a3, 0x70a4, 0x70a5, 0x70a6, 0x70a7,
00794 0x70a8, 0x70a9, 0x70aa, 0x70ab, 0x70ac, 0x70ad, 0x70ae, 0x70af,
00795 0x70ba, 0x70bb, 0x70bc, 0x70bd, 0x70be, 0x70bf, 0x70c0, 0x70c1,
00796 0x70cb, 0x70cc, 0x70cd, 0x70ce, 0x70cf, 0x70d0, 0x70d1, 0x70d2,
00797 0x70d3, 0x70d4, 0x70d5, 0x70d6, 0x70d7, 0x70da,
00798 /* 0x9f */
00799 0x70dc, 0x70dd, 0x70de, 0x70e0, 0x70e1, 0x70e2, 0x70e3, 0x70e5,
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00804 0x7117, 0x711b, 0x711c, 0x711d, 0x711e, 0x711f, 0x7120, 0x7121,
00805 0x7122, 0x7123, 0x7124, 0x7125, 0x7127, 0x7128, 0x7129, 0x712a,
00806 0x712b, 0x712c, 0x712d, 0x712e, 0x7132, 0x7133, 0x7134, 0x7135,
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00808 0x713f, 0x7140, 0x7141, 0x7142, 0x7143, 0x7144, 0x7146, 0x7147,
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00817 0x719d, 0x719e, 0x71a1, 0x71a2, 0x71a3, 0x71a4, 0x71a5, 0x71a6,
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00819 0x71b1, 0x71b2, 0x71b4, 0x71b6, 0x71b7, 0x71b8, 0x71ba, 0x71bb,
00820 0x71bc, 0x71bd, 0x71be, 0x71bf, 0x71c0, 0x71c1, 0x71c2, 0x71c4,
00821 0x71c5, 0x71c6, 0x71c7, 0x71c8, 0x71c9, 0x71ca, 0x71cb, 0x71cc,
00822 0x71cd, 0x71cf, 0x71d0, 0x71d1, 0x71d2, 0x71d3,
00823 /* 0xa0 */
00824 0x71d6, 0x71d7, 0x71d8, 0x71d9, 0x71da, 0x71db, 0x71dc, 0x71dd,
00825 0x71de, 0x71df, 0x71e1, 0x71e2, 0x71e3, 0x71e4, 0x71e6, 0x71e8,
00826 0x71e9, 0x71ea, 0x71eb, 0x71ec, 0x71ed, 0x71ef, 0x71f0, 0x71f1,
00827 0x71f2, 0x71f3, 0x71f4, 0x71f5, 0x71f6, 0x71f7, 0x71f8, 0x71fa,
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00831 0x7214, 0x7215, 0x7216, 0x7217, 0x7218, 0x7219, 0x721a, 0x721b,
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00833 0x7225, 0x7226, 0x7227, 0x7229, 0x722b, 0x722d, 0x722e, 0x722f,
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00837 0x7258, 0x725a, 0x725c, 0x725e, 0x7260, 0x7263, 0x7264, 0x7265,
00838 0x7268, 0x726a, 0x726b, 0x726c, 0x726d, 0x7270, 0x7271, 0x7273,
00839 0x7274, 0x7276, 0x7277, 0x7278, 0x727b, 0x727c, 0x727d, 0x7282,
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00843 0x72a2, 0x72a3, 0x72a4, 0x72a5, 0x72a6, 0x72a7, 0x72a8, 0x72a9,
00844 0x72aa, 0x72ab, 0x72ae, 0x72b1, 0x72b2, 0x72b3, 0x72b5, 0x72ba,
00845 0x72bb, 0x72bc, 0x72bd, 0x72be, 0x72bf, 0x72c0, 0x72c5, 0x72c6,
00846 0x72c7, 0x72c9, 0x72ca, 0x72cb, 0x72cc, 0x72cf, 0x72d1, 0x72d3,
00847 0x72d4, 0x72d5, 0x72d6, 0x72d8, 0x72da, 0x72db,
00848 /* 0xa1 */
00849 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00850 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00851 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00852 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00853 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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00857 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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00859 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00860 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00861 0x3000, 0x3001, 0x3002, 0x00b7, 0x02c9, 0x02c7, 0x00a8, 0x3003,
00862 0x3005, 0x2014, 0x2014, 0xff5e, 0x2016, 0x2026, 0x2018, 0x2019, 0x201c,
00863 0x201d, 0x3014, 0x3015, 0x3008, 0x3009, 0x300a, 0x300b, 0x300c,
00864 0x300d, 0x300e, 0x300f, 0x3016, 0x3017, 0x3010, 0x3011, 0x00b1,
00865 0x00d7, 0x00f7, 0x00f7, 0x2236, 0x2227, 0x2228, 0x2211, 0x220f, 0x222a,
00866 0x2229, 0x2208, 0x2237, 0x221a, 0x22a5, 0x2225, 0x2220, 0x2312,
00867 0x2299, 0x222b, 0x222e, 0x2261, 0x224c, 0x2248, 0x223d, 0x221d,
00868 0x2260, 0x226e, 0x226f, 0x226f, 0x2264, 0x2265, 0x221e, 0x2235, 0x2234,
00869 0x2642, 0x2640, 0x00b0, 0x2032, 0x2033, 0x2103, 0xff04, 0x00a4,
00870 0xffe0, 0xffe1, 0x2030, 0x00a7, 0x2116, 0x2606, 0x2605, 0x25cb,
00871 0x25cf, 0x25ce, 0x25c7, 0x25c6, 0x25a1, 0x25a0, 0x25b3, 0x25b2,
00872 0x203b, 0x2192, 0x2190, 0x2191, 0x2193, 0x3013,
00873 /* 0xa2 */
00874 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00875 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00876 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00877 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00878 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00879 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00880 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00881 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00882 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00883 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00884 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00885 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00886 0x2170, 0x2171, 0x2172, 0x2173, 0x2174, 0x2175, 0x2176, 0x2177,
00887 0x2178, 0x2179, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00888 0x2488, 0x2489, 0x248a, 0x248b, 0x248c, 0x248d, 0x248e, 0x248f,
00889 0x2490, 0x2491, 0x2492, 0x2493, 0x2494, 0x2495, 0x2496, 0x2497,
00890 0x2498, 0x2499, 0x249a, 0x249b, 0x2474, 0x2475, 0x2476, 0x2477,
00891 0x2478, 0x2479, 0x247a, 0x247b, 0x247c, 0x247d, 0x247e, 0x247f,
00892 0x2480, 0x2481, 0x2482, 0x2483, 0x2484, 0x2485, 0x2486, 0x2487,
00893 0x2460, 0x2461, 0x2462, 0x2463, 0x2464, 0x2465, 0x2466, 0x2467,
00894 0x2468, 0x2469, 0xffff, 0xffff, 0x3220, 0x3221, 0x3222, 0x3223,
00895 0x3224, 0x3225, 0x3226, 0x3227, 0x3228, 0x3229, 0xffff, 0xffff,
00896 0x2160, 0x2161, 0x2162, 0x2163, 0x2164, 0x2165, 0x2166, 0x2167,
00897 0x2168, 0x2169, 0x216a, 0x216b, 0xffff, 0xffff,
00898 /* 0xa3 */
00899 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00900 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00901 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00902 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00903 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00904 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00905 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00906 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00907 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00908 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00909 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00910 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00911 0xff01, 0xff02, 0xff03, 0xffe5, 0xff05, 0xff06, 0xff07, 0xff08,
00912 0xff09, 0xff0a, 0xff0b, 0xff0c, 0xff0d, 0xff0e, 0xff0f, 0xff10,
00913 0xff11, 0xff12, 0xff13, 0xff14, 0xff15, 0xff16, 0xff17, 0xff18,
00914 0xff19, 0xff1a, 0xff1b, 0xff1c, 0xff1d, 0xff1e, 0xff1f, 0xff20,
00915 0xff21, 0xff22, 0xff23, 0xff24, 0xff25, 0xff26, 0xff27, 0xff28,
00916 0xff29, 0xff2a, 0xff2b, 0xff2c, 0xff2d, 0xff2e, 0xff2f, 0xff30,
00917 0xff31, 0xff32, 0xff33, 0xff34, 0xff35, 0xff36, 0xff37, 0xff38,
00918 0xff39, 0xff3a, 0xff3b, 0xff3c, 0xff3d, 0xff3e, 0xff3f, 0xff40,
00919 0xff41, 0xff42, 0xff43, 0xff44, 0xff45, 0xff46, 0xff47, 0xff48,
00920 0xff49, 0xff4a, 0xff4b, 0xff4c, 0xff4d, 0xff4e, 0xff4f, 0xff50,
00921 0xff51, 0xff52, 0xff53, 0xff54, 0xff55, 0xff56, 0xff57, 0xff58,
00922 0xff59, 0xff5a, 0xff5b, 0xff5c, 0xff5d, 0xffe3,
00923 /* 0xa4 */
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00925 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00926 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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00928 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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00935 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00936 0x3041, 0x3042, 0x3043, 0x3044, 0x3045, 0x3046, 0x3047, 0x3048,
00937 0x3049, 0x304a, 0x304b, 0x304c, 0x304d, 0x304e, 0x304f, 0x3050,
00938 0x3051, 0x3052, 0x3053, 0x3054, 0x3055, 0x3056, 0x3057, 0x3058,
00939 0x3059, 0x305a, 0x305b, 0x305c, 0x305d, 0x305e, 0x305f, 0x3060,
00940 0x3061, 0x3062, 0x3063, 0x3064, 0x3065, 0x3066, 0x3067, 0x3068,
00941 0x3069, 0x306a, 0x306b, 0x306c, 0x306d, 0x306e, 0x306f, 0x3070,
00942 0x3071, 0x3072, 0x3073, 0x3074, 0x3075, 0x3076, 0x3077, 0x3078,
00943 0x3079, 0x307a, 0x307b, 0x307c, 0x307d, 0x307e, 0x307f, 0x3080,
00944 0x3081, 0x3082, 0x3083, 0x3084, 0x3085, 0x3086, 0x3087, 0x3088,
00945 0x3089, 0x308a, 0x308b, 0x308c, 0x308d, 0x308e, 0x308f, 0x3090,
00946 0x3091, 0x3092, 0x3093, 0xffff, 0xffff, 0xffff, 0xffff,
00947 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00948 /* 0xa5 */
00949 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00950 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00951 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00952 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00953 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00954 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00955 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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00959 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00960 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00961 0x30a1, 0x30a2, 0x30a3, 0x30a4, 0x30a5, 0x30a6, 0x30a7, 0x30a8,
00962 0x30a9, 0x30aa, 0x30ab, 0x30ac, 0x30ad, 0x30ae, 0x30af, 0x30b0,
00963 0x30b1, 0x30b2, 0x30b3, 0x30b4, 0x30b5, 0x30b6, 0x30b7, 0x30b8,
00964 0x30b9, 0x30ba, 0x30bb, 0x30bc, 0x30bd, 0x30be, 0x30bf, 0x30c0,
00965 0x30c1, 0x30c2, 0x30c3, 0x30c4, 0x30c5, 0x30c6, 0x30c7, 0x30c8,
00966 0x30c9, 0x30ca, 0x30cb, 0x30cc, 0x30cd, 0x30ce, 0x30cf, 0x30d0,
00967 0x30d1, 0x30d2, 0x30d3, 0x30d4, 0x30d5, 0x30d6, 0x30d7, 0x30d8,
00968 0x30d9, 0x30da, 0x30db, 0x30dc, 0x30dd, 0x30de, 0x30df, 0x30e0,
00969 0x30e1, 0x30e2, 0x30e3, 0x30e4, 0x30e5, 0x30e6, 0x30e7, 0x30e8,
00970 0x30e9, 0x30ea, 0x30eb, 0x30ec, 0x30ed, 0x30ee, 0x30ef, 0x30f0,
00971 0x30f1, 0x30f2, 0x30f3, 0x30f4, 0x30f5, 0x30f6, 0xffff, 0xffff,
00972 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00973 /* 0xa6 */
00974 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00975 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00976 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00977 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00978 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00979 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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00981 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00982 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00983 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00984 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00985 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00986 0x0391, 0x0392, 0x0393, 0x0394, 0x0395, 0x0396, 0x0397, 0x0398,
00987 0x0399, 0x039a, 0x039b, 0x039c, 0x039d, 0x039e, 0x039f, 0x03a0,
00988 0x03a1, 0x03a2, 0x03a3, 0x03a4, 0x03a5, 0x03a6, 0x03a7, 0x03a8, 0x03a9,
00989 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00990 0x03b1, 0x03b2, 0x03b3, 0x03b4, 0x03b5, 0x03b6, 0x03b7, 0x03b8,
00991 0x03b9, 0x03ba, 0x03bb, 0x03bc, 0x03bd, 0x03be, 0x03bf, 0x03c0,
00992 0x03c1, 0x03c2, 0x03c3, 0x03c4, 0x03c5, 0x03c6, 0x03c7, 0x03c8, 0x03c9,
00993 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00994 0xfe36, 0xfe39, 0xfe3a, 0xfe3f, 0xfe40, 0xfe3d, 0xfe3e, 0xfe41,
00995 0xfe42, 0xfe43, 0xfe44, 0xffff, 0xffff, 0xfe3b, 0xfe3c, 0xfe37,
00996 0xfe38, 0xfe31, 0xffff, 0xffff, 0xfe33, 0xffff, 0xffff, 0xffff,
00997 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00998 /* 0xa7 */
00999 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01000 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01001 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01002 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01003 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01004 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01005 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01006 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01007 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01008 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01009 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01010 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01011 0x0410, 0x0411, 0x0412, 0x0413, 0x0414, 0x0415, 0x0401, 0x0416,
01012 0x0417, 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e,
01013 0x041f, 0x0420, 0x0421, 0x0422, 0x0423, 0x0424, 0x0425, 0x0426,
01014 0x0427, 0x0428, 0x0429, 0x042a, 0x042b, 0x042c, 0x042d, 0x042e,
01015 0x042f, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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01016 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01017 0x0430, 0x0431, 0x0432, 0x0433, 0x0434, 0x0435, 0x0451, 0x0436,
01018 0x0437, 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e,
01019 0x043f, 0x0440, 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446,
01020 0x0447, 0x0448, 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e,
01021 0x044f, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01022 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01023 /* Oxa8 */
01024 0x02ca, 0x02cb, 0x02d9, 0x2013, 0x2015, 0x2025, 0x2035, 0x2105,
01025 0x2109, 0x2196, 0x2197, 0x2198, 0x2199, 0x2215, 0x221f, 0x2223,
01026 0x2252, 0x2266, 0x2267, 0x22bf, 0x2550, 0x2551, 0x2552, 0x2553,
01027 0x2554, 0x2555, 0x2556, 0x2557, 0x2558, 0x2559, 0x255a, 0x255b,
01028 0x255c, 0x255d, 0x255e, 0x255f, 0x2560, 0x2561, 0x2562, 0x2563,
01029 0x2564, 0x2565, 0x2566, 0x2567, 0x2568, 0x2569, 0x256a, 0x256b,
01030 0x256c, 0x256d, 0x256e, 0x256f, 0x2570, 0x2571, 0x2572, 0x2573,
01031 0x2581, 0x2582, 0x2583, 0x2584, 0x2585, 0x2586, 0x2587, 0x2588,
01032 0x2589, 0x258a, 0x258b, 0x258c, 0x258d, 0x258e, 0x258f, 0x2593,
01033 0x2594, 0x2595, 0x25bc, 0x25bd, 0x25e2, 0x25e3, 0x25e4, 0x25e5,
01034 0x2609, 0x2295, 0x3012, 0x301d, 0x301e, 0xffffd, 0xffffd, 0xffffd,
01035 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01036 0x0101, 0x00e1, 0x01ce, 0x00e0, 0x0113, 0x00e9, 0x011b, 0x00e8,
01037 0x012b, 0x00ed, 0x01d0, 0x00ec, 0x014d, 0x00f3, 0x01d2, 0x00f2,
01038 0x016b, 0x00fa, 0x01d4, 0x00f9, 0x01d6, 0x01d8, 0x01da, 0x01dc,
01039 0x00fc, 0x00ea, 0x0251, 0xffffd, 0x0144, 0x0148, 0xffffd, 0x0261,
01040 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0x3105, 0x3106, 0x3107, 0x3108,
01041 0x3109, 0x310a, 0x310b, 0x310c, 0x310d, 0x310e, 0x310f, 0x3110,
01042 0x3111, 0x3112, 0x3113, 0x3114, 0x3115, 0x3116, 0x3117, 0x3118,
01043 0x3119, 0x311a, 0x311b, 0x311c, 0x311d, 0x311e, 0x311f, 0x3120,
01044 0x3121, 0x3122, 0x3123, 0x3124, 0x3125, 0x3126, 0x3127, 0x3128,
01045 0x3129, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01046 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01047 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01048 /* Oxa9 */
01049 0x3021, 0x3022, 0x3023, 0x3024, 0x3025, 0x3026, 0x3027, 0x3028,
01050 0x3029, 0x32a3, 0x338e, 0x338f, 0x339c, 0x339d, 0x339e, 0x33a1,
01051 0x33c4, 0x33ce, 0x33d1, 0x33d2, 0x33d5, 0xfe30, 0xfe2, 0xffe4,
01052 0xffffd, 0x2121, 0x3231, 0xffffd, 0x2010, 0xffffd, 0xffffd, 0xffffd,
01053 0x30fc, 0x309b, 0x309c, 0x30fd, 0x30fe, 0x3006, 0x309d, 0x309e,
01054 0xfe49, 0xfe4a, 0xfe4b, 0xfe4c, 0xfe4d, 0xfe4e, 0xfe4f, 0xfe50,
01055 0xfe51, 0xfe52, 0xfe53, 0xfe54, 0xfe55, 0xfe56, 0xfe57, 0xfe58, 0xfe59,
01056 0xfe5a, 0xfe5b, 0xfe5c, 0xfe5d, 0xfe5e, 0xfe5f, 0xfe60, 0xfe61, 0xfe62,
01057 0xfe63, 0xfe64, 0xfe65, 0xfe66, 0xfe67, 0xfe68, 0xfe69, 0xfe6a, 0xfe6b,
01058 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01059 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0x3007, 0xffffd, 0xffffd,
01060 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01061 0xffffd, 0xffffd, 0xffffd, 0x2500, 0x2501, 0x2502, 0x2503, 0x2504,
01062 0x2505, 0x2506, 0x2507, 0x2508, 0x2509, 0x250a, 0x250b, 0x250c,
01063 0x250d, 0x250e, 0x250f, 0x2510, 0x2511, 0x2512, 0x2513, 0x2514,
01064 0x2515, 0x2516, 0x2517, 0x2518, 0x2519, 0x251a, 0x251b, 0x251c,
01065 0x251d, 0x251e, 0x251f, 0x2520, 0x2521, 0x2522, 0x2523, 0x2524,
01066 0x2525, 0x2526, 0x2527, 0x2528, 0x2529, 0x252a, 0x252b, 0x252c,
01067 0x252d, 0x252e, 0x252f, 0x2530, 0x2531, 0x2532, 0x2533, 0x2534,
01068 0x2535, 0x2536, 0x2537, 0x2538, 0x2539, 0x253a, 0x253b, 0x253c,
01069 0x253d, 0x253e, 0x253f, 0x2540, 0x2541, 0x2542, 0x2543, 0x2544,
01070 0x2545, 0x2546, 0x2547, 0x2548, 0x2549, 0x254a, 0x254b, 0xffffd,
01071 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01072 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01073 /* Oxaa */
01074 0x72dc, 0x72dd, 0x72df, 0x72e2, 0x72e3, 0x72e4, 0x72e5, 0x72e6,
01075 0x72e7, 0x72ea, 0x72eb, 0x72f5, 0x72f6, 0x72f9, 0x72fd, 0x72fe,
01076 0x72ff, 0x7300, 0x7302, 0x7304, 0x7305, 0x7306, 0x7307, 0x7308,
01077 0x7309, 0x730b, 0x730c, 0x730d, 0x730f, 0x7310, 0x7311, 0x7312,
01078 0x7314, 0x7318, 0x7319, 0x731a, 0x731f, 0x7320, 0x7323, 0x7324,
01079 0x7326, 0x7327, 0x7328, 0x732d, 0x732f, 0x7330, 0x7332, 0x7333,
01080 0x7335, 0x7336, 0x733a, 0x733b, 0x733c, 0x733d, 0x7340, 0x7341,
01081 0x7342, 0x7343, 0x7344, 0x7345, 0x7346, 0x7347, 0x7348, 0x7349,
01082 0x734a, 0x734b, 0x734c, 0x734e, 0x734f, 0x7351, 0x7353, 0x7354,
01083 0x7355, 0x7356, 0x7358, 0x7359, 0x735a, 0x735b, 0x735c, 0x735d,
01084 0x735e, 0x735f, 0x7361, 0x7362, 0x7363, 0x7364, 0x7365, 0x7366,
01085 0x7367, 0x7368, 0x7369, 0x736a, 0x736b, 0x736c, 0x7370, 0x7371,
01086 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01087 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01088 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01089 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01090 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01091 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01092 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01093 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01094 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01095 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01096 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01097 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01098 /* Oxab */
01099 0x7372, 0x7373, 0x7374, 0x7375, 0x7376, 0x7377, 0x7378, 0x7379,
01100 0x737a, 0x737b, 0x737c, 0x737d, 0x737e, 0x7380, 0x7381, 0x7382,
01101 0x7383, 0x7385, 0x7386, 0x7388, 0x738a, 0x738c, 0x738d, 0x738e,
01102 0x7390, 0x7392, 0x7393, 0x7394, 0x7395, 0x7397, 0x7398, 0x7399,

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01104 0x73a5, 0x73a6, 0x73a7, 0x73a8, 0x73aa, 0x73ac, 0x73ad, 0x73b1,
01105 0x73b4, 0x73b5, 0x73b6, 0x73b8, 0x73b9, 0x73bc, 0x73bd, 0x73be,
01106 0x73bf, 0x73c1, 0x73c3, 0x73c4, 0x73c5, 0x73c6, 0x73c7, 0x73cb,
01107 0x73cc, 0x73ce, 0x73d2, 0x73d3, 0x73d4, 0x73d5, 0x73de, 0x73d7,
01108 0x73d8, 0x73da, 0x73db, 0x73dc, 0x73dd, 0x73df, 0x73e1, 0x73e2,
01109 0x73e3, 0x73e4, 0x73e6, 0x73e8, 0x73ea, 0x73eb, 0x73ec, 0x73ee,
01110 0x73ef, 0x73f0, 0x73f1, 0x73f3, 0x73f4, 0x73f5, 0x73f6, 0x73f7,
01111 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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01121 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01122 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01123 /* 0xac */
01124 0x73f8, 0x73f9, 0x73fa, 0x73fb, 0x73fc, 0x73fd, 0x73fe, 0x73ff,
01125 0x7400, 0x7401, 0x7402, 0x7404, 0x7407, 0x7408, 0x740b, 0x740c,
01126 0x740d, 0x740e, 0x7411, 0x7412, 0x7413, 0x7414, 0x7415, 0x7416,
01127 0x7417, 0x7418, 0x7419, 0x741c, 0x741d, 0x741e, 0x741f, 0x7420,
01128 0x7421, 0x7423, 0x7424, 0x7427, 0x7429, 0x742b, 0x742d, 0x742f,
01129 0x7431, 0x7432, 0x7437, 0x7438, 0x7439, 0x743a, 0x743b, 0x743d,
01130 0x743e, 0x743f, 0x7440, 0x7442, 0x7443, 0x7444, 0x7445, 0x7446,
01131 0x7447, 0x7448, 0x7449, 0x744a, 0x744b, 0x744c, 0x744d, 0x744e,
01132 0x744f, 0x7450, 0x7451, 0x7452, 0x7453, 0x7454, 0x7455, 0x7456,
01133 0x745d, 0x7460, 0x7461, 0x7462, 0x7463, 0x7464, 0x7465, 0x7466,
01134 0x7467, 0x7468, 0x7469, 0x746a, 0x746b, 0x746c, 0x746e, 0x746f,
01135 0x7471, 0x7472, 0x7473, 0x7474, 0x7475, 0x7478, 0x7479, 0x747a,
01136 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01137 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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01146 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01147 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01148 /* 0xad */
01149 0x747b, 0x747c, 0x747d, 0x747f, 0x7482, 0x7484, 0x7485, 0x7486,
01150 0x7488, 0x7489, 0x748a, 0x748c, 0x748d, 0x748f, 0x7491, 0x7492,
01151 0x7493, 0x7494, 0x7495, 0x7496, 0x7497, 0x7498, 0x7499, 0x749a,
01152 0x749b, 0x749d, 0x749f, 0x74a0, 0x74a1, 0x74a2, 0x74a3, 0x74a4,
01153 0x74a5, 0x74a6, 0x74aa, 0x74ab, 0x74ac, 0x74ad, 0x74ae, 0x74af,
01154 0x74b0, 0x74b1, 0x74b2, 0x74b3, 0x74b4, 0x74b5, 0x74b6, 0x74b7,
01155 0x74b8, 0x74b9, 0x74bb, 0x74bc, 0x74bd, 0x74be, 0x74bf, 0x74c0,
01156 0x74c1, 0x74c2, 0x74c3, 0x74c4, 0x74c5, 0x74c6, 0x74c7, 0x74c8,
01157 0x74c9, 0x74ca, 0x74cb, 0x74cc, 0x74cd, 0x74ce, 0x74cf, 0x74d0,
01158 0x74d1, 0x74d3, 0x74d4, 0x74d5, 0x74d6, 0x74d7, 0x74d8, 0x74d9,
01159 0x74da, 0x74db, 0x74dd, 0x74df, 0x74e1, 0x74e5, 0x74e7, 0x74e8,
01160 0x74e9, 0x74ea, 0x74eb, 0x74ec, 0x74ed, 0x74f0, 0x74f1, 0x74f2,
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01170 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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01172 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01173 /* 0xae */
01174 0x74f3, 0x74f5, 0x74f8, 0x74f9, 0x74fa, 0x74fb, 0x74fc, 0x74fd,
01175 0x74fe, 0x7500, 0x7501, 0x7502, 0x7503, 0x7505, 0x7506, 0x7507,
01176 0x7508, 0x7509, 0x750a, 0x750b, 0x750c, 0x750e, 0x7510, 0x7512,
01177 0x7514, 0x7515, 0x7516, 0x7517, 0x751b, 0x751d, 0x751e, 0x7520,
01178 0x7521, 0x7522, 0x7523, 0x7524, 0x7526, 0x7527, 0x752a, 0x752e,
01179 0x7534, 0x7536, 0x7539, 0x753c, 0x753d, 0x753f, 0x7541, 0x7542,
01180 0x7543, 0x7544, 0x7546, 0x7547, 0x7549, 0x754a, 0x754d, 0x7550,
01181 0x7551, 0x7552, 0x7553, 0x7555, 0x7556, 0x7557, 0x7558, 0x755d,
01182 0x755e, 0x755f, 0x7560, 0x7561, 0x7562, 0x7563, 0x7564, 0x7567,
01183 0x7568, 0x7569, 0x756b, 0x756c, 0x756d, 0x756e, 0x756f, 0x7570,
01184 0x7571, 0x7573, 0x7575, 0x7576, 0x7577, 0x757a, 0x757b, 0x757c,
01185 0x757d, 0x757e, 0x7580, 0x7581, 0x7582, 0x7584, 0x7585, 0x7587,
01186 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01187 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01188 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
01189 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
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01196 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01197 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01198 /* 0xaf */
01199 0x7588, 0x7589, 0x758a, 0x758c, 0x758d, 0x758e, 0x7590, 0x7593,
01200 0x7595, 0x7598, 0x759b, 0x759c, 0x759e, 0x75a2, 0x75a6, 0x75a7,
01201 0x75a8, 0x75a9, 0x75aa, 0x75ad, 0x75b6, 0x75b7, 0x75ba, 0x75bb,
01202 0x75bf, 0x75c0, 0x75c1, 0x75c6, 0x75cb, 0x75cc, 0x75ce, 0x75cf,
01203 0x75d0, 0x75d1, 0x75d3, 0x75d7, 0x75d9, 0x75da, 0x75dc, 0x75dd,
01204 0x75df, 0x75e0, 0x75e1, 0x75e5, 0x75e9, 0x75ec, 0x75ed, 0x75ee,
01205 0x75ef, 0x75f2, 0x75f3, 0x75f5, 0x75f6, 0x75f7, 0x75f8, 0x75fa,
01206 0x75fb, 0x75fd, 0x75fe, 0x7602, 0x7604, 0x7606, 0x7607, 0x7608,
01207 0x7609, 0x760b, 0x760d, 0x760e, 0x760f, 0x7611, 0x7612, 0x7613,
01208 0x7614, 0x7616, 0x761a, 0x761c, 0x761d, 0x761e, 0x7621, 0x7623,
01209 0x7627, 0x7628, 0x762c, 0x762e, 0x762f, 0x7631, 0x7632, 0x7636,
01210 0x7637, 0x7639, 0x763a, 0x763b, 0x763d, 0x7641, 0x7642, 0x7644,
01211 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01212 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01213 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01214 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01215 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
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01221 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01222 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
01223 /* 0xb0 */
01224 0x7645, 0x7646, 0x7647, 0x7648, 0x7649, 0x764a, 0x764b, 0x764e,
01225 0x764f, 0x7650, 0x7651, 0x7652, 0x7653, 0x7655, 0x7657, 0x7658,
01226 0x7659, 0x765a, 0x765b, 0x765d, 0x765f, 0x7660, 0x7661, 0x7662,
01227 0x7664, 0x7665, 0x7666, 0x7667, 0x7668, 0x7669, 0x766a, 0x766c,
01228 0x766d, 0x766e, 0x7670, 0x7671, 0x7672, 0x7673, 0x7674, 0x7675,
01229 0x7676, 0x7677, 0x7679, 0x767a, 0x767c, 0x767f, 0x7680, 0x7681,
01230 0x7683, 0x7685, 0x7689, 0x768a, 0x768c, 0x768d, 0x768f, 0x7690,
01231 0x7692, 0x7694, 0x769d, 0x769e, 0x769f, 0x76a0, 0x76a1, 0x76a2, 0x76a3,
01232 0x76a5, 0x76a6, 0x76a7, 0x76a8, 0x76a9, 0x76aa, 0x76ab, 0x76ac, 0x76ad,
01233 0x76af, 0x76b0, 0x76b3, 0x76b5, 0x76b6, 0x76b7, 0x76b8, 0x76b9,
01234 0x76ba, 0x76bb, 0x76bc, 0x76bd, 0x76be, 0x76c0, 0x76c1, 0x76c3,
01235 0x554a, 0x963f, 0x57c3, 0x6328, 0x54ce, 0x5509, 0x54c0, 0x7691,
01236 0x764c, 0x853c, 0x77ee, 0x827e, 0x788d, 0x7231, 0x9698, 0x978d,
01237 0x6c28, 0x5b89, 0x4ffa, 0x6309, 0x6697, 0x5cb8, 0x80fa, 0x6848,
01238 0x80ae, 0x6602, 0x76ce, 0x51f9, 0x6556, 0x71ac, 0x7ff1, 0x8884,
01239 0x50b2, 0x5965, 0x61ca, 0x6fb3, 0x82ad, 0x634c, 0x6252, 0x53ed,
01240 0x5427, 0x7b06, 0x516b, 0x75a4, 0x5df4, 0x62d4, 0x8dcb, 0x9776,
01241 0x628a, 0x8019, 0x575d, 0x9738, 0x7f62, 0x7238, 0x767d, 0x67cf,
01242 0x767e, 0x6446, 0x4f70, 0x8d25, 0x62dc, 0x7a17, 0x6591, 0x73ed,
01243 0x642c, 0x6273, 0x822c, 0x9881, 0x677e, 0x7248, 0x626e, 0x62cc,
01244 0x4f34, 0x74e3, 0x534a, 0x529e, 0x7eca, 0x90a6, 0x5e2e, 0x688e,
01245 0x699c, 0x8180, 0x7ed1, 0x68d2, 0x78c5, 0x868c, 0x9551, 0x508d,
01246 0x8c24, 0x82de, 0x80de, 0x5305, 0x8912, 0x5265,
01247 /* 0xb1 */
01248 0x76c4, 0x76c7, 0x76c9, 0x76cb, 0x76cc, 0x76d3, 0x76d5, 0x76d9,
01249 0x76da, 0x76dc, 0x76dd, 0x76de, 0x76e0, 0x76e1, 0x76e2, 0x76e3,
01250 0x76e4, 0x76e6, 0x76e7, 0x76e8, 0x76e9, 0x76ea, 0x76eb, 0x76ec,
01251 0x76ed, 0x76f0, 0x76f3, 0x76f5, 0x76f6, 0x76f7, 0x76fa, 0x76fb,
01252 0x76fd, 0x76ff, 0x7700, 0x7702, 0x7703, 0x7705, 0x7706, 0x770a,
01253 0x770c, 0x770e, 0x770f, 0x7710, 0x7711, 0x7712, 0x7713, 0x7714,
01254 0x7715, 0x7716, 0x7717, 0x7718, 0x771b, 0x771c, 0x771d, 0x771e,
01255 0x7721, 0x7723, 0x7724, 0x7725, 0x7727, 0x772a, 0x772b, 0x772c,
01256 0x772e, 0x7730, 0x7731, 0x7732, 0x7733, 0x7734, 0x7739, 0x773b,
01257 0x773d, 0x773e, 0x773f, 0x7742, 0x7744, 0x7745, 0x7746, 0x7748,
01258 0x7749, 0x774a, 0x774b, 0x774c, 0x774d, 0x774e, 0x774f, 0x7752,
01259 0x7753, 0x7754, 0x7755, 0x7756, 0x7757, 0x7758, 0x7759, 0x775c,
01260 0x8584, 0x96f9, 0x4fdd, 0x5821, 0x9971, 0x5b9d, 0x62b1, 0x62a5,
01261 0x66b4, 0x8c79, 0x9c8d, 0x7206, 0x676f, 0x7891, 0x60b2, 0x5351,
01262 0x5317, 0x8f88, 0x80cc, 0x8d1d, 0x94a1, 0x500d, 0x72c8, 0x5907,
01263 0x60eb, 0x7119, 0x88ab, 0x5954, 0x82ef, 0x672c, 0x7b28, 0x5d29,
01264 0x7ef7, 0x752d, 0x6cf5, 0x8e66, 0x8ff8, 0x903c, 0x9f3b, 0x6bd4,
01265 0x9119, 0x7b14, 0x5f7c, 0x78a7, 0x84d6, 0x853d, 0x6bd5, 0x6bd9,
01266 0x6bd6, 0x5e01, 0x5e87, 0x75f9, 0x95ed, 0x655d, 0x5f0a, 0x5fc5,
01267 0x8f9f, 0x58c1, 0x81c2, 0x907f, 0x965b, 0x97ad, 0x8fb9, 0x7f16,
01268 0x8d2c, 0x6241, 0x4fbf, 0x53d8, 0x535e, 0x8fa8, 0x8fa9, 0x8fab,
01269 0x904d, 0x6807, 0x5f6a, 0x8198, 0x8868, 0x9cd6, 0x618b, 0x522b,
01270 0x762a, 0x5f6c, 0x658c, 0x6fd2, 0x6ee8, 0x5bbe, 0x6448, 0x5175,
01271 0x51b0, 0x67c4, 0x4e19, 0x79c9, 0x997c, 0x70b3,
01272 /* 0xb2 */
01273 0x775d, 0x775e, 0x775f, 0x7760, 0x7764, 0x7767, 0x7769, 0x776a,
01274 0x776d, 0x776e, 0x776f, 0x7770, 0x7771, 0x7772, 0x7773, 0x7774,
01275 0x7775, 0x7776, 0x7777, 0x7778, 0x777a, 0x777b, 0x777c, 0x7781,

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01279 0x7799, 0x779a, 0x779b, 0x779c, 0x779d, 0x779e, 0x77a1, 0x77a3,
01280 0x77a4, 0x77a6, 0x77a8, 0x77ab, 0x77ad, 0x77ae, 0x77af, 0x77b1,
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01282 0x77be, 0x77c0, 0x77c1, 0x77c2, 0x77c3, 0x77c4, 0x77c5, 0x77c6,
01283 0x77c7, 0x77c8, 0x77c9, 0x77ca, 0x77cb, 0x77cc, 0x77ce, 0x77cf,
01284 0x77d0, 0x77d1, 0x77d2, 0x77d3, 0x77d4, 0x77d5, 0x77d6, 0x77d8,
01285 0x77d9, 0x77da, 0x77dd, 0x77de, 0x77df, 0x77e0, 0x77e1, 0x77e4,
01286 0x75c5, 0x5e76, 0x73bb, 0x83e0, 0x64ad, 0x62e8, 0x94b5, 0x6ce2,
01287 0x535a, 0x52c3, 0x640f, 0x94c2, 0x7b94, 0x4f2f, 0x5e1b, 0x8236,
01288 0x8116, 0x818a, 0x6e24, 0x6cca, 0x9a73, 0x6355, 0x535c, 0x54fa,
01289 0x8865, 0x57e0, 0x4e0d, 0x5e03, 0x6b65, 0x7c3f, 0x90e8, 0x6016,
01290 0x64e6, 0x731c, 0x88c1, 0x6750, 0x624d, 0x8d22, 0x776c, 0x8e29,
01291 0x91c7, 0x5f69, 0x83dc, 0x8521, 0x9910, 0x53c2, 0x8695, 0x6b8b,
01292 0x60ed, 0x60e8, 0x707f, 0x82cd, 0x8231, 0x4ed3, 0x6ca7, 0x85cf,
01293 0x64cd, 0x7cd9, 0x69fd, 0x66f9, 0x8349, 0x5395, 0x7b56, 0x4fa7,
01294 0x518c, 0x6d4b, 0x5c42, 0x8e6d, 0x63d2, 0x53c9, 0x832c, 0x8336,
01295 0x67e5, 0x78b4, 0x643d, 0x5bdf, 0x5c94, 0x5dee, 0x8be7, 0x62c6,
01296 0x67f4, 0x8c7a, 0x6400, 0x63ba, 0x8749, 0x998b, 0x8c17, 0x7f20,
01297 0x94f2, 0x4ea7, 0x9610, 0x98a4, 0x660c, 0x7316,
01298 /* 0xb3 */
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01300 0x77f5, 0x77f7, 0x77f9, 0x77fa, 0x77fb, 0x77fc, 0x7803, 0x7804,
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01306 0x784f, 0x7851, 0x7853, 0x7854, 0x7858, 0x7859, 0x785a, 0x785b,
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01310 0x787b, 0x787d, 0x787e, 0x787f, 0x7880, 0x7881, 0x7882, 0x7883,
01311 0x573a, 0x5c1d, 0x5e38, 0x957f, 0x507f, 0x80a0, 0x5382, 0x655e,
01312 0x7545, 0x5531, 0x5021, 0x8d85, 0x6284, 0x949e, 0x671d, 0x5632,
01313 0x6f6e, 0x5de2, 0x5435, 0x7092, 0x8f66, 0x626f, 0x64a4, 0x63a3,
01314 0x5f7b, 0x6f88, 0x90f4, 0x81e3, 0x8fb0, 0x5c18, 0x6668, 0x5ff1,
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01316 0x6210, 0x5448, 0x4e58, 0x7a0b, 0x60e9, 0x6f84, 0x8bda, 0x627f,
01317 0x901e, 0x9a8b, 0x79e4, 0x5403, 0x75f4, 0x6301, 0x5319, 0x6c60,
01318 0x8fdf, 0x5f1b, 0x9a70, 0x803b, 0x9ff7, 0x4f88, 0x5c3a, 0x8d64,
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01320 0x62bd, 0x916c, 0x7574, 0x8e0c, 0x7a20, 0x6101, 0x7b79, 0x4ec7,
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01322 0x8e87, 0x9504, 0x96cf, 0x6ec1, 0x9664, 0x695a,
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01329 0x78c6, 0x78c7, 0x78c8, 0x78cc, 0x78cd, 0x78ce, 0x78cf, 0x78d1,
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01336 0x7840, 0x50a8, 0x77d7, 0x6410, 0x89e6, 0x5904, 0x63e3, 0x5ddd,
01337 0x7a7f, 0x693d, 0x4f20, 0x8239, 0x5598, 0x4e32, 0x75ae, 0x7a97,
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01344 0x7601, 0x7cb9, 0x6dec, 0x7fe0, 0x6751, 0x5b58, 0x5bf8, 0x78cb,
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01369 0x6ec7, 0x7898, 0x7898, 0x70b9, 0x5178, 0x975b, 0x5743, 0x4f43,
01370 0x7538, 0x5e97, 0x60e6, 0x5960, 0x6dc0, 0x6bbf, 0x7889, 0x53fc,
01371 0x96d5, 0x51cb, 0x5201, 0x6389, 0x540a, 0x9493, 0x8c03, 0x8dcc,
01372 0x7239, 0x789f, 0x8776, 0x8fed, 0x8c0d, 0x53e0,
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01388 0x4f97, 0x606b, 0x51bb, 0x6d1e, 0x515c, 0x6296, 0x6597, 0x9661,
01389 0x8c46, 0x9017, 0x75d8, 0x90fd, 0x7763, 0x6bd2, 0x728a, 0x72ec,
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01391 0x6e21, 0x5992, 0x7aef, 0x77ed, 0x953b, 0x6bb5, 0x65ad, 0x7f0e,
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01394 0x593a, 0x579b, 0x8eb2, 0x6735, 0x8dfa, 0x8235, 0x5241, 0x60f0,
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01396 0x6076, 0x5384, 0x627c, 0x904f, 0x9102, 0x997f, 0x6069, 0x800c,
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01419 0x4e30, 0x5c01, 0x67ab, 0x8702, 0x5cf0, 0x950b, 0x98ce, 0x75af,
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01423 /* 0xb8 */
01424 0x7aa3, 0x7aa4, 0x7aa7, 0x7aa9, 0x7aaa, 0x7aab, 0x7aae, 0x7aaf,
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01454 0x7b6f, 0x7b70, 0x7b73, 0x7b74, 0x7b76, 0x7b78, 0x7b7a, 0x7b7c,
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01465 0x6cbd, 0x5b64, 0x59d1, 0x9f13, 0x53e4, 0x86ca, 0x9aa8, 0x8c37,
01466 0x80a1, 0x6545, 0x987e, 0x56fa, 0x96c7, 0x522e, 0x74dc, 0x5250,
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01535 0x7d2e, 0x7d30, 0x7d31, 0x7d32, 0x7d33, 0x7d34, 0x7d35, 0x7d36,
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01547 0x8df5, 0x8d31, 0x89c1, 0x952e, 0x7bad, 0x4ef6,
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01615 0x82db, 0x67ef, 0x68f5, 0x78d5, 0x9897, 0x79d1, 0x58f3, 0x54b3,
01616 0x53ef, 0x6e34, 0x514b, 0x523b, 0x5ba2, 0x8bfe, 0x80a4, 0x5543,
01617 0x57a6, 0x6073, 0x5751, 0x542d, 0x7a7a, 0x6050, 0x5b54, 0x63a7,
01618 0x62a0, 0x53e3, 0x6263, 0x5bc7, 0x67af, 0x54ed, 0x7a9f, 0x82e6,
01619 0x9177, 0x5e93, 0x88e4, 0x5938, 0x57ae, 0x630e, 0x8de8, 0x80ef,
01620 0x5757, 0x7b77, 0x4fa9, 0x5feb, 0x5bbd, 0x6b3e, 0x5321, 0x7b50,
01621 0x72c2, 0x6846, 0x77ff, 0x7736, 0x65f7, 0x51b5, 0x4e8f, 0x76d4,
01622 0x5cbf, 0x7aa5, 0x8475, 0x594e, 0x9b41, 0x5080,
01623 /* 0xc0 */
01624 0x7e5e, 0x7e5f, 0x7e60, 0x7e61, 0x7e62, 0x7e63, 0x7e64, 0x7e65,

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```
01625 0x7e66, 0x7e67, 0x7e68, 0x7e69, 0x7e6a, 0x7e6b, 0x7e6c, 0x7e6d,
01626 0x7e6e, 0x7e6f, 0x7e70, 0x7e71, 0x7e72, 0x7e73, 0x7e74, 0x7e75,
01627 0x7e76, 0x7e77, 0x7e78, 0x7e79, 0x7e7a, 0x7e7b, 0x7e7c, 0x7e7d,
01628 0x7e7e, 0x7e7f, 0x7e80, 0x7e81, 0x7e83, 0x7e84, 0x7e85, 0x7e86,
01629 0x7e87, 0x7e88, 0x7e89, 0x7e8a, 0x7e8b, 0x7e8c, 0x7e8d, 0x7e8e,
01630 0x7e8f, 0x7e90, 0x7e91, 0x7e92, 0x7e93, 0x7e94, 0x7e95, 0x7e96,
01631 0x7e97, 0x7e98, 0x7e99, 0x7e9a, 0x7e9c, 0x7e9d, 0x7e9e, 0x7eae,
01632 0x7eb4, 0x7ebb, 0x7ebc, 0x7ed6, 0x7ee4, 0x7eec, 0x7ef9, 0x7f0a,
01633 0x7f10, 0x7f1e, 0x7f37, 0x7f39, 0x7f3b, 0x7f3c, 0x7f3d, 0x7f3e,
01634 0x7f3f, 0x7f40, 0x7f41, 0x7f43, 0x7f46, 0x7f47, 0x7f48, 0x7f49,
01635 0x7f4a, 0x7f4b, 0x7f4c, 0x7f4d, 0x7f4e, 0x7f4f, 0x7f50, 0x7f53,
01636 0x9988, 0x6127, 0x6e83, 0x5764, 0x6606, 0x6346, 0x56f0, 0x62ec,
01637 0x6269, 0x5ed3, 0x9614, 0x5783, 0x62c9, 0x5587, 0x8721, 0x814a,
01638 0x8fa3, 0x5566, 0x83b1, 0x6765, 0x8d56, 0x84dd, 0x5a6a, 0x680f,
01639 0x62e6, 0x7bee, 0x9611, 0x5170, 0x6f9c, 0x8c30, 0x63fd, 0x89c8,
01640 0x61d2, 0x7f06, 0x70c2, 0x6ee5, 0x7405, 0x6994, 0x72fc, 0x5eca,
01641 0x90ce, 0x6717, 0x6d6a, 0x635e, 0x52b3, 0x7262, 0x8001, 0x4f6c,
01642 0x59e5, 0x916a, 0x70d9, 0x6d9d, 0x52d2, 0x4e50, 0x96f7, 0x956d,
01643 0x857e, 0x78ca, 0x7d2f, 0x5121, 0x5792, 0x64c2, 0x808b, 0x7c7b,
01644 0x6cea, 0x68f1, 0x695e, 0x51b7, 0x5398, 0x68a8, 0x7281, 0x9ece,
01645 0x7bf1, 0x72f8, 0x79bb, 0x6f13, 0x7406, 0x674e, 0x91cc, 0x9ca4,
01646 0x793c, 0x8389, 0x8354, 0x540f, 0x6817, 0x4e3d, 0x5389, 0x52b1,
01647 0x783e, 0x5386, 0x5229, 0x5088, 0x4f8b, 0x4fd0,
01648 /* 0xc1 */
01649 0x7f56, 0x7f59, 0x7f5b, 0x7f5c, 0x7f5d, 0x7f5e, 0x7f60, 0x7f63,
01650 0x7f64, 0x7f65, 0x7f66, 0x7f67, 0x7f6b, 0x7f6c, 0x7f6d, 0x7f6f,
01651 0x7f70, 0x7f73, 0x7f75, 0x7f76, 0x7f77, 0x7f78, 0x7f7a, 0x7f7b,
01652 0x7f7c, 0x7f7d, 0x7f7f, 0x7f80, 0x7f82, 0x7f83, 0x7f84, 0x7f85,
01653 0x7f86, 0x7f87, 0x7f88, 0x7f89, 0x7f8b, 0x7f8d, 0x7f8e, 0x7f90,
01654 0x7f91, 0x7f92, 0x7f93, 0x7f95, 0x7f96, 0x7f97, 0x7f98, 0x7f99,
01655 0x7f9b, 0x7f9c, 0x7fa0, 0x7fa2, 0x7fa3, 0x7fa5, 0x7fa6, 0x7fa8,
01656 0x7fa9, 0x7faa, 0x7fab, 0x7fac, 0x7fad, 0x7fae, 0x7fb1, 0x7fb3,
01657 0x7fb4, 0x7fb5, 0x7fb6, 0x7fb7, 0x7fba, 0x7fbb, 0x7fbe, 0x7fc0,
01658 0x7fc2, 0x7fc3, 0x7fc4, 0x7fc6, 0x7fc7, 0x7fc8, 0x7fc9, 0x7fcb,
01659 0x7fcd, 0x7fce, 0x7fd0, 0x7fd1, 0x7fd2, 0x7fd3, 0x7fd6, 0x7fd7,
01660 0x7fd9, 0x7fda, 0x7fdb, 0x7fdc, 0x7fdd, 0x7fde, 0x7fe2, 0x7fe3,
01661 0x75e2, 0x7acb, 0x7c92, 0x6ca5, 0x96b6, 0x529b, 0x7483, 0x54e9,
01662 0x4fe9, 0x8054, 0x83b2, 0x8fde, 0x9570, 0x5ec9, 0x601c, 0x6d9f,
01663 0x5e18, 0x655b, 0x8138, 0x94fe, 0x604b, 0x70bc, 0x7ec3, 0x7cae,
01664 0x51c9, 0x6881, 0x7cb1, 0x826f, 0x4e24, 0x8f86, 0x91cf, 0x667e,
01665 0x4eae, 0x8c05, 0x64a9, 0x804a, 0x50da, 0x7597, 0x71ce, 0x5be5,
01666 0x8fbd, 0x6f6b, 0x4e86, 0x6482, 0x9563, 0x5ed6, 0x6599, 0x5217,
01667 0x88c2, 0x70c8, 0x52a3, 0x730e, 0x7433, 0x6797, 0x78f7, 0x9716,
01668 0x4e34, 0x90bb, 0x9cde, 0x6dcb, 0x51db, 0x8d41, 0x541d, 0x62ce,
01669 0x73b2, 0x83f1, 0x83f1, 0x96f6, 0x9f84, 0x94c3, 0x4f36, 0x7f9a, 0x51cc,
01670 0x7075, 0x9675, 0x5cad, 0x9886, 0x53e6, 0x4ee4, 0x6e9c, 0x7409,
01671 0x69b4, 0x786b, 0x998f, 0x7559, 0x5218, 0x7624, 0x6d41, 0x67f3,
01672 0x516d, 0x9f99, 0x804b, 0x5499, 0x7b3c, 0x7abf,
01673 /* 0xc2 */
01674 0x7fe4, 0x7fe7, 0x7fe8, 0x7fea, 0x7feb, 0x7fec, 0x7fed, 0x7fef,
01675 0x7ff2, 0x7ff4, 0x7ff5, 0x7ff6, 0x7ff7, 0x7ff8, 0x7ff9, 0x7ffa,
01676 0x7ffd, 0x7ffe, 0x7fff, 0x8002, 0x8007, 0x8008, 0x8009, 0x800a,
01677 0x800e, 0x800f, 0x8011, 0x8013, 0x801a, 0x801b, 0x801d, 0x801e,
01678 0x801f, 0x8021, 0x8023, 0x8024, 0x802b, 0x802c, 0x802d, 0x802e,
01679 0x802f, 0x8030, 0x8032, 0x8034, 0x8039, 0x803a, 0x803c, 0x803e,
01680 0x8040, 0x8041, 0x8044, 0x8045, 0x8047, 0x8048, 0x8049, 0x804e,
01681 0x804f, 0x8051, 0x8051, 0x8053, 0x8055, 0x8056, 0x8057, 0x8059,
01682 0x805b, 0x805c, 0x805d, 0x805e, 0x805f, 0x8060, 0x8061, 0x8062,
01683 0x8063, 0x8064, 0x8065, 0x8066, 0x8067, 0x8068, 0x806b, 0x806c,
01684 0x806d, 0x806e, 0x806f, 0x8070, 0x8072, 0x8073, 0x8074, 0x8075,
01685 0x8076, 0x8077, 0x8078, 0x8079, 0x807a, 0x807b, 0x807c, 0x807d,
01686 0x9686, 0x5784, 0x62e2, 0x9647, 0x697c, 0x5a04, 0x6402, 0x7bd3,
01687 0x6f0f, 0x964b, 0x82a6, 0x5362, 0x9885, 0x5e90, 0x7089, 0x63b3,
01688 0x5364, 0x864f, 0x9c81, 0x9e93, 0x788c, 0x9732, 0x8def, 0x8d42,
01689 0x9e7f, 0x6f5e, 0x7984, 0x5f55, 0x9646, 0x622e, 0x9a74, 0x5415,
01690 0x94dd, 0x4fa3, 0x65c5, 0x5c65, 0x5c61, 0x7f15, 0x8651, 0x6c2f,
01691 0x5f8b, 0x7387, 0x6ee4, 0x7eff, 0x5ce6, 0x631b, 0x5b6a, 0x6ee6,
01692 0x5375, 0x4e71, 0x63a0, 0x7565, 0x62a1, 0x8f6e, 0x4f26, 0x4ed1,
01693 0x6ca6, 0x7eb6, 0x8bba, 0x841d, 0x87ba, 0x7f57, 0x903b, 0x9523,
01694 0x7ba9, 0x9aa1, 0x88f8, 0x843d, 0x6d1b, 0x9a86, 0x7edc, 0x5988,
01695 0x9ebb, 0x739b, 0x7801, 0x8682, 0x9a6c, 0x9a82, 0x561b, 0x5417,
01696 0x57cb, 0x4e70, 0x9ea6, 0x5356, 0x8fc8, 0x8109, 0x7792, 0x9992,
01697 0x86ee, 0x6ee1, 0x8513, 0x66fc, 0x6162, 0x6f2b,
01698 /* 0xc3 */
01699 0x807e, 0x8081, 0x8082, 0x8085, 0x8088, 0x808a, 0x808d, 0x808e,
01700 0x808f, 0x8090, 0x8091, 0x8092, 0x8094, 0x8095, 0x8097, 0x8099,
01701 0x809e, 0x80a3, 0x80a6, 0x80a7, 0x80a8, 0x80ac, 0x80b0, 0x80b3,
01702 0x80b5, 0x80b6, 0x80b8, 0x80b9, 0x80bb, 0x80c5, 0x80c7, 0x80c8,
01703 0x80c9, 0x80ca, 0x80cb, 0x80cf, 0x80d0, 0x80d1, 0x80d2, 0x80d3,
01704 0x80d4, 0x80d5, 0x80d8, 0x80df, 0x80e0, 0x80e2, 0x80e3, 0x80e6,
01705 0x80ee, 0x80f5, 0x80f7, 0x80f9, 0x80fb, 0x80fe, 0x80ff, 0x8100,
01706 0x8101, 0x8103, 0x8104, 0x8105, 0x8107, 0x8108, 0x810b, 0x810c,
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01708 0x8121, 0x8122, 0x8123, 0x8124, 0x8125, 0x8126, 0x8127, 0x8128,
01709 0x8129, 0x812a, 0x812b, 0x812d, 0x812e, 0x8130, 0x8133, 0x8134,
01710 0x8135, 0x8137, 0x8139, 0x813a, 0x813b, 0x813c, 0x813d, 0x813f,
01711 0x8c29, 0x8292, 0x832b, 0x76f2, 0x6c13, 0x5fd9, 0x83bd, 0x732b,
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01712 0x8305, 0x951a, 0x6bdb, 0x77db, 0x94c6, 0x536f, 0x8302, 0x5192,
01713 0x5e3d, 0x8c8c, 0x8d38, 0x4e48, 0x73ab, 0x679a, 0x6885, 0x9176,
01714 0x9709, 0x7164, 0x6ca1, 0x7709, 0x5a92, 0x9541, 0x6bcf, 0x7f8e,
01715 0x6627, 0x5bd0, 0x59b9, 0x5a9a, 0x95e8, 0x95f7, 0x4eec, 0x840c,
01716 0x8499, 0x6aac, 0x76df, 0x9530, 0x731b, 0x68a6, 0x5b5f, 0x772f,
01717 0x919a, 0x9761, 0x7cdc, 0x8ff7, 0x8c1c, 0x5f25, 0x7c73, 0x79d8,
01718 0x89c5, 0x6ccc, 0x871c, 0x5bc6, 0x5e42, 0x68c9, 0x7720, 0x7ef5,
01719 0x5195, 0x514d, 0x52c9, 0x5a29, 0x7f05, 0x9762, 0x82d7, 0x63cf,
01720 0x7784, 0x85d0, 0x79d2, 0x6e3a, 0x5e99, 0x5999, 0x8511, 0x706d,
01721 0x6c11, 0x62bf, 0x76bf, 0x654f, 0x60af, 0x95fd, 0x660e, 0x879f,
01722 0x9e23, 0x94ed, 0x540d, 0x547d, 0x8c2c, 0x6478,
01723 /* 0xc4 */
01724 0x8140, 0x8141, 0x8142, 0x8143, 0x8144, 0x8145, 0x8147, 0x8149,
01725 0x814d, 0x814e, 0x814f, 0x8152, 0x8156, 0x8157, 0x8158, 0x815b,
01726 0x815c, 0x815d, 0x815e, 0x815f, 0x8161, 0x8162, 0x8163, 0x8164,
01727 0x8166, 0x8168, 0x816a, 0x816b, 0x816c, 0x816f, 0x8172, 0x8173,
01728 0x8175, 0x8176, 0x8177, 0x8178, 0x8181, 0x8183, 0x8184, 0x8185,
01729 0x8186, 0x8187, 0x818f, 0x8189, 0x818b, 0x818c, 0x818e, 0x8190,
01730 0x8192, 0x8193, 0x8194, 0x8195, 0x8196, 0x8197, 0x8199, 0x819a,
01731 0x819e, 0x819f, 0x81a0, 0x81a1, 0x81a2, 0x81a4, 0x81a5, 0x81a7,
01732 0x81a9, 0x81ab, 0x81ac, 0x81ad, 0x81ae, 0x81af, 0x81b0, 0x81b1,
01733 0x81b2, 0x81b4, 0x81b5, 0x81b6, 0x81b7, 0x81b8, 0x81b9, 0x81bc,
01734 0x81bd, 0x81be, 0x81bf, 0x81c4, 0x81c5, 0x81c7, 0x81c8, 0x81c9,
01735 0x81cb, 0x81cd, 0x81ce, 0x81cf, 0x81d0, 0x81d1, 0x81d2, 0x81d3,
01736 0x6479, 0x8611, 0x6a21, 0x819c, 0x78e8, 0x6469, 0x9b54, 0x62b9,
01737 0x672b, 0x83ab, 0x58a8, 0x9ed8, 0x6cab, 0x6f20, 0x5bde, 0x964c,
01738 0x8c0b, 0x725f, 0x67d0, 0x62c7, 0x7261, 0x4ea9, 0x59c6, 0x6bcd,
01739 0x5893, 0x66ae, 0x5e55, 0x52df, 0x6155, 0x6728, 0x76ee, 0x7766,
01740 0x7267, 0x7a46, 0x62ff, 0x54ea, 0x5450, 0x94a0, 0x90a3, 0x5a1c,
01741 0x7eb3, 0x6c16, 0x4e43, 0x5976, 0x8010, 0x5948, 0x5357, 0x7537,
01742 0x96be, 0x56ca, 0x6320, 0x8111, 0x607c, 0x95f9, 0x6dd6, 0x5462,
01743 0x9981, 0x5185, 0x5ae9, 0x80fd, 0x59ae, 0x9713, 0x502a, 0x6ce5,
01744 0x5c3c, 0x62df, 0x4f60, 0x533f, 0x817b, 0x9006, 0x6eba, 0x852b,
01745 0x62c8, 0x5e74, 0x78be, 0x64b5, 0x637b, 0x5ff5, 0x5a18, 0x917f,
01746 0x9e1f, 0x5c3f, 0x634f, 0x8042, 0x5b7d, 0x556e, 0x954a, 0x954d,
01747 0x6d85, 0x60a8, 0x67e0, 0x72de, 0x51dd, 0x5b81,
01748 /* 0xc5 */
01749 0x81d4, 0x81d5, 0x81d6, 0x81d7, 0x81d8, 0x81d9, 0x81da, 0x81db,
01750 0x81dc, 0x81dd, 0x81de, 0x81df, 0x81e0, 0x81e1, 0x81e2, 0x81e4,
01751 0x81e5, 0x81e6, 0x81e8, 0x81e9, 0x81eb, 0x81ee, 0x81ef, 0x81f0,
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01754 0x820e, 0x820f, 0x8211, 0x8213, 0x8215, 0x8216, 0x8217, 0x8218,
01755 0x8219, 0x821a, 0x821d, 0x8220, 0x8224, 0x8225, 0x8226, 0x8227,
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01765 0x5e15, 0x6015, 0x7436, 0x62cd, 0x6392, 0x724c, 0x5f98, 0x6e43,
01766 0x6d3e, 0x6500, 0x6f58, 0x76d8, 0x78d0, 0x76fc, 0x7554, 0x5224,
01767 0x53db, 0x4e53, 0x5e9e, 0x65c1, 0x802a, 0x80d6, 0x629b, 0x5486,
01768 0x5228, 0x70ae, 0x888d, 0x8dd1, 0x6ce1, 0x5478, 0x80da, 0x57f9,
01769 0x88f4, 0x8d54, 0x966a, 0x914d, 0x4f69, 0x6c9b, 0x55b7, 0x76c6,
01770 0x7830, 0x62a8, 0x70f9, 0x6f8e, 0x5f6d, 0x84ec, 0x68da, 0x787c,
01771 0x7bf7, 0x81a8, 0x670b, 0x9e4f, 0x6367, 0x78b0, 0x576f, 0x7812,
01772 0x9739, 0x6279, 0x62ab, 0x5288, 0x7435, 0x6bd7,
01773 /* 0xc6 */
01774 0x826a, 0x826b, 0x826c, 0x826d, 0x8271, 0x8275, 0x8276, 0x8277,
01775 0x8278, 0x827b, 0x827c, 0x8280, 0x8281, 0x8283, 0x8285, 0x8286,
01776 0x8287, 0x8289, 0x828c, 0x8290, 0x8293, 0x8294, 0x8295, 0x8296,
01777 0x829a, 0x829b, 0x829e, 0x82a0, 0x82a2, 0x82a3, 0x82a7, 0x82b2,
01778 0x82b5, 0x82b6, 0x82ba, 0x82bb, 0x82bc, 0x82bf, 0x82c0, 0x82c2,
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01780 0x82dd, 0x82e2, 0x82e7, 0x82e8, 0x82e9, 0x82ea, 0x82ec, 0x82ed,
01781 0x82ee, 0x82f0, 0x82f2, 0x82f3, 0x82f5, 0x82f6, 0x82f8, 0x82fa,
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01785 0x8329, 0x832a, 0x832e, 0x832e, 0x8330, 0x8332, 0x8337, 0x833b, 0x833d,
01786 0x5564, 0x813e, 0x75b2, 0x76ae, 0x5339, 0x75de, 0x50fb, 0x5c41,
01787 0x8b6c, 0x7bc7, 0x504f, 0x7247, 0x9a97, 0x98d8, 0x6f02, 0x74e2,
01788 0x7968, 0x6487, 0x77a5, 0x62fc, 0x9891, 0x8d2b, 0x54c1, 0x8058,
01789 0x4e52, 0x576a, 0x82f9, 0x840d, 0x5e73, 0x51ed, 0x74f6, 0x8bc4,
01790 0x5c4f, 0x5761, 0x6cfc, 0x9887, 0x5a46, 0x7834, 0x9b44, 0x8feb,
01791 0x7c95, 0x5256, 0x6251, 0x94fa, 0x4ec6, 0x8386, 0x8461, 0x83e9,
01792 0x84b2, 0x57d4, 0x6734, 0x5703, 0x666e, 0x6d66, 0x8c31, 0x66dd,
01793 0x7011, 0x671f, 0x6b3a, 0x6816, 0x621a, 0x59bb, 0x4e03, 0x51c4,
01794 0x6f06, 0x67d2, 0x6c8f, 0x5176, 0x68cb, 0x5947, 0x6b67, 0x7566,
01795 0x5d0e, 0x8110, 0x9f50, 0x65d7, 0x7948, 0x7941, 0x9a91, 0x8d77,
01796 0x5c82, 0x4e5e, 0x4f01, 0x542f, 0x5951, 0x780c, 0x5668, 0x6c14,
01797 0x8fc4, 0x5f03, 0x6c7d, 0x6ce3, 0x8bab, 0x6390,
01798 /* 0xc7 */

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01801 0x8358, 0x8359, 0x835d, 0x8362, 0x8370, 0x8371, 0x8372, 0x8373,
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01805 0x8397, 0x8399, 0x839a, 0x839d, 0x839f, 0x83a1, 0x83a2, 0x83a3,
01806 0x83a4, 0x83a5, 0x83a6, 0x83a7, 0x83ac, 0x83ad, 0x83ae, 0x83af,
01807 0x83b5, 0x83bb, 0x83be, 0x83bf, 0x83c2, 0x83c3, 0x83c4, 0x83c6,
01808 0x83c8, 0x83c9, 0x83cb, 0x83cd, 0x83ce, 0x83d0, 0x83d1, 0x83d2,
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01810 0x83e3, 0x83e4, 0x83e6, 0x83e7, 0x83e8, 0x83eb, 0x83ec, 0x83ed,
01811 0x6070, 0x6d3d, 0x7275, 0x6266, 0x948e, 0x94c5, 0x5343, 0x8fc1,
01812 0x7b7e, 0x4edf, 0x8c26, 0x4e7e, 0x9ed4, 0x94b1, 0x94b3, 0x524d,
01813 0x6f5c, 0x9063, 0x6d45, 0x8c34, 0x5811, 0x5d4c, 0x6b20, 0x6b49,
01814 0x67aa, 0x545b, 0x8154, 0x7f8c, 0x5899, 0x8537, 0x5f3a, 0x62a2,
01815 0x6a47, 0x9539, 0x6572, 0x6084, 0x6865, 0x77a7, 0x4e54, 0x4fa8,
01816 0x5de7, 0x9798, 0x64ac, 0x7fd8, 0x5ced, 0x4fcf, 0x7a8d, 0x5207,
01817 0x8304, 0x4e14, 0x602f, 0x7a83, 0x94a6, 0x4fb5, 0x4eb2, 0x79e6,
01818 0x7434, 0x52e4, 0x82b9, 0x64d2, 0x79bd, 0x5bdd, 0x6c81, 0x9752,
01819 0x8f7b, 0x6c22, 0x6c22, 0x503e, 0x537f, 0x6e05, 0x64ce, 0x6674, 0x6c30,
01820 0x60c5, 0x9877, 0x8bf7, 0x5e86, 0x743c, 0x7a77, 0x79cb, 0x4e18,
01821 0x90b1, 0x7403, 0x6c42, 0x56da, 0x914b, 0x6cc5, 0x8d8b, 0x533a,
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01823 /* 0xc8 */
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01825 0x83fb, 0x83fc, 0x83fe, 0x83ff, 0x8400, 0x8402, 0x8405, 0x8407,
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01835 0x846f, 0x8470, 0x8472, 0x8474, 0x8477, 0x8479, 0x847b, 0x847c,
01836 0x53d6, 0x5a36, 0x9f8b, 0x8da3, 0x53bb, 0x5708, 0x98a7, 0x6743,
01837 0x919b, 0x6cc9, 0x5168, 0x75ca, 0x62f3, 0x72ac, 0x5238, 0x52d9,
01838 0x7f3a, 0x7094, 0x7638, 0x5374, 0x9e4a, 0x69b7, 0x786e, 0x96c0,
01839 0x88d9, 0x7fa4, 0x7136, 0x71c3, 0x5189, 0x67d3, 0x74e4, 0x58e4,
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01843 0x8363, 0x878d, 0x7194, 0x6eb6, 0x5bb9, 0x7ed2, 0x5197, 0x63c9,
01844 0x67d4, 0x8089, 0x8339, 0x8815, 0x5112, 0x5b7a, 0x5982, 0x8fb1,
01845 0x4e73, 0x6c5d, 0x5165, 0x8925, 0x8f6f, 0x962e, 0x854a, 0x745e,
01846 0x9510, 0x95f0, 0x6da6, 0x82e5, 0x5f31, 0x6492, 0x6d12, 0x8428,
01847 0x816e, 0x9cc3, 0x585e, 0x8d5b, 0x4e09, 0x53c1,
01848 /* 0xc9 */
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01866 0x7f2e, 0x5892, 0x4f24, 0x5546, 0x8d4f, 0x664c, 0x4e0a, 0x5c1a,
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01869 0x820d, 0x8d66, 0x6444, 0x5c04, 0x6151, 0x6d89, 0x793e, 0x8bbe,
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01873 /* 0xca */
01874 0x8503, 0x8504, 0x8505, 0x8506, 0x8507, 0x8508, 0x8509, 0x850a,
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01888 0x65f6, 0x4ec0, 0x98df, 0x8680, 0x5b9e, 0x8bc6, 0x53f2, 0x77e2,
01889 0x4f7f, 0x5c4e, 0x9a76, 0x59cb, 0x5f0f, 0x793a, 0x58eb, 0x4e16,
01890 0x67ff, 0x4e8b, 0x62ed, 0x8a93, 0x901d, 0x52bf, 0x662f, 0x55dc,
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01892 0x6043, 0x5ba4, 0x89c6, 0x8bd5, 0x6536, 0x624b, 0x9996, 0x5b88,
01893 0x5bff, 0x6388, 0x552e, 0x53d7, 0x7626, 0x517d, 0x852c, 0x67a2,
01894 0x68b3, 0x6b8a, 0x6292, 0x8f93, 0x53d4, 0x8212, 0x6dd1, 0x758f,
01895 0x4e66, 0x8d4e, 0x5b70, 0x719f, 0x85af, 0x6691, 0x66d9, 0x7f72,
01896 0x8700, 0x9ecd, 0x9f20, 0x5c5e, 0x672f, 0x8ff0, 0x6811, 0x675f,
01897 0x620d, 0x7ad6, 0x5885, 0x5eb6, 0x6570, 0x6f31,
01898 /* 0xcb */
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01905 0x85c0, 0x85c2, 0x85c3, 0x85c4, 0x85c5, 0x85c6, 0x85c7, 0x85c8,
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01921 0x7b0b, 0x84d1, 0x68ad, 0x5506, 0x7f29, 0x7410, 0x7d22, 0x9501,
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01946 0x8711, 0x8712, 0x8713, 0x8714, 0x8715, 0x8716, 0x8717, 0x8718,
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01948 /* 0xcd */
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01966 0x875f, 0x8760, 0x8761, 0x8762, 0x8763, 0x8764, 0x8765, 0x8766,
01967 0x8767, 0x8768, 0x8769, 0x876a, 0x876b, 0x876c, 0x876d, 0x876e,
01968 0x876f, 0x8770, 0x8771, 0x8772, 0x8773, 0x8774, 0x8775, 0x8776,
01969 0x8777, 0x8778, 0x8779, 0x877a, 0x877b, 0x877c, 0x877d, 0x877e,
01970 0x877f, 0x8780, 0x8781, 0x8782, 0x8783, 0x8784, 0x8785, 0x8786,
01971 0x8787, 0x8788, 0x8789, 0x878a, 0x878b, 0x878c, 0x878d, 0x878e,
01972 0x878f, 0x8790, 0x8791, 0x8792, 0x8793, 0x8794, 0x8795, 0x8796,
```

```
01973 /* 0xce */
01974 0x8719, 0x871b, 0x871d, 0x871f, 0x8720, 0x8724, 0x8726, 0x8727,
01975 0x8728, 0x872a, 0x872b, 0x872c, 0x872d, 0x872f, 0x8730, 0x8732,
01976 0x8733, 0x8735, 0x8736, 0x8738, 0x8739, 0x873a, 0x873c, 0x873d,
01977 0x8740, 0x8741, 0x8742, 0x8743, 0x8744, 0x8745, 0x8746, 0x874a,
01978 0x874b, 0x874d, 0x874f, 0x8750, 0x8751, 0x8752, 0x8754, 0x8755,
01979 0x8756, 0x8758, 0x875a, 0x875b, 0x875c, 0x875d, 0x875e, 0x875f,
01980 0x8761, 0x8762, 0x8766, 0x8767, 0x8768, 0x8769, 0x876a, 0x876b,
01981 0x876c, 0x876d, 0x876f, 0x8771, 0x8772, 0x8773, 0x8775, 0x8777,
01982 0x8778, 0x8779, 0x877a, 0x877f, 0x8780, 0x8781, 0x8784, 0x8786,
01983 0x8787, 0x8789, 0x878a, 0x878c, 0x878e, 0x878f, 0x8790, 0x8791,
01984 0x8792, 0x8794, 0x8795, 0x8796, 0x8798, 0x8799, 0x879a, 0x879b,
01985 0x879c, 0x879d, 0x879e, 0x87a0, 0x87a1, 0x87a2, 0x87a3, 0x87a4,
01986 0x5dcd, 0x5fae, 0x5371, 0x97e6, 0x8fdd, 0x6845, 0x56f4, 0x552f,
01987 0x60df, 0x4e3a, 0x6f4d, 0x7ef4, 0x82c7, 0x840e, 0x59d4, 0x4f1f,
01988 0x4f2a, 0x5c3e, 0x7eac, 0x672a, 0x851a, 0x5473, 0x754f, 0x80c3,
01989 0x5582, 0x9b4f, 0x4f4d, 0x6e2d, 0x8c13, 0x5c09, 0x6170, 0x536b,
01990 0x761f, 0x6e29, 0x6e29, 0x868a, 0x6587, 0x95fb, 0x7eb9, 0x543b,
01991 0x7d0a, 0x95ee, 0x55e1, 0x7fc1, 0x74ee, 0x631d, 0x8717, 0x6da1,
01992 0x7a9d, 0x6211, 0x65a1, 0x5367, 0x63e1, 0x6c83, 0x5deb, 0x545c,
01993 0x94a8, 0x4e4c, 0x87c9, 0x8c61, 0x8bec, 0x5c4b, 0x65e0, 0x829c, 0x68a7,
01994 0x543e, 0x5434, 0x6bcb, 0x6b66, 0x4e94, 0x6342, 0x5348, 0x821e,
01995 0x4f0d, 0x4fae, 0x575e, 0x620a, 0x96fe, 0x6664, 0x7269, 0x52ff,
01996 0x52a1, 0x609f, 0x8bef, 0x6614, 0x7199, 0x6790, 0x897f, 0x7852,
01997 0x77fd, 0x6670, 0x563b, 0x5438, 0x9521, 0x727a,
01998 /* 0xcf */
01999 0x87a5, 0x87a6, 0x87a7, 0x87a9, 0x87aa, 0x87ae, 0x87b0, 0x87b1,
02000 0x87b2, 0x87b4, 0x87b6, 0x87b7, 0x87b8, 0x87b9, 0x87bb, 0x87bc,
02001 0x87be, 0x87bf, 0x87c1, 0x87c2, 0x87c3, 0x87c4, 0x87c5, 0x87c7,
02002 0x87c8, 0x87c9, 0x87cc, 0x87cd, 0x87ce, 0x87cf, 0x87d0, 0x87d4,
02003 0x87d5, 0x87d6, 0x87d7, 0x87d8, 0x87d9, 0x87da, 0x87dc, 0x87dd,
02004 0x87de, 0x87df, 0x87e1, 0x87e2, 0x87e3, 0x87e4, 0x87e6, 0x87e7,
02005 0x87e8, 0x87e9, 0x87eb, 0x87ec, 0x87ed, 0x87ef, 0x87f0, 0x87f1,
02006 0x87f2, 0x87f3, 0x87f4, 0x87f5, 0x87f6, 0x87f7, 0x87f8, 0x87fa,
02007 0x87fb, 0x87fc, 0x87fd, 0x87ff, 0x8800, 0x8801, 0x8802, 0x8804,
02008 0x8805, 0x8806, 0x8807, 0x8808, 0x8809, 0x880b, 0x880c, 0x880d,
02009 0x880e, 0x880f, 0x8810, 0x8811, 0x8812, 0x8814, 0x8817, 0x8818,
02010 0x8819, 0x881a, 0x881c, 0x881d, 0x881e, 0x881f, 0x8820, 0x8823,
02011 0x7a00, 0x606f, 0x5e0c, 0x6089, 0x819d, 0x5915, 0x60dc, 0x7184,
02012 0x70ef, 0x6eaa, 0x6c50, 0x7280, 0x6a84, 0x88ad, 0x5e2d, 0x4e60,
02013 0x5ab3, 0x559c, 0x94e3, 0x6d17, 0x7cfb, 0x9699, 0x620f, 0x7ec6,
02014 0x778e, 0x867e, 0x5323, 0x971e, 0x8f96, 0x6687, 0x5ce1, 0x4fa0,
02015 0x72ed, 0x4e0b, 0x53a6, 0x590f, 0x5413, 0x6380, 0x9528, 0x5148,
02016 0x4ed9, 0x9c9c, 0x7ea4, 0x54b8, 0x8d24, 0x8854, 0x8237, 0x95f2,
02017 0x6d8e, 0x5f26, 0x5acc, 0x663e, 0x9669, 0x73b0, 0x732e, 0x53bf,
02018 0x817a, 0x9985, 0x7fa1, 0x5baa, 0x9677, 0x9650, 0x7ebf, 0x76f8,
02019 0x53a2, 0x9576, 0x9999, 0x7bb1, 0x8944, 0x6e58, 0x4e61, 0x7fd4,
02020 0x7965, 0x8be6, 0x60f3, 0x54cd, 0x4eab, 0x9879, 0x5df7, 0x6a61,
02021 0x50cf, 0x5411, 0x8c61, 0x8427, 0x785d, 0x9704, 0x524a, 0x54ee,
02022 0x56a3, 0x9500, 0x6d88, 0x5bb5, 0x6dc6, 0x6653,
02023 /* 0xd0 */
02024 0x8824, 0x8825, 0x8826, 0x8827, 0x8828, 0x8829, 0x882a, 0x882b,
02025 0x882c, 0x882d, 0x882e, 0x882f, 0x8830, 0x8831, 0x8833, 0x8834,
02026 0x8835, 0x8836, 0x8837, 0x8838, 0x883a, 0x883b, 0x883d, 0x883e,
02027 0x883f, 0x8841, 0x8842, 0x8843, 0x8844, 0x8847, 0x8848, 0x8849,
02028 0x884a, 0x884b, 0x884e, 0x884f, 0x8850, 0x8851, 0x8852, 0x8853,
02029 0x8855, 0x8856, 0x8858, 0x885a, 0x885b, 0x885c, 0x885d, 0x885e,
02030 0x885f, 0x8860, 0x8866, 0x8867, 0x886a, 0x886d, 0x886f, 0x8871,
02031 0x8873, 0x8874, 0x8875, 0x8876, 0x8878, 0x8879, 0x887a, 0x887b,
02032 0x887c, 0x8880, 0x8883, 0x8886, 0x8887, 0x8889, 0x888a, 0x888c,
02033 0x888e, 0x888f, 0x8890, 0x8891, 0x8893, 0x8894, 0x8895, 0x8897,
02034 0x8898, 0x8899, 0x889a, 0x889b, 0x889d, 0x889e, 0x889f, 0x88a0,
02035 0x88a1, 0x88a3, 0x88a5, 0x88a6, 0x88a7, 0x88a8, 0x88a9, 0x88aa,
02036 0x5c0f, 0x5b5d, 0x6821, 0x8096, 0x5578, 0x7b11, 0x6548, 0x6954,
02037 0x4e9b, 0x6b47, 0x874e, 0x978b, 0x534f, 0x631f, 0x643a, 0x90aa,
02038 0x659c, 0x80c1, 0x8c10, 0x5199, 0x68b0, 0x5378, 0x87f9, 0x61c8,
02039 0x6cc4, 0x6cfd, 0x8c22, 0x5c51, 0x85aa, 0x82af, 0x950c, 0x6b23,
02040 0x8f9b, 0x65b0, 0x5fffb, 0x5fc3, 0x4fe1, 0x8845, 0x661f, 0x8165,
02041 0x7329, 0x60fa, 0x5174, 0x5211, 0x578b, 0x5f62, 0x90a2, 0x884c,
02042 0x9192, 0x5e78, 0x674f, 0x6027, 0x59d3, 0x5144, 0x51f6, 0x80f8,
02043 0x5308, 0x6c79, 0x96c4, 0x718a, 0x4f11, 0x4fee, 0x7f9e, 0x67d3,
02044 0x55c5, 0x9508, 0x79c0, 0x8896, 0x7ee3, 0x589f, 0x620c, 0x9700,
02045 0x865a, 0x5618, 0x987b, 0x5f90, 0x8bb8, 0x84c4, 0x9157, 0x53d9,
02046 0x65ed, 0x5e8f, 0x755c, 0x6064, 0x7d6e, 0x5a7f, 0x7eea, 0x7eed,
02047 0x8f69, 0x55a7, 0x5ba3, 0x60ac, 0x65cb, 0x7384,
02048 /* 0xd1 */
02049 0x88ac, 0x88ae, 0x88af, 0x88b0, 0x88b2, 0x88b3, 0x88b4, 0x88b5,
02050 0x88b6, 0x88b8, 0x88b9, 0x88ba, 0x88bb, 0x88bd, 0x88be, 0x88bf,
02051 0x88c0, 0x88c3, 0x88c4, 0x88c7, 0x88c8, 0x88ca, 0x88cb, 0x88cc,
02052 0x88cd, 0x88cf, 0x88d0, 0x88d1, 0x88d3, 0x88d6, 0x88d7, 0x88da,
02053 0x88db, 0x88dc, 0x88dd, 0x88de, 0x88e0, 0x88e1, 0x88e6, 0x88e7,
02054 0x88e9, 0x88ea, 0x88eb, 0x88ec, 0x88ed, 0x88ee, 0x88ef, 0x88f2,
02055 0x88f5, 0x88f6, 0x88f7, 0x88fa, 0x88fb, 0x88fd, 0x88ff, 0x8900,
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02057 0x890b, 0x890c, 0x890d, 0x890e, 0x890f, 0x8911, 0x8914, 0x8915,
02058 0x8916, 0x8917, 0x8918, 0x8919, 0x891c, 0x891d, 0x891e, 0x891f, 0x8920,
02059 0x8922, 0x8923, 0x8924, 0x8926, 0x8927, 0x8928, 0x8929, 0x892c,
```

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02060 0x892d, 0x892e, 0x892f, 0x8931, 0x8932, 0x8933, 0x8935, 0x8937,
02061 0x9009, 0x7663, 0x7729, 0x7eda, 0x9774, 0x859b, 0x5b66, 0x7a74,
02062 0x96ea, 0x8840, 0x52cb, 0x718f, 0x5faa, 0x65ec, 0x8be2, 0x5fbf,
02063 0x9a6f, 0x5de1, 0x6b89, 0x6c5b, 0x8bad, 0x8baf, 0x900a, 0x8fc5,
02064 0x538b, 0x62bc, 0x9e26, 0x9e2d, 0x5440, 0x4e2b, 0x82bd, 0x7259,
02065 0x869c, 0x5d16, 0x8859, 0x6daf, 0x96c5, 0x54d1, 0x4e9a, 0x8bb6,
02066 0x7109, 0x54bd, 0x9609, 0x70df, 0x6df9, 0x76d0, 0x4e25, 0x7814,
02067 0x8712, 0x5ca9, 0x5ef6, 0x8a00, 0x989c, 0x960e, 0x708e, 0x6cbf,
02068 0x5944, 0x63a9, 0x773c, 0x884d, 0x6f14, 0x8273, 0x5830, 0x71d5,
02069 0x538c, 0x781a, 0x96c1, 0x5501, 0x5f66, 0x7130, 0x5bb4, 0x8c1a,
02070 0x9a8c, 0x6b83, 0x592e, 0x9e2f, 0x79e7, 0x6768, 0x626c, 0x4f6f,
02071 0x75a1, 0x7f8a, 0x6d0b, 0x9633, 0x6c27, 0x4ef0, 0x75d2, 0x517b,
02072 0x6837, 0x6f3e, 0x9080, 0x8170, 0x5996, 0x7476,
02073 /* 0xd2 */
02074 0x8938, 0x8939, 0x893a, 0x893b, 0x893c, 0x893d, 0x893e, 0x893f,
02075 0x8940, 0x8942, 0x8943, 0x8945, 0x8946, 0x8947, 0x8948, 0x8949,
02076 0x894a, 0x894b, 0x894c, 0x894d, 0x894e, 0x894f, 0x8950, 0x8951,
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02080 0x896d, 0x896e, 0x896f, 0x8970, 0x8971, 0x8972, 0x8973, 0x8974,
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02082 0x897e, 0x8980, 0x8982, 0x8984, 0x8985, 0x8987, 0x8988, 0x8989,
02083 0x898a, 0x898b, 0x898c, 0x898d, 0x898e, 0x898f, 0x8990, 0x8991,
02084 0x8992, 0x8993, 0x8994, 0x8995, 0x8996, 0x8997, 0x8998, 0x8999,
02085 0x899a, 0x899b, 0x899c, 0x899d, 0x899e, 0x899f, 0x89a0, 0x89a1,
02086 0x6447, 0x5c27, 0x9065, 0x7a91, 0x8c23, 0x59da, 0x54ac, 0x8200,
02087 0x836f, 0x8981, 0x8000, 0x6930, 0x564e, 0x8036, 0x7237, 0x91ce,
02088 0x51b6, 0x4e5f, 0x9875, 0x6396, 0x4e1a, 0x53f6, 0x66f3, 0x814b,
02089 0x591c, 0x6db2, 0x4e00, 0x4e00, 0x58f9, 0x533b, 0x63d6, 0x94f1, 0x4f9d,
02090 0x4f0a, 0x8863, 0x9890, 0x5937, 0x9057, 0x79fb, 0x4eea, 0x80f0,
02091 0x7591, 0x6c82, 0x5b9c, 0x59e8, 0x5f5d, 0x6905, 0x8681, 0x501a,
02092 0x5df2, 0x4e59, 0x77e3, 0x4ee5, 0x827a, 0x6291, 0x6613, 0x9091,
02093 0x5c79, 0x4ebf, 0x5f79, 0x81c6, 0x9038, 0x8084, 0x75ab, 0x4ea6,
02094 0x88d4, 0x610f, 0x6bc5, 0x5fc6, 0x4e49, 0x76ca, 0x6ea2, 0x8be3,
02095 0x8bae, 0x8c0a, 0x8bd1, 0x5f02, 0x7ffc, 0x7fcc, 0x7ece, 0x8335,
02096 0x836b, 0x56e0, 0x6bb7, 0x97f3, 0x9634, 0x59fb, 0x541f, 0x94f6,
02097 0x6deb, 0x5bc5, 0x996e, 0x5c39, 0x5f15, 0x9690,
02098 /* 0xd3 */
02099 0x89a2, 0x89a3, 0x89a4, 0x89a5, 0x89a6, 0x89a7, 0x89a8, 0x89a9,
02100 0x89aa, 0x89ab, 0x89ac, 0x89ad, 0x89ae, 0x89af, 0x89b0, 0x89b1,
02101 0x89b2, 0x89b3, 0x89b4, 0x89b5, 0x89b6, 0x89b7, 0x89b8, 0x89b9,
02102 0x89ba, 0x89bb, 0x89bc, 0x89bd, 0x89be, 0x89bf, 0x89c0, 0x89c3,
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02104 0x89dd, 0x89df, 0x89e0, 0x89e1, 0x89e2, 0x89e4, 0x89e7, 0x89e8,
02105 0x89e9, 0x89ea, 0x89ec, 0x89ed, 0x89ee, 0x89f0, 0x89f1, 0x89f2,
02106 0x89f4, 0x89f5, 0x89f6, 0x89f7, 0x89f8, 0x89f9, 0x89fa, 0x89fb,
02107 0x89fc, 0x89fd, 0x89fe, 0x89ff, 0x8a01, 0x8a02, 0x8a03, 0x8a04,
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02112 0x8424, 0x8425, 0x8367, 0x8747, 0x8fce, 0x8d62, 0x76c8, 0x5f71,
02113 0x9896, 0x786c, 0x6620, 0x54df, 0x62e5, 0x4f63, 0x81c3, 0x75c8,
02114 0x5eb8, 0x96cd, 0x8e0a, 0x86f9, 0x548f, 0x6cf3, 0x6d8c, 0x6c38,
02115 0x607f, 0x52c7, 0x7528, 0x5e7d, 0x4f18, 0x60a0, 0x5fe7, 0x5c24,
02116 0x7531, 0x90ae, 0x94c0, 0x72b9, 0x6cb9, 0x6e38, 0x9149, 0x6709,
02117 0x53cb, 0x53f3, 0x4f51, 0x91c9, 0x8bf1, 0x53c8, 0x5e7c, 0x8fc2,
02118 0x6de4, 0x4e8e, 0x76c2, 0x6986, 0x865e, 0x611a, 0x8206, 0x4f59,
02119 0x4fde, 0x903e, 0x9c7c, 0x6109, 0x6e1d, 0x6e14, 0x9685, 0x4e88,
02120 0x5a31, 0x96e8, 0x4e0e, 0x5c7f, 0x79b9, 0x5b87, 0x8bed, 0x7fbd,
02121 0x7389, 0x57df, 0x828b, 0x90c1, 0x5401, 0x9047, 0x55bb, 0x5cea,
02122 0x5fa1, 0x6108, 0x6b32, 0x72f1, 0x80b2, 0x8a89,
02123 /* 0xd4 */
02124 0x8a1e, 0x8a1f, 0x8a20, 0x8a21, 0x8a22, 0x8a23, 0x8a24, 0x8a25,
02125 0x8a26, 0x8a27, 0x8a28, 0x8a29, 0x8a2a, 0x8a2b, 0x8a2c, 0x8a2d,
02126 0x8a2e, 0x8a2f, 0x8a30, 0x8a31, 0x8a32, 0x8a33, 0x8a34, 0x8a35,
02127 0x8a36, 0x8a37, 0x8a38, 0x8a39, 0x8a3a, 0x8a3b, 0x8a3c, 0x8a3d,
02128 0x8a3f, 0x8a40, 0x8a41, 0x8a42, 0x8a43, 0x8a44, 0x8a45, 0x8a46,
02129 0x8a47, 0x8a49, 0x8a4a, 0x8a4b, 0x8a4c, 0x8a4d, 0x8a4e, 0x8a4f,
02130 0x8a50, 0x8a51, 0x8a52, 0x8a53, 0x8a54, 0x8a55, 0x8a56, 0x8a57,
02131 0x8a58, 0x8a59, 0x8a5a, 0x8a5b, 0x8a5c, 0x8a5d, 0x8a5e, 0x8a5f,
02132 0x8a60, 0x8a61, 0x8a62, 0x8a63, 0x8a64, 0x8a65, 0x8a66, 0x8a67,
02133 0x8a68, 0x8a69, 0x8a6a, 0x8a6b, 0x8a6c, 0x8a6d, 0x8a6e, 0x8a6f,
02134 0x8a70, 0x8a71, 0x8a72, 0x8a73, 0x8a74, 0x8a75, 0x8a76, 0x8a77,
02135 0x8a78, 0x8a7a, 0x8a7b, 0x8a7c, 0x8a7d, 0x8a7e, 0x8a7f, 0x8a80,
02136 0x6d74, 0x5bd3, 0x88d5, 0x88d5, 0x9884, 0x8c6b, 0x9a6d, 0x9e33, 0x6e0a,
02137 0x51a4, 0x5143, 0x57a3, 0x8881, 0x539f, 0x63f4, 0x8f95, 0x56ed,
02138 0x5458, 0x5706, 0x733f, 0x6e90, 0x7f18, 0x8fdc, 0x82d1, 0x613f,
02139 0x6028, 0x9662, 0x66f0, 0x7ea6, 0x8d8a, 0x8dc3, 0x94a5, 0x5cb3,
02140 0x7ca4, 0x6708, 0x60a6, 0x9605, 0x8018, 0x4e91, 0x90e7, 0x5300,
02141 0x9668, 0x5141, 0x8fd0, 0x8574, 0x915d, 0x6655, 0x97f5, 0x5b55,
02142 0x531d, 0x7838, 0x6742, 0x683d, 0x54c9, 0x707e, 0x5bb0, 0x8f7d,
02143 0x518d, 0x5728, 0x54b1, 0x6512, 0x6682, 0x8d5e, 0x8d43, 0x810f,
02144 0x846c, 0x906d, 0x7cdf, 0x51ff, 0x85fb, 0x67a3, 0x65e9, 0x6fa1,
02145 0x86a4, 0x8e81, 0x566a, 0x9020, 0x7682, 0x7076, 0x71e5, 0x8d23,
02146 0x62e9, 0x5219, 0x6cfd, 0x8d3c, 0x600e, 0x589e, 0x618e, 0x66fe,
```



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02147 0x8d60, 0x624e, 0x55b3, 0x6e23, 0x672d, 0x8f67,
02148 /* 0xd5 */
02149 0x8a81, 0x8a82, 0x8a83, 0x8a84, 0x8a85, 0x8a86, 0x8a87, 0x8a88,
02150 0x8a8b, 0x8a8c, 0x8a8d, 0x8a8e, 0x8a8f, 0x8a90, 0x8a91, 0x8a92,
02151 0x8a94, 0x8a95, 0x8a96, 0x8a97, 0x8a98, 0x8a99, 0x8a9a, 0x8a9b,
02152 0x8a9c, 0x8a9d, 0x8a9e, 0x8a9f, 0x8aa0, 0x8aa1, 0x8aa2, 0x8aa3,
02153 0x8aa4, 0x8aa5, 0x8aa6, 0x8aa7, 0x8aa8, 0x8aa9, 0x8aaa, 0x8aab,
02154 0x8aac, 0x8aad, 0x8aae, 0x8aaf, 0x8ab0, 0x8ab1, 0x8ab2, 0x8ab3,
02155 0x8ab4, 0x8ab5, 0x8ab6, 0x8ab7, 0x8ab8, 0x8ab9, 0x8aba, 0x8abb,
02156 0x8abc, 0x8abd, 0x8abe, 0x8abf, 0x8ac0, 0x8ac1, 0x8ac2, 0x8ac3,
02157 0x8ac4, 0x8ac5, 0x8ac6, 0x8ac7, 0x8ac8, 0x8ac9, 0x8aca, 0x8acb,
02158 0x8acc, 0x8acd, 0x8ace, 0x8acf, 0x8ad0, 0x8ad1, 0x8ad2, 0x8ad3,
02159 0x8ad4, 0x8ad5, 0x8ad6, 0x8ad7, 0x8ad8, 0x8ad9, 0x8ada, 0x8adb,
02160 0x8adc, 0x8add, 0x8ade, 0x8adf, 0x8ae0, 0x8ae1, 0x8ae2, 0x8ae3,
02161 0x94e1, 0x95f8, 0x7728, 0x6805, 0x69a8, 0x548b, 0x4e4d, 0x70b8,
02162 0x8bc8, 0x6458, 0x658b, 0x5b85, 0x7a84, 0x503a, 0x5be8, 0x77bb,
02163 0x6be1, 0x8a79, 0x7c98, 0x6cbe, 0x76cf, 0x65a9, 0x8f97, 0x5d2d,
02164 0x5c55, 0x8633, 0x6808, 0x5360, 0x6218, 0x7ad9, 0x6e56, 0x7efd,
02165 0x6a1f, 0x7ae0, 0x5f70, 0x6f33, 0x5f20, 0x638c, 0x6da8, 0x6756,
02166 0x4e08, 0x5e10, 0x8d26, 0x4ed7, 0x80c0, 0x7634, 0x969c, 0x62db,
02167 0x662d, 0x62f7, 0x6cbc, 0x8d75, 0x7167, 0x7f69, 0x5146, 0x8087,
02168 0x53ec, 0x906e, 0x6298, 0x54f2, 0x86f0, 0x8f99, 0x8005, 0x9517,
02169 0x8517, 0x8fd9, 0x6d59, 0x73cd, 0x659f, 0x771f, 0x7504, 0x7827,
02170 0x81fb, 0x8d1e, 0x9488, 0x4fa6, 0x6795, 0x75b9, 0x8bca, 0x9707,
02171 0x632f, 0x9547, 0x9635, 0x84b8, 0x6323, 0x7741, 0x5f81, 0x72f0,
02172 0x4e89, 0x6014, 0x6574, 0x62ef, 0x6b63, 0x653f,
02173 /* 0xd6 */
02174 0x8ae4, 0x8ae5, 0x8ae6, 0x8ae7, 0x8ae8, 0x8ae9, 0x8aea, 0x8aeb,
02175 0x8aec, 0x8aed, 0x8aee, 0x8aef, 0x8af0, 0x8af1, 0x8af2, 0x8af3,
02176 0x8af4, 0x8af5, 0x8af6, 0x8af7, 0x8af8, 0x8af9, 0x8afa, 0x8afb,
02177 0x8afc, 0x8afd, 0x8afe, 0x8aff, 0x8b00, 0x8b01, 0x8b02, 0x8b03,
02178 0x8b04, 0x8b05, 0x8b06, 0x8b08, 0x8b09, 0x8b0a, 0x8b0b, 0x8b0c,
02179 0x8b0d, 0x8b0e, 0x8b0f, 0x8b10, 0x8b11, 0x8b12, 0x8b13, 0x8b14,
02180 0x8b15, 0x8b16, 0x8b17, 0x8b18, 0x8b19, 0x8b1a, 0x8b1b, 0x8b1c,
02181 0x8b1d, 0x8b1e, 0x8b1f, 0x8b20, 0x8b21, 0x8b22, 0x8b23, 0x8b24,
02182 0x8b25, 0x8b27, 0x8b28, 0x8b29, 0x8b2a, 0x8b2b, 0x8b2c, 0x8b2d,
02183 0x8b2e, 0x8b2f, 0x8b30, 0x8b31, 0x8b32, 0x8b33, 0x8b34, 0x8b35,
02184 0x8b36, 0x8b37, 0x8b38, 0x8b39, 0x8b3a, 0x8b3b, 0x8b3c, 0x8b3d,
02185 0x8b3e, 0x8b3f, 0x8b40, 0x8b41, 0x8b42, 0x8b43, 0x8b44, 0x8b45,
02186 0x5e27, 0x75c7, 0x90d1, 0x8bc1, 0x829d, 0x679d, 0x652f, 0x5431,
02187 0x8718, 0x77e5, 0x80a2, 0x8102, 0x6c41, 0x4e4b, 0x7ec7, 0x804c,
02188 0x76f4, 0x690d, 0x6b96, 0x6267, 0x503c, 0x4f84, 0x5740, 0x6307,
02189 0x6b62, 0x8dbe, 0x53ea, 0x65e8, 0x7eb8, 0x5fd7, 0x631a, 0x63b7,
02190 0x81f3, 0x81f4, 0x7f6e, 0x5e1c, 0x5cd9, 0x5236, 0x667a, 0x79e9,
02191 0x7a1a, 0x8d28, 0x7099, 0x75d4, 0x6ede, 0x6cbb, 0x7a92, 0x4e2d,
02192 0x76c5, 0x5fe0, 0x949f, 0x8877, 0x7ec8, 0x79cd, 0x80bf, 0x91cd,
02193 0x4ef2, 0x4f17, 0x821f, 0x5468, 0x5dde, 0x6d32, 0x8bcc, 0x7ca5,
02194 0x8f74, 0x8098, 0x5e1a, 0x5492, 0x76b1, 0x5b99, 0x663c, 0x9aa4,
02195 0x73e0, 0x682a, 0x86db, 0x6731, 0x732a, 0x8bf8, 0x8bdb, 0x9010,
02196 0x7af9, 0x70db, 0x716e, 0x62c4, 0x77a9, 0x5631, 0x4e3b, 0x8457,
02197 0x67f1, 0x52a9, 0x86c0, 0x8d2e, 0x94f8, 0x7b51,
02198 /* 0xd7 */
02199 0x8b46, 0x8b47, 0x8b48, 0x8b49, 0x8b4a, 0x8b4b, 0x8b4c, 0x8b4d,
02200 0x8b4e, 0x8b4f, 0x8b50, 0x8b51, 0x8b52, 0x8b53, 0x8b54, 0x8b55,
02201 0x8b56, 0x8b57, 0x8b58, 0x8b59, 0x8b5a, 0x8b5b, 0x8b5c, 0x8b5d,
02202 0x8b5e, 0x8b5f, 0x8b60, 0x8b61, 0x8b62, 0x8b63, 0x8b64, 0x8b65,
02203 0x8b67, 0x8b68, 0x8b69, 0x8b6a, 0x8b6b, 0x8b6c, 0x8b6e, 0x8b6f,
02204 0x8b70, 0x8b71, 0x8b72, 0x8b73, 0x8b74, 0x8b75, 0x8b76, 0x8b77,
02205 0x8b78, 0x8b79, 0x8b7a, 0x8b7b, 0x8b7c, 0x8b7d, 0x8b7e, 0x8b7f,
02206 0x8b80, 0x8b81, 0x8b82, 0x8b83, 0x8b84, 0x8b85, 0x8b86, 0x8b87,
02207 0x8b88, 0x8b89, 0x8b8a, 0x8b8b, 0x8b8c, 0x8b8d, 0x8b8e, 0x8b8f,
02208 0x8b90, 0x8b91, 0x8b92, 0x8b93, 0x8b94, 0x8b95, 0x8b96, 0x8b97,
02209 0x8b98, 0x8b99, 0x8b9a, 0x8b9b, 0x8b9c, 0x8b9d, 0x8b9e, 0x8b9f,
02210 0x8bac, 0x8bb1, 0x8bbb, 0x8bc7, 0x8bd0, 0x8bea, 0x8c09, 0x8c1e,
02211 0x4f4f, 0x6ce8, 0x795d, 0x9a7b, 0x6293, 0x722a, 0x62f2, 0x4e13,
02212 0x7816, 0x8f6c, 0x64b0, 0x8d5a, 0x7bc6, 0x6869, 0x5e84, 0x88c5,
02213 0x5986, 0x649e, 0x58ee, 0x72b6, 0x690e, 0x9525, 0x8ffd, 0x8d58,
02214 0x5760, 0x7f00, 0x8c06, 0x51c6, 0x6349, 0x62d9, 0x5353, 0x684c,
02215 0x7422, 0x8301, 0x914c, 0x5544, 0x7740, 0x707c, 0x6d4a, 0x5179,
02216 0x54a8, 0x8d44, 0x59ff, 0x6ecb, 0x6dc4, 0x5b5c, 0x7d2b, 0x4ed4,
02217 0x7c7d, 0x6ed3, 0x5b50, 0x81ea, 0x6e0d, 0x5b57, 0x9b03, 0x68d5,
02218 0x8e2a, 0x5b97, 0x7efc, 0x603b, 0x7eb5, 0x90b9, 0x8d70, 0x594f,
02219 0x63cd, 0x79df, 0x8db3, 0x5352, 0x65cf, 0x7956, 0x8bc5, 0x963b,
02220 0x7ec4, 0x94bb, 0x7e82, 0x5634, 0x9189, 0x6700, 0x7f6a, 0x5c0a,
02221 0x9075, 0x6628, 0x5de6, 0x4f50, 0x67de, 0x505a, 0x4f5c, 0x5750,
02222 0x5ea7, 0xffff, 0xffff, 0xffff, 0xffff,
02223 /* 0xd8 */
02224 0x8c38, 0x8c39, 0x8c3a, 0x8c3b, 0x8c3c, 0x8c3d, 0x8c3e, 0x8c3f,
02225 0x8c40, 0x8c42, 0x8c43, 0x8c44, 0x8c45, 0x8c48, 0x8c4a, 0x8c4b,
02226 0x8c4d, 0x8c4e, 0x8c4f, 0x8c50, 0x8c51, 0x8c52, 0x8c53, 0x8c54,
02227 0x8c56, 0x8c57, 0x8c58, 0x8c59, 0x8c5b, 0x8c5c, 0x8c5d, 0x8c5e,
02228 0x8c5f, 0x8c60, 0x8c63, 0x8c64, 0x8c65, 0x8c66, 0x8c67, 0x8c68,
02229 0x8c69, 0x8c6c, 0x8c6d, 0x8c6e, 0x8c6f, 0x8c70, 0x8c71, 0x8c72,
02230 0x8c74, 0x8c75, 0x8c76, 0x8c77, 0x8c7b, 0x8c7c, 0x8c7d, 0x8c7e,
02231 0x8c7f, 0x8c80, 0x8c81, 0x8c83, 0x8c84, 0x8c86, 0x8c87, 0x8c88,
02232 0x8c8b, 0x8c8d, 0x8c8e, 0x8c8f, 0x8c90, 0x8c91, 0x8c92, 0x8c93,
02233 0x8c95, 0x8c96, 0x8c97, 0x8c99, 0x8c9a, 0x8c9b, 0x8c9c, 0x8c9d,
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02234 0x8c9e, 0x8c9f, 0x8ca0, 0x8ca1, 0x8ca2, 0x8ca3, 0x8ca4, 0x8ca5,
02235 0x8ca6, 0x8ca7, 0x8ca8, 0x8ca9, 0x8caa, 0x8cab, 0x8cac, 0x8cad,
02236 0x4e8d, 0x4e0c, 0x5140, 0x4e10, 0x5eff, 0x5345, 0x4e15, 0x4e98,
02237 0x4e1e, 0x9b32, 0x5b6c, 0x5669, 0x4e28, 0x79ba, 0x4e3f, 0x5315,
02238 0x4e47, 0x592d, 0x723b, 0x536e, 0x6c10, 0x56df, 0x80e4, 0x9997,
02239 0x6bd3, 0x777e, 0x9f17, 0x4e36, 0x4e9f, 0x9f10, 0x4e5c, 0x4e69,
02240 0x4e93, 0x8288, 0x5b5b, 0x556c, 0x560f, 0x4ec4, 0x538d, 0x539d,
02241 0x53a3, 0x53a5, 0x53ae, 0x9765, 0x8d5d, 0x531a, 0x53f5, 0x5326,
02242 0x532e, 0x533e, 0x8d5c, 0x5366, 0x5363, 0x5202, 0x5208, 0x520e,
02243 0x522d, 0x5233, 0x523f, 0x5240, 0x524c, 0x525e, 0x5261, 0x525c,
02244 0x84af, 0x527d, 0x5282, 0x5281, 0x5290, 0x5293, 0x5182, 0x7f54,
02245 0x4ebb, 0x4ec3, 0x4ec9, 0x4ec2, 0x4ee8, 0x4ee1, 0x4eeb, 0x4ede,
02246 0x4f1b, 0x4ef3, 0x4f22, 0x4f64, 0x4ef5, 0x4f25, 0x4f27, 0x4f09,
02247 0x4f2b, 0x4f5e, 0x4f67, 0x6538, 0x4f5a, 0x4f5d,
02248 /* 0xd9 */
02249 0x8cae, 0x8caf, 0x8cb0, 0x8cb1, 0x8cb2, 0x8cb3, 0x8cb4, 0x8cb5,
02250 0x8cb6, 0x8cb7, 0x8cb8, 0x8cb9, 0x8cba, 0x8cbb, 0x8cbc, 0x8cbd,
02251 0x8cbe, 0x8cbf, 0x8cc0, 0x8cc1, 0x8cc2, 0x8cc3, 0x8cc4, 0x8cc5,
02252 0x8cc6, 0x8cc7, 0x8cc8, 0x8cc9, 0x8cca, 0x8ccb, 0x8ccc, 0x8ccd,
02253 0x8cce, 0x8ccf, 0x8cd0, 0x8cd1, 0x8cd2, 0x8cd3, 0x8cd4, 0x8cd5,
02254 0x8cd6, 0x8cd7, 0x8cd8, 0x8cd9, 0x8cda, 0x8cdb, 0x8cdc, 0x8cdd,
02255 0x8cde, 0x8cdf, 0x8ce0, 0x8ce1, 0x8ce2, 0x8ce3, 0x8ce4, 0x8ce5,
02256 0x8ce6, 0x8ce7, 0x8ce8, 0x8ce9, 0x8cea, 0x8ceb, 0x8cec, 0x8ced,
02257 0x8cee, 0x8cef, 0x8cf0, 0x8cf1, 0x8cf2, 0x8cf3, 0x8cf4, 0x8cf5,
02258 0x8cf6, 0x8cf7, 0x8cf8, 0x8cf9, 0x8cfa, 0x8cfb, 0x8cfc, 0x8cfd,
02259 0x8cfe, 0x8cff, 0x8d00, 0x8d01, 0x8d02, 0x8d03, 0x8d04, 0x8d05,
02260 0x8d06, 0x8d07, 0x8d08, 0x8d09, 0x8d0a, 0x8d0b, 0x8d0c, 0x8d0d,
02261 0x4f5f, 0x4f57, 0x4f32, 0x4f3d, 0x4f76, 0x4f74, 0x4f91, 0x4f89,
02262 0x4f83, 0x4f8e, 0x4f7e, 0x4f7b, 0x4faa, 0x4f7c, 0x4fac, 0x4f94,
02263 0x4fe6, 0x4fe8, 0x4fea, 0x4fec, 0x4f5c, 0x4fda, 0x4fe3, 0x4fdc, 0x4fd1,
02264 0x4fdf, 0x4ff8, 0x5029, 0x504c, 0x4ff3, 0x502c, 0x500f, 0x502e,
02265 0x502d, 0x4ffe, 0x501c, 0x500c, 0x5025, 0x5028, 0x507e, 0x5043,
02266 0x5055, 0x5048, 0x504e, 0x506c, 0x507b, 0x50a5, 0x50a7, 0x50a9,
02267 0x50ba, 0x50d6, 0x5106, 0x50ed, 0x50ec, 0x50e6, 0x50ee, 0x5107,
02268 0x510b, 0x4edd, 0x6c3d, 0x4f58, 0x4f65, 0x4fce, 0x9fa0, 0x6c46,
02269 0x7c74, 0x516e, 0x5dfc, 0x9ec9, 0x9998, 0x5181, 0x5914, 0x52f9,
02270 0x530d, 0x8a07, 0x5310, 0x51eb, 0x5919, 0x5155, 0x4ea0, 0x5156,
02271 0x4eb3, 0x886e, 0x88a4, 0x4eb5, 0x8114, 0x88d2, 0x7980, 0x5b34,
02272 0x8803, 0x7fb8, 0x51ab, 0x51b1, 0x51bd, 0x51bc,
02273 /* 0xda */
02274 0x8d0e, 0x8d0f, 0x8d10, 0x8d11, 0x8d12, 0x8d13, 0x8d14, 0x8d15,
02275 0x8d16, 0x8d17, 0x8d18, 0x8d19, 0x8d1a, 0x8d1b, 0x8d1c, 0x8d20,
02276 0x8d51, 0x8d52, 0x8d57, 0x8d5f, 0x8d65, 0x8d68, 0x8d69, 0x8d6a,
02277 0x8d6c, 0x8d6e, 0x8d6f, 0x8d71, 0x8d72, 0x8d78, 0x8d79, 0x8d7a,
02278 0x8d7b, 0x8d7c, 0x8d7d, 0x8d7e, 0x8d7f, 0x8d80, 0x8d82, 0x8d83,
02279 0x8d86, 0x8d87, 0x8d88, 0x8d89, 0x8d8c, 0x8d8d, 0x8d8e, 0x8d8f,
02280 0x8d90, 0x8d92, 0x8d93, 0x8d95, 0x8d96, 0x8d97, 0x8d98, 0x8d99,
02281 0x8d9a, 0x8d9b, 0x8d9c, 0x8d9d, 0x8d9e, 0x8da0, 0x8da1, 0x8da2,
02282 0x8da4, 0x8da5, 0x8da6, 0x8da7, 0x8da8, 0x8da9, 0x8daa, 0x8dab,
02283 0x8dac, 0x8dad, 0x8dae, 0x8daf, 0x8db0, 0x8db2, 0x8db6, 0x8db7,
02284 0x8db9, 0x8dbb, 0x8dbd, 0x8dc0, 0x8dc1, 0x8dc2, 0x8dc5, 0x8dc7,
02285 0x8dc8, 0x8dc9, 0x8dca, 0x8dcd, 0x8dd0, 0x8dd2, 0x8dd3, 0x8dd4,
02286 0x51c7, 0x5196, 0x51a2, 0x51a5, 0x8ba0, 0x8ba6, 0x8ba7, 0x8baa,
02287 0x8bb4, 0x8bb5, 0x8bb7, 0x8bc2, 0x8bc3, 0x8bc4, 0x8bc5, 0x8bce,
02288 0x8bd2, 0x8bd3, 0x8bd4, 0x8bd6, 0x8bd8, 0x8bd9, 0x8bdc, 0x8bdf,
02289 0x8be0, 0x8be4, 0x8be8, 0x8be9, 0x8bee, 0x8bf0, 0x8bf3, 0x8bf6,
02290 0x8bf9, 0x8bfc, 0x8bff, 0x8c00, 0x8c02, 0x8c04, 0x8c07, 0x8c0c,
02291 0x8c0f, 0x8c11, 0x8c12, 0x8c14, 0x8c15, 0x8c16, 0x8c19, 0x8c1b,
02292 0x8c18, 0x8c1d, 0x8c1f, 0x8c20, 0x8c21, 0x8c25, 0x8c27, 0x8c2a,
02293 0x8c2b, 0x8c2e, 0x8c2f, 0x8c32, 0x8c33, 0x8c35, 0x8c36, 0x5369,
02294 0x537a, 0x961d, 0x9622, 0x9621, 0x9631, 0x962a, 0x963d, 0x963c,
02295 0x9642, 0x9649, 0x9654, 0x965f, 0x9667, 0x966c, 0x9672, 0x9674,
02296 0x9688, 0x968d, 0x9697, 0x9697, 0x9097, 0x909b, 0x909d, 0x9099,
02297 0x90ac, 0x90a1, 0x90b4, 0x90b3, 0x90b6, 0x90ba,
02298 /* 0xdb */
02299 0x8dd5, 0x8dd8, 0x8dd9, 0x8ddc, 0x8de0, 0x8de1, 0x8de2, 0x8de5,
02300 0x8de6, 0x8de7, 0x8de9, 0x8ded, 0x8dee, 0x8df0, 0x8df1, 0x8df2,
02301 0x8df4, 0x8df6, 0x8dfc, 0x8dfc, 0x8dff, 0x8e00, 0x8e01, 0x8e02,
02302 0x8e03, 0x8e04, 0x8e06, 0x8e07, 0x8e08, 0x8e0b, 0x8e0d, 0x8e0e,
02303 0x8e10, 0x8e11, 0x8e12, 0x8e13, 0x8e15, 0x8e16, 0x8e17, 0x8e18,
02304 0x8e19, 0x8e1a, 0x8e1b, 0x8e1c, 0x8e20, 0x8e21, 0x8e24, 0x8e25,
02305 0x8e26, 0x8e27, 0x8e28, 0x8e2b, 0x8e2d, 0x8e30, 0x8e32, 0x8e33,
02306 0x8e34, 0x8e36, 0x8e37, 0x8e38, 0x8e3b, 0x8e3c, 0x8e3e, 0x8e3f,
02307 0x8e43, 0x8e45, 0x8e46, 0x8e4c, 0x8e4d, 0x8e4e, 0x8e4f, 0x8e50,
02308 0x8e53, 0x8e54, 0x8e55, 0x8e56, 0x8e57, 0x8e58, 0x8e5a, 0x8e5b,
02309 0x8e5c, 0x8e5d, 0x8e5e, 0x8e5f, 0x8e60, 0x8e61, 0x8e62, 0x8e63,
02310 0x8e64, 0x8e65, 0x8e67, 0x8e68, 0x8e6a, 0x8e6b, 0x8e6e, 0x8e71,
02311 0x90b8, 0x90b0, 0x90cf, 0x90c5, 0x90be, 0x90d0, 0x90c4, 0x90c7,
02312 0x90d3, 0x90e6, 0x90e2, 0x90dc, 0x90d7, 0x90db, 0x90ef, 0x90ef,
02313 0x90fe, 0x9104, 0x9122, 0x911e, 0x9123, 0x9131, 0x912f, 0x9139,
02314 0x9143, 0x9146, 0x520d, 0x5942, 0x52a2, 0x52ac, 0x52ad, 0x52be,
02315 0x54ff, 0x52d0, 0x52d6, 0x52f0, 0x53df, 0x71ee, 0x77cd, 0x5ef4,
02316 0x51f5, 0x51fc, 0x9b2f, 0x53b6, 0x5f01, 0x755a, 0x5def, 0x574c,
02317 0x57a9, 0x57a1, 0x587e, 0x58bc, 0x58c5, 0x58d1, 0x5729, 0x572c,
02318 0x572a, 0x5733, 0x5739, 0x572e, 0x572f, 0x575c, 0x573b, 0x5742,
02319 0x5769, 0x5785, 0x576b, 0x5786, 0x577c, 0x577b, 0x5768, 0x576d,
02320 0x5776, 0x5773, 0x57ad, 0x57a4, 0x578c, 0x57b2, 0x57cf, 0x57a7,

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02321 0x57b4, 0x5793, 0x57a0, 0x57d5, 0x57d8, 0x57da, 0x57d9, 0x57d2,
02322 0x57b8, 0x57f4, 0x57ef, 0x57f8, 0x57e4, 0x57dd,
02323 /* 0xdc */
02324 0x8e73, 0x8e75, 0x8e77, 0x8e78, 0x8e79, 0x8e7a, 0x8e7b, 0x8e7d,
02325 0x8e7e, 0x8e80, 0x8e82, 0x8e83, 0x8e84, 0x8e86, 0x8e88, 0x8e89,
02326 0x8e8a, 0x8e8b, 0x8e8c, 0x8e8d, 0x8e8e, 0x8e91, 0x8e92, 0x8e93,
02327 0x8e95, 0x8e96, 0x8e97, 0x8e98, 0x8e99, 0x8e9a, 0x8e9b, 0x8e9d,
02328 0x8e9f, 0x8ea0, 0x8ea1, 0x8ea2, 0x8ea3, 0x8ea4, 0x8ea5, 0x8ea6,
02329 0x8ea7, 0x8ea8, 0x8ea9, 0x8eaa, 0x8ead, 0x8eae, 0x8eb0, 0x8eb1,
02330 0x8eb3, 0x8eb4, 0x8eb5, 0x8eb6, 0x8eb7, 0x8eb8, 0x8eb9, 0x8ebb,
02331 0x8ebc, 0x8ebd, 0x8ebe, 0x8ebf, 0x8ec0, 0x8ec1, 0x8ec2, 0x8ec3,
02332 0x8ec4, 0x8ec5, 0x8ec6, 0x8ec7, 0x8ec8, 0x8ec9, 0x8eca, 0x8ecb,
02333 0x8ecc, 0x8ecd, 0x8ecf, 0x8ed0, 0x8ed1, 0x8ed2, 0x8ed3, 0x8ed4,
02334 0x8ed5, 0x8ed6, 0x8ed7, 0x8ed8, 0x8ed9, 0x8eda, 0x8edb, 0x8edc,
02335 0x8edd, 0x8ede, 0x8edf, 0x8ee0, 0x8ee1, 0x8ee2, 0x8ee3, 0x8ee4,
02336 0x580b, 0x580d, 0x57fd, 0x57ed, 0x5800, 0x581e, 0x5819, 0x5844,
02337 0x5820, 0x5865, 0x586c, 0x5881, 0x5889, 0x589a, 0x5880, 0x99a8,
02338 0x9f19, 0x61ff, 0x8279, 0x827d, 0x827f, 0x828f, 0x828a, 0x82a8,
02339 0x8284, 0x828e, 0x8291, 0x8297, 0x8299, 0x82ab, 0x82b8, 0x82be,
02340 0x82b0, 0x82c8, 0x82ca, 0x82e3, 0x8298, 0x82b7, 0x82ae, 0x82cb,
02341 0x82cc, 0x82c1, 0x82a9, 0x82b4, 0x82a1, 0x82aa, 0x829f, 0x82ca,
02342 0x82ce, 0x82a4, 0x82e1, 0x8309, 0x82f7, 0x82e4, 0x830f, 0x8307,
02343 0x82dc, 0x82f4, 0x82d2, 0x82d8, 0x830c, 0x82fb, 0x82d3, 0x8311,
02344 0x831a, 0x8306, 0x830e, 0x8314, 0x8315, 0x82e0, 0x82d5, 0x831c, 0x8351,
02345 0x835b, 0x835c, 0x8308, 0x8392, 0x833c, 0x8334, 0x8331, 0x839b,
02346 0x835e, 0x832f, 0x834f, 0x8347, 0x8343, 0x835f, 0x8340, 0x8317,
02347 0x8360, 0x832d, 0x833a, 0x8333, 0x8366, 0x8365,
02348 /* 0xdd */
02349 0x8ee5, 0x8ee6, 0x8ee7, 0x8ee8, 0x8ee9, 0x8eea, 0x8eeb, 0x8eec,
02350 0x8eed, 0x8eee, 0x8eef, 0x8ef0, 0x8ef1, 0x8ef2, 0x8ef3, 0x8ef4,
02351 0x8ef5, 0x8ef6, 0x8ef7, 0x8ef8, 0x8ef9, 0x8efa, 0x8efb, 0x8efc,
02352 0x8efd, 0x8efe, 0x8eff, 0x8f00, 0x8f01, 0x8f02, 0x8f03, 0x8f04,
02353 0x8f05, 0x8f06, 0x8f07, 0x8f08, 0x8f09, 0x8f0a, 0x8f0b, 0x8f0c,
02354 0x8f0d, 0x8f0e, 0x8f0f, 0x8f10, 0x8f11, 0x8f12, 0x8f13, 0x8f14,
02355 0x8f15, 0x8f16, 0x8f17, 0x8f18, 0x8f19, 0x8f1a, 0x8f1b, 0x8f1c,
02356 0x8f1d, 0x8f1e, 0x8f1f, 0x8f20, 0x8f21, 0x8f22, 0x8f23, 0x8f24,
02357 0x8f25, 0x8f26, 0x8f27, 0x8f28, 0x8f29, 0x8f2a, 0x8f2b, 0x8f2c,
02358 0x8f2d, 0x8f2e, 0x8f2f, 0x8f30, 0x8f31, 0x8f32, 0x8f33, 0x8f34,
02359 0x8f35, 0x8f36, 0x8f37, 0x8f38, 0x8f39, 0x8f3a, 0x8f3b, 0x8f3c,
02360 0x8f3d, 0x8f3e, 0x8f3f, 0x8f40, 0x8f41, 0x8f42, 0x8f43, 0x8f44,
02361 0x8368, 0x831b, 0x8369, 0x836c, 0x836a, 0x836d, 0x836e, 0x83b0,
02362 0x8378, 0x83b3, 0x83b4, 0x83a0, 0x83aa, 0x8393, 0x839c, 0x8385,
02363 0x837c, 0x83b6, 0x83a9, 0x837d, 0x83b8, 0x837b, 0x8398, 0x839e,
02364 0x83a8, 0x83ba, 0x83bc, 0x83c1, 0x8401, 0x83e5, 0x83d8, 0x5807,
02365 0x8418, 0x840b, 0x840d, 0x83fd, 0x83d6, 0x841c, 0x8438, 0x8411,
02366 0x8406, 0x83d4, 0x83df, 0x840f, 0x8403, 0x83f8, 0x83f9, 0x83ea,
02367 0x83c5, 0x83c0, 0x8426, 0x83f0, 0x83e1, 0x845c, 0x8451, 0x845a,
02368 0x8459, 0x8473, 0x8487, 0x8488, 0x847a, 0x8489, 0x8478, 0x843c,
02369 0x8446, 0x8469, 0x8476, 0x848c, 0x848e, 0x8431, 0x846d, 0x84c1,
02370 0x84cd, 0x84d0, 0x84e6, 0x84bd, 0x84d3, 0x84ca, 0x84bf, 0x84ba,
02371 0x84e0, 0x84a1, 0x84b9, 0x84b4, 0x8497, 0x84e5, 0x84e3, 0x850c,
02372 0x750d, 0x8538, 0x84f0, 0x8539, 0x851f, 0x853a,
02373 /* 0xde */
02374 0x8f45, 0x8f46, 0x8f47, 0x8f48, 0x8f49, 0x8f4a, 0x8f4b, 0x8f4c,
02375 0x8f4d, 0x8f4e, 0x8f4f, 0x8f50, 0x8f51, 0x8f52, 0x8f53, 0x8f54,
02376 0x8f55, 0x8f56, 0x8f57, 0x8f58, 0x8f59, 0x8f5a, 0x8f5b, 0x8f5c,
02377 0x8f5d, 0x8f5e, 0x8f5f, 0x8f60, 0x8f61, 0x8f62, 0x8f63, 0x8f64,
02378 0x8f65, 0x8f6a, 0x8f80, 0x8f8c, 0x8f92, 0x8f9d, 0x8fa0, 0x8fa1,
02379 0x8fa2, 0x8fa4, 0x8fa5, 0x8fa6, 0x8fa7, 0x8faa, 0x8fac, 0x8fad,
02380 0x8fae, 0x8faf, 0x8fb2, 0x8fb3, 0x8fb4, 0x8fb5, 0x8fb7, 0x8fb8,
02381 0x8fba, 0x8fbb, 0x8fbc, 0x8fbf, 0x8fc0, 0x8fc3, 0x8fc6, 0x8fc9,
02382 0x8fca, 0x8fcb, 0x8fcc, 0x8fcd, 0x8fcf, 0x8fd2, 0x8fd6, 0x8fd7,
02383 0x8fda, 0x8fe0, 0x8fe1, 0x8fe3, 0x8fe7, 0x8fec, 0x8fe9, 0x8ff1,
02384 0x8ff2, 0x8ff4, 0x8ff5, 0x8ff6, 0x8ffa, 0x8ffb, 0x8ffc, 0x8ffe,
02385 0x8fff, 0x9007, 0x9008, 0x900c, 0x900e, 0x9013, 0x9015, 0x9018,
02386 0x8556, 0x853b, 0x84ff, 0x84fc, 0x8559, 0x8548, 0x8568, 0x8564,
02387 0x855e, 0x857a, 0x77a2, 0x8543, 0x8572, 0x857b, 0x85a4, 0x85a8,
02388 0x8587, 0x858f, 0x8579, 0x85ae, 0x859c, 0x8585, 0x85b9, 0x85b7,
02389 0x85b0, 0x85d3, 0x85c1, 0x85dc, 0x85ff, 0x8627, 0x8605, 0x8629,
02390 0x8616, 0x863c, 0x5efe, 0x5f08, 0x593c, 0x5941, 0x8037, 0x5955,
02391 0x595a, 0x5958, 0x530f, 0x5c22, 0x5c25, 0x5c2c, 0x5c34, 0x624c,
02392 0x626a, 0x629f, 0x62bb, 0x62ca, 0x62da, 0x62d7, 0x62ee, 0x6322,
02393 0x62f6, 0x6339, 0x634b, 0x6343, 0x63ad, 0x63f6, 0x6371, 0x637a,
02394 0x638e, 0x63b4, 0x636d, 0x63ac, 0x638a, 0x6369, 0x63ae, 0x63bc,
02395 0x63f2, 0x63f8, 0x63e0, 0x63ff, 0x63c4, 0x63de, 0x63ce, 0x6452,
02396 0x63c6, 0x63be, 0x6445, 0x6441, 0x640b, 0x641b, 0x6420, 0x640c,
02397 0x6426, 0x6421, 0x645e, 0x6484, 0x646d, 0x6496,
02398 /* 0xdf */
02399 0x9019, 0x901c, 0x9023, 0x9024, 0x9025, 0x9027, 0x9028, 0x9029,
02400 0x902a, 0x902b, 0x902c, 0x902d, 0x9030, 0x9031, 0x9032, 0x9033, 0x9034,
02401 0x9037, 0x9039, 0x903a, 0x903d, 0x903f, 0x9040, 0x9043, 0x9045,
02402 0x9046, 0x9048, 0x9049, 0x904a, 0x904b, 0x904c, 0x904e, 0x9054,
02403 0x9055, 0x9056, 0x9059, 0x9059, 0x905c, 0x905d, 0x905e, 0x905f,
02404 0x9060, 0x9061, 0x9064, 0x9066, 0x9067, 0x9069, 0x906a, 0x906b,
02405 0x906c, 0x906e, 0x9070, 0x9071, 0x9072, 0x9073, 0x9076, 0x9077,
02406 0x9078, 0x9079, 0x907a, 0x907b, 0x907c, 0x907e, 0x9081, 0x9084,
02407 0x9085, 0x9086, 0x9087, 0x9089, 0x908a, 0x908c, 0x908d, 0x908e,
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02408 0x908f, 0x9090, 0x9092, 0x9094, 0x9096, 0x9098, 0x909a, 0x909c,
02409 0x909e, 0x909f, 0x90a0, 0x90a4, 0x90a5, 0x90a7, 0x90a8, 0x90a9,
02410 0x90ab, 0x90ad, 0x90b2, 0x90b7, 0x90bc, 0x90bd, 0x90bf, 0x90c0,
02411 0x647a, 0x64b7, 0x64b8, 0x6499, 0x64ba, 0x64c0, 0x64d0, 0x64d7,
02412 0x64e4, 0x64e2, 0x6509, 0x6525, 0x652e, 0x5f0b, 0x5fd2, 0x7519,
02413 0x5f11, 0x535f, 0x53f1, 0x53fd, 0x53e9, 0x53e8, 0x53fb, 0x5412,
02414 0x5416, 0x5406, 0x544b, 0x5452, 0x5453, 0x5454, 0x5456, 0x5443,
02415 0x5421, 0x5457, 0x5459, 0x5423, 0x5432, 0x5482, 0x5494, 0x5477,
02416 0x5471, 0x5464, 0x549a, 0x549b, 0x5484, 0x5476, 0x5466, 0x549d,
02417 0x54d0, 0x54ad, 0x54c2, 0x54b4, 0x54d2, 0x54a7, 0x54a6, 0x54d3,
02418 0x54d4, 0x5472, 0x54a3, 0x54d5, 0x54bb, 0x54bf, 0x54cc, 0x54d9,
02419 0x54da, 0x54dc, 0x54a9, 0x54aa, 0x54a4, 0x54dd, 0x54cf, 0x54de,
02420 0x551b, 0x54e7, 0x5520, 0x54fd, 0x5514, 0x54f3, 0x5522, 0x5523,
02421 0x550f, 0x5511, 0x5527, 0x552a, 0x5567, 0x558f, 0x55b5, 0x5549,
02422 0x556d, 0x5541, 0x5555, 0x553f, 0x5550, 0x553c,
02423 /* 0xe0 */
02424 0x90c2, 0x90c3, 0x90c6, 0x90c8, 0x90c9, 0x90cb, 0x90cc, 0x90cd,
02425 0x90d2, 0x90d4, 0x90d5, 0x90d6, 0x90d8, 0x90d9, 0x90da, 0x90de,
02426 0x90df, 0x90e0, 0x90e3, 0x90e4, 0x90e5, 0x90e9, 0x90ea, 0x90ec,
02427 0x90ee, 0x90f0, 0x90f1, 0x90f2, 0x90f3, 0x90f5, 0x90f6, 0x90f7,
02428 0x90f9, 0x90fa, 0x90fb, 0x90fc, 0x90ff, 0x9100, 0x9101, 0x9103,
02429 0x9105, 0x9106, 0x9107, 0x9108, 0x9109, 0x910a, 0x910b, 0x910c,
02430 0x910d, 0x910e, 0x910f, 0x9110, 0x9111, 0x9112, 0x9113, 0x9114,
02431 0x9115, 0x9116, 0x9117, 0x9118, 0x911a, 0x911b, 0x911c, 0x911d,
02432 0x911f, 0x9120, 0x9121, 0x9124, 0x9125, 0x9126, 0x9127, 0x9128,
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02434 0x9133, 0x9134, 0x9135, 0x9136, 0x9137, 0x9138, 0x913a, 0x913b,
02435 0x913c, 0x913d, 0x913e, 0x913f, 0x9140, 0x9141, 0x9142, 0x9144,
02436 0x5537, 0x5556, 0x5575, 0x5576, 0x5577, 0x5533, 0x5530, 0x555c,
02437 0x558b, 0x55d2, 0x5583, 0x5582, 0x55b1, 0x55b9, 0x5588, 0x5581, 0x559f,
02438 0x557e, 0x55d6, 0x5591, 0x557b, 0x55df, 0x55bd, 0x55be, 0x5594,
02439 0x5599, 0x55ea, 0x55f7, 0x55c9, 0x556f, 0x55d1, 0x55eb, 0x55ec,
02440 0x55d4, 0x55e6, 0x55dd, 0x55c4, 0x55ef, 0x55e5, 0x55f2, 0x55f3,
02441 0x55cc, 0x55cd, 0x55e8, 0x55f5, 0x55e4, 0x8f94, 0x561e, 0x5608,
02442 0x560c, 0x5601, 0x5624, 0x5623, 0x55fe, 0x5600, 0x5627, 0x562d,
02443 0x5658, 0x5639, 0x5657, 0x562c, 0x564d, 0x5662, 0x5659, 0x565c,
02444 0x564c, 0x5654, 0x5686, 0x5664, 0x5671, 0x566b, 0x567b, 0x567c,
02445 0x5685, 0x5693, 0x56af, 0x56d4, 0x56d7, 0x56dd, 0x56e1, 0x56f5,
02446 0x56eb, 0x56f9, 0x56ff, 0x5704, 0x570a, 0x5709, 0x571c, 0x5e0f,
02447 0x5e19, 0x5e14, 0x5e11, 0x5e31, 0x5e3b, 0x5e3c,
02448 /* 0xe1 */
02449 0x9145, 0x9147, 0x9148, 0x9151, 0x9153, 0x9154, 0x9155, 0x9156,
02450 0x9158, 0x9159, 0x915b, 0x915c, 0x915f, 0x9160, 0x9166, 0x9167,
02451 0x9168, 0x916b, 0x916d, 0x9173, 0x917a, 0x917b, 0x917c, 0x9180,
02452 0x9181, 0x9182, 0x9183, 0x9184, 0x9186, 0x9188, 0x918a, 0x918e,
02453 0x918f, 0x9193, 0x9194, 0x9195, 0x9196, 0x9197, 0x9198, 0x9199,
02454 0x919c, 0x919d, 0x919e, 0x919f, 0x91a0, 0x91a1, 0x91a4, 0x91a5,
02455 0x91a6, 0x91a7, 0x91a8, 0x91a9, 0x91ab, 0x91ac, 0x91b0, 0x91b1,
02456 0x91b2, 0x91b3, 0x91b6, 0x91b7, 0x91b8, 0x91b9, 0x91bb, 0x91bc,
02457 0x91bd, 0x91be, 0x91bf, 0x91c0, 0x91c1, 0x91c2, 0x91c3, 0x91c4,
02458 0x91c5, 0x91c6, 0x91c8, 0x91cb, 0x91d0, 0x91d2, 0x91d3, 0x91d4,
02459 0x91d5, 0x91d6, 0x91d7, 0x91d8, 0x91d9, 0x91da, 0x91db, 0x91dd,
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02462 0x5c8d, 0x5c90, 0x5c96, 0x5c88, 0x5c98, 0x5c99, 0x5c91, 0x5c9a,
02463 0x5c9c, 0x5cb5, 0x5ca2, 0x5cbd, 0x5cac, 0x5cab, 0x5cb1, 0x5ca3,
02464 0x5cc1, 0x5cb7, 0x5cc4, 0x5cc2, 0x5cc4, 0x5ccb, 0x5ce5, 0x5d02,
02465 0x5d03, 0x5d27, 0x5d26, 0x5d2e, 0x5d24, 0x5d1e, 0x5d06, 0x5d1b,
02466 0x5d58, 0x5d3e, 0x5d34, 0x5d3d, 0x5d6c, 0x5d5b, 0x5d6f, 0x5d5d,
02467 0x5d6b, 0x5d4b, 0x5d4a, 0x5d69, 0x5d74, 0x5d82, 0x5d99, 0x5d9d,
02468 0x8c73, 0x5db7, 0x5dc5, 0x5f73, 0x5f77, 0x5f82, 0x5f87, 0x5f89,
02469 0x5f8c, 0x5f95, 0x5f99, 0x5f9c, 0x5fa8, 0x5fad, 0x5fb5, 0x5fbc,
02470 0x8862, 0x5f61, 0x72ad, 0x72b0, 0x72b4, 0x72b7, 0x72b8, 0x72c3,
02471 0x72c1, 0x72ce, 0x72cd, 0x72d2, 0x72e8, 0x72ef, 0x72e9, 0x72f2,
02472 0x72f4, 0x72f7, 0x7301, 0x72f3, 0x7303, 0x72fa,
02473 /* 0xe2 */
02474 0x91e6, 0x91e7, 0x91e8, 0x91e9, 0x91ea, 0x91eb, 0x91ec, 0x91ed,
02475 0x91ee, 0x91ef, 0x91f0, 0x91f1, 0x91f2, 0x91f3, 0x91f4, 0x91f5,
02476 0x91f6, 0x91f7, 0x91f8, 0x91f9, 0x91fa, 0x91fb, 0x91fc, 0x91fd,
02477 0x91fe, 0x91ff, 0x9200, 0x9201, 0x9202, 0x9203, 0x9204, 0x9205,
02478 0x9206, 0x9207, 0x9208, 0x9209, 0x920a, 0x920b, 0x920c, 0x920d,
02479 0x920e, 0x920f, 0x9210, 0x9211, 0x9212, 0x9213, 0x9214, 0x9215,
02480 0x9216, 0x9217, 0x9218, 0x9219, 0x921a, 0x921b, 0x921c, 0x921d,
02481 0x921e, 0x921f, 0x9220, 0x9221, 0x9222, 0x9223, 0x9224, 0x9225,
02482 0x9226, 0x9227, 0x9228, 0x9229, 0x922a, 0x922b, 0x922c, 0x922d,
02483 0x922e, 0x922f, 0x9230, 0x9231, 0x9232, 0x9233, 0x9234, 0x9235,
02484 0x9236, 0x9237, 0x9238, 0x9239, 0x923a, 0x923b, 0x923c, 0x923d,
02485 0x923e, 0x923f, 0x9240, 0x9241, 0x9242, 0x9243, 0x9244, 0x9245,
02486 0x72fb, 0x7317, 0x7313, 0x7321, 0x730a, 0x731e, 0x731d, 0x7315,
02487 0x7322, 0x7339, 0x7325, 0x732c, 0x7338, 0x7331, 0x7350, 0x734d,
02488 0x7357, 0x7360, 0x736c, 0x736f, 0x737e, 0x821b, 0x5925, 0x98e7,
02489 0x5924, 0x5902, 0x9963, 0x9967, 0x9968, 0x9969, 0x996a, 0x996b,
02490 0x996c, 0x9974, 0x9977, 0x997d, 0x9980, 0x9984, 0x9987, 0x998a,
02491 0x998d, 0x9990, 0x9991, 0x9993, 0x9994, 0x9995, 0x5e80, 0x5e91,
02492 0x5e8b, 0x5e96, 0x5ea5, 0x5ea0, 0x5eb9, 0x5eb5, 0x5eba, 0x5eb3,
02493 0x8d53, 0x5ed2, 0x5ed1, 0x5edb, 0x5ee8, 0x5eea, 0x81ba, 0x5fc4,
02494 0x5fc9, 0x5fd6, 0x5fcf, 0x6003, 0x5fee, 0x6004, 0x5fe1, 0x5fe4,
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02496 0x6026, 0x601b, 0x600f, 0x600d, 0x6029, 0x602b, 0x600a, 0x603f,
02497 0x6021, 0x6078, 0x6079, 0x607b, 0x607a, 0x6042,
02498 /* 0xe3 */
02499 0x9246, 0x9247, 0x9248, 0x9249, 0x924a, 0x924b, 0x924c, 0x924d,
02500 0x924e, 0x924f, 0x9250, 0x9251, 0x9252, 0x9253, 0x9254, 0x9255,
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02509 0x9298, 0x9299, 0x929a, 0x929b, 0x929c, 0x929d, 0x929e, 0x929f,
02510 0x92a0, 0x92a1, 0x92a2, 0x92a3, 0x92a4, 0x92a5, 0x92a6, 0x92a7,
02511 0x606a, 0x607d, 0x6096, 0x609a, 0x60ad, 0x609d, 0x6083, 0x6092,
02512 0x608c, 0x609b, 0x609c, 0x60ec, 0x60bb, 0x60b1, 0x60dd, 0x60d8, 0x60c6,
02513 0x60da, 0x60b4, 0x6120, 0x6126, 0x6115, 0x6123, 0x60f4, 0x6100,
02514 0x610e, 0x612b, 0x614a, 0x6175, 0x61ac, 0x6194, 0x61a7, 0x61b7,
02515 0x61d4, 0x61f5, 0x5fdd, 0x96b3, 0x95e9, 0x95eb, 0x95f1, 0x95f3,
02516 0x95f5, 0x95f6, 0x95fc, 0x95fe, 0x9603, 0x9604, 0x9606, 0x9608,
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02519 0x6c5c, 0x6c4a, 0x6ca3, 0x6c85, 0x6c90, 0x6c94, 0x6c8c, 0x6c68,
02520 0x6c69, 0x6c74, 0x6c76, 0x6c86, 0x6ca9, 0x6cd0, 0x6cd4, 0x6cad,
02521 0x6cf7, 0x6cf8, 0x6cf1, 0x6cd7, 0x6cb2, 0x6ce0, 0x6cd6, 0x6cfa,
02522 0x6ceb, 0x6cee, 0x6cb1, 0x6cd3, 0x6cef, 0x6cfe,
02523 /* 0xe4 */
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02525 0x92b1, 0x92b2, 0x92b3, 0x92b4, 0x92b5, 0x92b6, 0x92b7, 0x92b8,
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02533 0x92f2, 0x92f3, 0x92f4, 0x92f5, 0x92f6, 0x92f7, 0x92f8, 0x92f9,
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02537 0x6d0e, 0x6d2b, 0x6d4d, 0x6d2e, 0x6d35, 0x6d1a, 0x6d4f, 0x6d52,
02538 0x6d54, 0x6d3c, 0x6d91, 0x6d6f, 0x6d9e, 0x6da0, 0x6d5e, 0x6d93,
02539 0x6d94, 0x6d5c, 0x6d60, 0x6d7c, 0x6d63, 0x6e1a, 0x6dc7, 0x6dc5,
02540 0x6dde, 0x6e0e, 0x6dbf, 0x6de0, 0x6e11, 0x6de6, 0x6ddd, 0x6dd9,
02541 0x6e16, 0x6dab, 0x6e0c, 0x6dae, 0x6e2b, 0x6e6e, 0x6e4e, 0x6e6b,
02542 0x6eb2, 0x6e5f, 0x6e86, 0x6e53, 0x6e54, 0x6e32, 0x6e25, 0x6e44,
02543 0x6edf, 0x6eb1, 0x6e98, 0x6ee0, 0x6f2d, 0x6ee2, 0x6ea5, 0x6ea7,
02544 0x6ebd, 0x6ebb, 0x6eb7, 0x6ed7, 0x6eb4, 0x6ecf, 0x6e8f, 0x6ec2,
02545 0x6e9f, 0x6f62, 0x6f46, 0x6f47, 0x6f24, 0x6f15, 0x6ef9, 0x6f2f,
02546 0x6f36, 0x6f4b, 0x6f74, 0x6f2a, 0x6f09, 0x6f29, 0x6f89, 0x6f8d,
02547 0x6f8c, 0x6f78, 0x6f72, 0x6f7c, 0x6f7a, 0x6fd1,
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02563 0x705e, 0x5b80, 0x5b84, 0x5b95, 0x5b93, 0x5ba5, 0x5bb8, 0x752f,
02564 0x9a9e, 0x6434, 0x5be4, 0x5bee, 0x8930, 0x5bf0, 0x8e47, 0x8b07,
02565 0x8fb6, 0x8fd3, 0x8fd5, 0x8fe5, 0x8fee, 0x8fe4, 0x8fe9, 0x8fe6,
02566 0x8ff3, 0x8fe8, 0x9005, 0x9004, 0x900b, 0x9026, 0x9011, 0x900d,
02567 0x9016, 0x9021, 0x9035, 0x9036, 0x902d, 0x902f, 0x9044, 0x9051,
02568 0x9052, 0x9050, 0x9068, 0x9068, 0x9062, 0x9058, 0x905b, 0x66b9, 0x9074,
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02570 0x5f58, 0x5c3b, 0x54ab, 0x5c50, 0x5c59, 0x5b71, 0x5c63, 0x5c66,
02571 0x7fbc, 0x5f2a, 0x5f29, 0x5f2d, 0x8274, 0x5f3c, 0x9b3b, 0x5c6e,
02572 0x5981, 0x5983, 0x598d, 0x59a9, 0x59aa, 0x59a3,
02573 /* 0xe6 */
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02579 0x9395, 0x9396, 0x9397, 0x9398, 0x9399, 0x939a, 0x939b, 0x939c,
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02584 0x93bd, 0x93be, 0x93bf, 0x93c0, 0x93c1, 0x93c2, 0x93c3, 0x93c4,
02585 0x93c5, 0x93c6, 0x93c7, 0x93c8, 0x93c9, 0x93cb, 0x93cc, 0x93cd,
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02587 0x59d7, 0x59be, 0x5a05, 0x5a06, 0x59dd, 0x5a08, 0x59e3, 0x59d8,
02588 0x59f9, 0x5a0c, 0x5a09, 0x5a32, 0x5a34, 0x5a11, 0x5a23, 0x5a13,
02589 0x5a40, 0x5a67, 0x5a4a, 0x5a55, 0x5a3c, 0x5a62, 0x5a75, 0x80ec,
02590 0x5aaa, 0x5a9b, 0x5a77, 0x5a7a, 0x5abe, 0x5aeb, 0x5ab2, 0x5ad2,
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02592 0x5adc, 0x5b09, 0x5b17, 0x5b16, 0x5b32, 0x5b37, 0x5b40, 0x5c15,
02593 0x5c1c, 0x5b5a, 0x5b65, 0x5b73, 0x5b51, 0x5b53, 0x5b62, 0x9a75,
02594 0x9a77, 0x9a78, 0x9a7a, 0x9a7f, 0x9a7d, 0x9a80, 0x9a81, 0x9a85,
02595 0x9a88, 0x9a8a, 0x9a90, 0x9a92, 0x9a93, 0x9a96, 0x9a98, 0x9a9b,
02596 0x9a9c, 0x9a9d, 0x9a9f, 0x9aa0, 0x9aa2, 0x9aa3, 0x9aa5, 0x9aa7,
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02605 0x93ff, 0x9400, 0x9401, 0x9402, 0x9403, 0x9404, 0x9405, 0x9406,
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02611 0x7ead, 0x7eb0, 0x7ebe, 0x7ec0, 0x7ec1, 0x7ec2, 0x7ec9, 0x7ecb,
02612 0x7ecc, 0x7ed0, 0x7ed4, 0x7ed7, 0x7edb, 0x7ee0, 0x7ee1, 0x7ee8,
02613 0x7eeb, 0x7eee, 0x7eef, 0x7ef1, 0x7ef2, 0x7ef0, 0x7ef6, 0x7efa,
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02617 0x7f2a, 0x7f2b, 0x7f2c, 0x7f2d, 0x7f2f, 0x7f30, 0x7f31, 0x7f32,
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02619 0x7391, 0x73ae, 0x73a2, 0x739f, 0x73cf, 0x73c2, 0x73d1, 0x73b7,
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02621 0x73e9, 0x73e7, 0x73de, 0x73ba, 0x73f2, 0x740f, 0x742a, 0x745b,
02622 0x7426, 0x7425, 0x7428, 0x7430, 0x742e, 0x742c,
02623 /* 0xe8 */
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02639 0x97eb, 0x97ec, 0x674c, 0x6753, 0x675e, 0x6748, 0x6769, 0x67a5,
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02645 0x681d, 0x6855, 0x6866, 0x6841, 0x6867, 0x6840, 0x683e, 0x684a,
02646 0x6849, 0x6829, 0x68b5, 0x688f, 0x6874, 0x6877, 0x6893, 0x686b,
02647 0x68c2, 0x696e, 0x68fc, 0x691f, 0x6920, 0x68f9,
02648 /* 0xe9 */
02649 0x9527, 0x9533, 0x953d, 0x9543, 0x9548, 0x954b, 0x9555, 0x955a,
02650 0x9560, 0x956e, 0x9574, 0x9575, 0x9577, 0x9578, 0x9579, 0x957a,
02651 0x957b, 0x957c, 0x957d, 0x957e, 0x9580, 0x9581, 0x9582, 0x9583,
02652 0x9584, 0x9585, 0x9586, 0x9587, 0x9588, 0x9589, 0x958a, 0x958b,
02653 0x958c, 0x958d, 0x958e, 0x958f, 0x9590, 0x9591, 0x9592, 0x9593,
02654 0x9594, 0x9595, 0x9596, 0x9597, 0x9598, 0x9599, 0x959a, 0x959b,
02655 0x959c, 0x959d, 0x959e, 0x959f, 0x95a0, 0x95a1, 0x95a2, 0x95a3,
02656 0x95a4, 0x95a5, 0x95a6, 0x95a7, 0x95a8, 0x95a9, 0x95aa, 0x95ab,
02657 0x95ac, 0x95ad, 0x95ae, 0x95af, 0x95b0, 0x95b1, 0x95b2, 0x95b3,
02658 0x95b4, 0x95b5, 0x95b6, 0x95b7, 0x95b8, 0x95b9, 0x95ba, 0x95bb,
02659 0x95bc, 0x95bd, 0x95be, 0x95bf, 0x95c0, 0x95c1, 0x95c2, 0x95c3,
02660 0x95c4, 0x95c5, 0x95c6, 0x95c7, 0x95c8, 0x95c9, 0x95ca, 0x95cb,
02661 0x6924, 0x68f0, 0x690b, 0x6901, 0x6957, 0x68e3, 0x6910, 0x6971,
02662 0x6939, 0x6960, 0x6942, 0x695d, 0x6984, 0x696b, 0x6980, 0x6998,
02663 0x6978, 0x6934, 0x69cc, 0x6987, 0x6988, 0x69ce, 0x6989, 0x6966,
02664 0x6963, 0x6979, 0x699b, 0x69a7, 0x69bb, 0x69ab, 0x69ad, 0x69d4,
02665 0x69b1, 0x69c1, 0x69ca, 0x69df, 0x6995, 0x69e0, 0x698d, 0x69ff,
02666 0x6a2f, 0x69ed, 0x6a17, 0x6a18, 0x6a65, 0x69f2, 0x6a44, 0x6a3e,
02667 0x6aa0, 0x6a50, 0x6a5b, 0x6a35, 0x6a8e, 0x6a79, 0x6a3d, 0x6a28,
02668 0x6a58, 0x6a7c, 0x6a91, 0x6a90, 0x6aa9, 0x6a97, 0x6aab, 0x7337,
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02669 0x7352, 0x6b81, 0x6b82, 0x6b87, 0x6b84, 0x6b92, 0x6b93, 0x6b8d,
02670 0x6b9a, 0x6b9b, 0x6ba1, 0x6baa, 0x8f6b, 0x8f6d, 0x8f71, 0x8f72,
02671 0x8f73, 0x8f75, 0x8f76, 0x8f77, 0x8f78, 0x8f79, 0x8f7a, 0x8f7c,
02672 0x8f7e, 0x8f81, 0x8f82, 0x8f84, 0x8f87, 0x8f8b,
02673 /* Oxea */
02674 0x95cc, 0x95cd, 0x95ce, 0x95cf, 0x95d0, 0x95d1, 0x95d2, 0x95d3,
02675 0x95d4, 0x95d5, 0x95d6, 0x95d7, 0x95d8, 0x95d9, 0x95da, 0x95db,
02676 0x95dc, 0x95dd, 0x95de, 0x95df, 0x95e0, 0x95e1, 0x95e2, 0x95e3,
02677 0x95e4, 0x95e5, 0x95e6, 0x95e7, 0x95ec, 0x95ff, 0x9607, 0x9613,
02678 0x9618, 0x961b, 0x961e, 0x9620, 0x9623, 0x9624, 0x9625, 0x9626,
02679 0x9627, 0x9628, 0x9629, 0x962b, 0x962c, 0x962d, 0x962f, 0x9630,
02680 0x9637, 0x9638, 0x9639, 0x963a, 0x963e, 0x9641, 0x9643, 0x964a,
02681 0x964e, 0x964f, 0x9651, 0x9652, 0x9653, 0x9656, 0x9657, 0x9658,
02682 0x9659, 0x965a, 0x965c, 0x965d, 0x965e, 0x9660, 0x9663, 0x9665,
02683 0x9666, 0x966b, 0x966d, 0x966e, 0x966f, 0x9670, 0x9671, 0x9673,
02684 0x9678, 0x9679, 0x967a, 0x967b, 0x967c, 0x967d, 0x967e, 0x967f,
02685 0x9680, 0x9681, 0x9682, 0x9683, 0x9684, 0x9687, 0x9689, 0x968a,
02686 0x8f8d, 0x8f8e, 0x8f8f, 0x8f98, 0x8f9a, 0x8ece, 0x620b, 0x6217,
02687 0x621b, 0x621f, 0x6222, 0x6221, 0x6225, 0x6224, 0x622c, 0x81e7,
02688 0x74ef, 0x74f4, 0x74ff, 0x750f, 0x7511, 0x7513, 0x6534, 0x65ee,
02689 0x65ef, 0x65f0, 0x660a, 0x6619, 0x6772, 0x6603, 0x6615, 0x6600,
02690 0x7085, 0x66f7, 0x661d, 0x6634, 0x6631, 0x6636, 0x6635, 0x8006,
02691 0x665f, 0x6654, 0x6641, 0x664f, 0x6656, 0x6661, 0x6657, 0x6677,
02692 0x6684, 0x668c, 0x66a5, 0x66a7, 0x669d, 0x66be, 0x66db, 0x66dc,
02693 0x66e9, 0x8d32, 0x8d33, 0x8d36, 0x8d3b, 0x8d3d, 0x8d40, 0x8d45,
02694 0x8d46, 0x8d48, 0x8d49, 0x8d47, 0x8d4d, 0x8d55, 0x8d59, 0x89c7,
02695 0x89ca, 0x89cb, 0x89cc, 0x89ce, 0x89cf, 0x89d0, 0x89d1, 0x726e,
02696 0x729f, 0x725d, 0x7266, 0x726f, 0x727e, 0x727f, 0x7284, 0x728b,
02697 0x728d, 0x728f, 0x7292, 0x6308, 0x6332, 0x63b0,
02698 /* Oxeb */
02699 0x968c, 0x968e, 0x9691, 0x9692, 0x9693, 0x9695, 0x9696, 0x969a,
02700 0x969b, 0x969d, 0x969e, 0x969f, 0x96a0, 0x96a1, 0x96a2, 0x96a3,
02701 0x96a4, 0x96a5, 0x96a6, 0x96a8, 0x96a9, 0x96aa, 0x96ab, 0x96ac,
02702 0x96ad, 0x96ae, 0x96af, 0x96b1, 0x96b2, 0x96b4, 0x96b5, 0x96b7,
02703 0x96b8, 0x96ba, 0x96bb, 0x96bf, 0x96c2, 0x96c3, 0x96c8, 0x96ca,
02704 0x96cb, 0x96cd, 0x96d1, 0x96d3, 0x96d4, 0x96d6, 0x96d7, 0x96d8,
02705 0x96d9, 0x96da, 0x96db, 0x96dc, 0x96dd, 0x96de, 0x96df, 0x96e1,
02706 0x96e2, 0x96e3, 0x96e4, 0x96e5, 0x96e6, 0x96e7, 0x96eb, 0x96ec,
02707 0x96ed, 0x96ee, 0x96f0, 0x96f1, 0x96f2, 0x96f4, 0x96f5, 0x96f8,
02708 0x96fa, 0x96fb, 0x96fc, 0x96fd, 0x96ff, 0x9702, 0x9703, 0x9705,
02709 0x970a, 0x970b, 0x970c, 0x9710, 0x9711, 0x9712, 0x9714, 0x9715,
02710 0x9717, 0x9718, 0x9719, 0x971a, 0x971b, 0x971d, 0x971f, 0x9720,
02711 0x643f, 0x64d8, 0x8004, 0x6bea, 0x6bf3, 0x6bfd, 0x6bf5, 0x6bf9,
02712 0x6c05, 0x6c07, 0x6c06, 0x6c0d, 0x6c15, 0x6c18, 0x6c19, 0x6c1a,
02713 0x6c21, 0x6c29, 0x6c27, 0x6c24, 0x6c32, 0x6535, 0x6555, 0x656b,
02714 0x724d, 0x7252, 0x7256, 0x7230, 0x8662, 0x5216, 0x809f, 0x809c,
02715 0x8093, 0x80bc, 0x670a, 0x80bd, 0x80b1, 0x80ab, 0x80ad, 0x80b4,
02716 0x80b7, 0x80e7, 0x80e8, 0x80e9, 0x80ea, 0x80db, 0x80c2, 0x80c4,
02717 0x80d9, 0x80cd, 0x80d7, 0x6710, 0x80dd, 0x80eb, 0x80f1, 0x80f4,
02718 0x80ed, 0x810d, 0x810e, 0x80f2, 0x80fc, 0x6715, 0x8112, 0x8c5a,
02719 0x8136, 0x811e, 0x812c, 0x8118, 0x812c, 0x8132, 0x8148, 0x814c, 0x8153,
02720 0x8174, 0x8159, 0x815a, 0x8171, 0x8160, 0x8169, 0x817c, 0x817d,
02721 0x816d, 0x8167, 0x584d, 0x5ab5, 0x8188, 0x8182, 0x8191, 0x6ed5,
02722 0x81a3, 0x81aa, 0x81cc, 0x6726, 0x81ca, 0x81bb,
02723 /* Oxec */
02724 0x9721, 0x9722, 0x9723, 0x9724, 0x9725, 0x9726, 0x9727, 0x9728,
02725 0x9729, 0x972b, 0x972c, 0x972e, 0x972f, 0x9731, 0x9733, 0x9734,
02726 0x9735, 0x9736, 0x9737, 0x973a, 0x973b, 0x973c, 0x973d, 0x973f,
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02728 0x9748, 0x9749, 0x974a, 0x974b, 0x974c, 0x974d, 0x974e, 0x974f,
02729 0x9750, 0x9751, 0x9754, 0x9755, 0x9757, 0x9758, 0x975a, 0x975c,
02730 0x975d, 0x975f, 0x9763, 0x9764, 0x9766, 0x9767, 0x9768, 0x976a,
02731 0x976b, 0x976c, 0x976d, 0x976e, 0x976f, 0x9770, 0x9771, 0x9772,
02732 0x9775, 0x9777, 0x9778, 0x9779, 0x977a, 0x977b, 0x977d, 0x977e,
02733 0x977f, 0x9780, 0x9781, 0x9782, 0x9783, 0x9784, 0x9786, 0x9787,
02734 0x9788, 0x9789, 0x978a, 0x978c, 0x978e, 0x978f, 0x9790, 0x9793,
02735 0x9795, 0x9796, 0x9797, 0x9799, 0x979a, 0x979b, 0x979c, 0x979d,
02736 0x81c1, 0x81a6, 0x6b24, 0x6b37, 0x6b39, 0x6b43, 0x6b46, 0x6b59,
02737 0x98d1, 0x98d2, 0x98d3, 0x98d5, 0x98d9, 0x98da, 0x6bb3, 0x5f40,
02738 0x6bc2, 0x89f3, 0x6590, 0x9f51, 0x6593, 0x65bc, 0x65c6, 0x65c4,
02739 0x65c3, 0x65cc, 0x65ce, 0x65d2, 0x65d6, 0x7080, 0x709c, 0x7096,
02740 0x709d, 0x70bb, 0x70c0, 0x70b7, 0x70ab, 0x70b1, 0x70e8, 0x70ca,
02741 0x7110, 0x7113, 0x7116, 0x712f, 0x7131, 0x7173, 0x715c, 0x7168,
02742 0x7145, 0x7172, 0x714a, 0x7178, 0x717a, 0x7198, 0x71b3, 0x71b5,
02743 0x71a8, 0x71a0, 0x71e0, 0x71d4, 0x71e7, 0x71f9, 0x721d, 0x7228,
02744 0x706c, 0x7118, 0x7166, 0x71b9, 0x623e, 0x623d, 0x6243, 0x6248,
02745 0x6249, 0x793b, 0x7940, 0x7946, 0x7949, 0x795b, 0x795c, 0x7953,
02746 0x795a, 0x7962, 0x7957, 0x7960, 0x796f, 0x7967, 0x797a, 0x7985,
02747 0x798a, 0x799a, 0x79a7, 0x79b3, 0x5fd1, 0x5fd0,
02748 /* Oxed */
02749 0x979e, 0x979f, 0x97a1, 0x97a2, 0x97a4, 0x97a5, 0x97a6, 0x97a7,
02750 0x97a8, 0x97a9, 0x97aa, 0x97ac, 0x97ae, 0x97b0, 0x97b1, 0x97b3,
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02792 0x9907, 0x9908, 0x9909, 0x990a, 0x990b, 0x990c, 0x990d, 0x990e,
02793 0x990f, 0x9910, 0x9911, 0x9912, 0x9913, 0x9914, 0x9915, 0x9916,
02794 0x9917, 0x9918, 0x9919, 0x991a, 0x991b, 0x991c, 0x991d, 0x991e,
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02823 0xa05f, 0xa060, 0xa061, 0xa062, 0xa063, 0xa064, 0xa065, 0xa066,
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02843 0x9e73, 0x7592, 0x7594, 0x7596, 0x75a0, 0x759d, 0x75ac, 0x75a3,
02844 0x75b3, 0x75b4, 0x75b8, 0x75c4, 0x75b1, 0x75b0, 0x75c3, 0x75c2,
02845 0x75d6, 0x75cd, 0x75e3, 0x75e8, 0x75e6, 0x75e4, 0x75eb, 0x75e7,
02846 0x7603, 0x75f1, 0x75fc, 0x75ff, 0x7610, 0x7600, 0x7605, 0x760c,
02847 0x7617, 0x760a, 0x7625, 0x7618, 0x7615, 0x7619,
02848 /* 0xf1 */
02849 0x998c, 0x998e, 0x999a, 0x999b, 0x999c, 0x999d, 0x999e, 0x999f,
02850 0x99a0, 0x99a1, 0x99a2, 0x99a3, 0x99a4, 0x99a6, 0x99a7, 0x99a9,
02851 0x99aa, 0x99ab, 0x99ac, 0x99ad, 0x99ae, 0x99af, 0x99b0, 0x99b1,
02852 0x99b2, 0x99b3, 0x99b4, 0x99b5, 0x99b6, 0x99b7, 0x99b8, 0x99b9,
02853 0x99ba, 0x99bb, 0x99bc, 0x99bd, 0x99be, 0x99bf, 0x99c0, 0x99c1,
02854 0x99c2, 0x99c3, 0x99c4, 0x99c5, 0x99c6, 0x99c7, 0x99c8, 0x99c9,
02855 0x99ca, 0x99cb, 0x99cc, 0x99cd, 0x99ce, 0x99cf, 0x99d0, 0x99d1,
02856 0x99d2, 0x99d3, 0x99d4, 0x99d5, 0x99d6, 0x99d7, 0x99d8, 0x99d9,
02857 0x99da, 0x99db, 0x99dc, 0x99dd, 0x99de, 0x99df, 0x99e0, 0x99e1,
02858 0x99e2, 0x99e3, 0x99e4, 0x99e5, 0x99e6, 0x99e7, 0x99e8, 0x99e9,
02859 0x99ea, 0x99eb, 0x99ec, 0x99ed, 0x99ee, 0x99ef, 0x99f0, 0x99f1,
02860 0x99f2, 0x99f3, 0x99f4, 0x99f5, 0x99f6, 0x99f7, 0x99f8, 0x99f9,
02861 0x761b, 0x763c, 0x7622, 0x7620, 0x7640, 0x762d, 0x7630, 0x763f,
02862 0x7635, 0x7643, 0x763e, 0x7633, 0x764d, 0x765e, 0x7654, 0x765c,
02863 0x7656, 0x766b, 0x766f, 0x766f, 0x766f, 0x766f, 0x766f, 0x766f,
02864 0x7a86, 0x7a88, 0x7a95, 0x7aa6, 0x7aa0, 0x7aac, 0x7aa8, 0x7aad,
02865 0x7ab3, 0x8864, 0x8869, 0x8872, 0x887d, 0x887f, 0x8882, 0x88a2,
02866 0x88c6, 0x88b7, 0x88bc, 0x88c9, 0x88e2, 0x88ce, 0x88e3, 0x88e5,
02867 0x88f1, 0x891a, 0x88fc, 0x88e8, 0x88fe, 0x88f0, 0x8921, 0x8919,
02868 0x8913, 0x891b, 0x890a, 0x8934, 0x892b, 0x8936, 0x8941, 0x8966,
02869 0x897b, 0x758b, 0x80a2, 0x80e5, 0x76b2, 0x76b4, 0x77dc, 0x8012, 0x8014,
02870 0x8016, 0x801c, 0x8020, 0x8022, 0x8025, 0x8026, 0x8027, 0x8029,
02871 0x8028, 0x8031, 0x800b, 0x8035, 0x8043, 0x8046, 0x804d, 0x8052,
02872 0x8069, 0x8071, 0x8983, 0x9878, 0x9880, 0x9883,
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02875 0x9a02, 0x9a03, 0x9a04, 0x9a05, 0x9a06, 0x9a07, 0x9a08, 0x9a09,
02876 0x9a0a, 0x9a0b, 0x9a0c, 0x9a0d, 0x9a0e, 0x9a0f, 0x9a10, 0x9a11,
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02879 0x9a22, 0x9a23, 0x9a24, 0x9a25, 0x9a26, 0x9a27, 0x9a28, 0x9a29,
02880 0x9a2a, 0x9a2b, 0x9a2c, 0x9a2d, 0x9a2e, 0x9a2f, 0x9a30, 0x9a31,
02881 0x9a32, 0x9a33, 0x9a34, 0x9a35, 0x9a36, 0x9a37, 0x9a38, 0x9a39,
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02885 0x9a52, 0x9a53, 0x9a54, 0x9a55, 0x9a56, 0x9a57, 0x9a58, 0x9a59,
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02887 0x989f, 0x98a1, 0x98a2, 0x98a5, 0x98a6, 0x864d, 0x8654, 0x866c,
02888 0x866e, 0x867f, 0x867a, 0x867c, 0x867b, 0x86a8, 0x868d, 0x868b,
02889 0x86ac, 0x869d, 0x86a7, 0x86a3, 0x86aa, 0x8693, 0x86a9, 0x86b6,
02890 0x86c4, 0x86b5, 0x86ce, 0x86b0, 0x86ba, 0x86b1, 0x86af, 0x86c9,
02891 0x86cf, 0x86b4, 0x86e9, 0x86f1, 0x86f2, 0x86ed, 0x86f3, 0x86d0,
02892 0x8713, 0x86de, 0x86f4, 0x86df, 0x86d8, 0x86d1, 0x8703, 0x8707,
02893 0x86f8, 0x8708, 0x870a, 0x870d, 0x8709, 0x8723, 0x873b, 0x871e,
02894 0x8725, 0x872e, 0x871a, 0x873e, 0x8748, 0x8734, 0x8731, 0x8729,
02895 0x8737, 0x873f, 0x8782, 0x8722, 0x877d, 0x877e, 0x877b, 0x8760,
02896 0x8770, 0x874c, 0x876e, 0x878b, 0x8753, 0x8763, 0x877c, 0x8764,
02897 0x8759, 0x8765, 0x8793, 0x87af, 0x87a8, 0x87d2,
02898 /* 0xf3 */
02899 0x9a5a, 0x9a5b, 0x9a5c, 0x9a5d, 0x9a5e, 0x9a5f, 0x9a60, 0x9a61,
02900 0x9a62, 0x9a63, 0x9a64, 0x9a65, 0x9a66, 0x9a67, 0x9a68, 0x9a69,
02901 0x9a6a, 0x9a6b, 0x9a72, 0x9a83, 0x9a89, 0x9a8d, 0x9a8e, 0x9a94,
02902 0x9a95, 0x9a99, 0x9aa6, 0x9aa9, 0x9aaa, 0x9aab, 0x9aac, 0x9aad,
02903 0x9aae, 0x9aaf, 0x9ab2, 0x9ab3, 0x9ab4, 0x9ab5, 0x9ab9, 0x9abb,
02904 0x9abd, 0x9abe, 0x9abf, 0x9ac3, 0x9ac4, 0x9ac6, 0x9ac7, 0x9ac8,
02905 0x9ac9, 0x9aca, 0x9acd, 0x9ace, 0x9acf, 0x9ad0, 0x9ad2, 0x9ad4,
02906 0x9ad5, 0x9ad6, 0x9ad7, 0x9ad9, 0x9ada, 0x9adb, 0x9adc, 0x9add,
02907 0x9ade, 0x9ae0, 0x9ae2, 0x9ae3, 0x9ae4, 0x9ae5, 0x9ae7, 0x9ae8,
02908 0x9ae9, 0x9aea, 0x9aec, 0x9aee, 0x9af0, 0x9af1, 0x9af2, 0x9af3,
02909 0x9af4, 0x9af5, 0x9af6, 0x9af7, 0x9af8, 0x9afa, 0x9afc, 0x9afd,
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02912 0x87ac, 0x87b5, 0x87b3, 0x87cb, 0x87d3, 0x87bd, 0x87d1, 0x87c0,
02913 0x87ca, 0x87db, 0x87ea, 0x87e0, 0x87ee, 0x8816, 0x8813, 0x87fe,
02914 0x880a, 0x881b, 0x8821, 0x8839, 0x883c, 0x7f36, 0x7f42, 0x7f44,
02915 0x7f45, 0x8210, 0x7afa, 0x7afd, 0x7b08, 0x7b03, 0x7b04, 0x7b15,
02916 0x7b0a, 0x7b2b, 0x7b0f, 0x7b47, 0x7b38, 0x7b38, 0x7b2a, 0x7b19, 0x7b2e,
02917 0x7b31, 0x7b20, 0x7b25, 0x7b24, 0x7b33, 0x7b3e, 0x7b1e, 0x7b58,
02918 0x7b5a, 0x7b45, 0x7b75, 0x7b4c, 0x7b5d, 0x7b60, 0x7b6e, 0x7b7b,
02919 0x7b62, 0x7b72, 0x7b71, 0x7b90, 0x7ba6, 0x7ba7, 0x7bb8, 0x7bac,
02920 0x7b9d, 0x7ba8, 0x7b85, 0x7baa, 0x7b9c, 0x7ba2, 0x7bab, 0x7bb4,
02921 0x7bd1, 0x7bc1, 0x7bcc, 0x7bdd, 0x7bda, 0x7be5, 0x7be6, 0x7bea,
02922 0x7c0c, 0x7bfe, 0x7bfc, 0x7c0f, 0x7c16, 0x7c0b,
02923 /* 0xf4 */
02924 0x9b07, 0x9b09, 0x9b0a, 0x9b0b, 0x9b0c, 0x9b0d, 0x9b0e, 0x9b10,
02925 0x9b11, 0x9b12, 0x9b13, 0x9b14, 0x9b15, 0x9b16, 0x9b17, 0x9b18, 0x9b19,
02926 0x9b1a, 0x9b1b, 0x9b1c, 0x9b1d, 0x9b1e, 0x9b20, 0x9b21, 0x9b22,
02927 0x9b24, 0x9b25, 0x9b26, 0x9b27, 0x9b28, 0x9b29, 0x9b2a, 0x9b2b,
02928 0x9b2c, 0x9b2d, 0x9b2e, 0x9b2f, 0x9b30, 0x9b31, 0x9b33, 0x9b34, 0x9b35,
02929 0x9b36, 0x9b37, 0x9b38, 0x9b39, 0x9b3a, 0x9b3d, 0x9b3e, 0x9b3f,
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02931 0x9b53, 0x9b55, 0x9b56, 0x9b57, 0x9b58, 0x9b59, 0x9b5a, 0x9b5b,
02932 0x9b5c, 0x9b5d, 0x9b5e, 0x9b5f, 0x9b60, 0x9b61, 0x9b62, 0x9b63,
02933 0x9b64, 0x9b65, 0x9b66, 0x9b67, 0x9b68, 0x9b69, 0x9b6a, 0x9b6b,
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02935 0x9b74, 0x9b75, 0x9b76, 0x9b77, 0x9b78, 0x9b79, 0x9b7a, 0x9b7b,
02936 0x7c1f, 0x7c2a, 0x7c26, 0x7c38, 0x7c41, 0x7c40, 0x81fe, 0x8201,
02937 0x8202, 0x8204, 0x81ec, 0x8844, 0x8221, 0x8222, 0x8223, 0x822d,
02938 0x822f, 0x8228, 0x822b, 0x8238, 0x823b, 0x8234, 0x823e,
02939 0x8244, 0x8249, 0x824b, 0x824f, 0x825a, 0x825f, 0x8268, 0x887e,
02940 0x8885, 0x8888, 0x88d8, 0x88df, 0x895e, 0x7f9d, 0x7f9f, 0x7fa7,
02941 0x7faf, 0x7fb0, 0x7fb2, 0x7c7c, 0x6549, 0x7c91, 0x7c9d, 0x7c9c,
02942 0x7c9e, 0x7ca2, 0x7cb2, 0x7cbc, 0x7cbd, 0x7cc1, 0x7cc7, 0x7ccc,
02943 0x7ccd, 0x7cc8, 0x7cc5, 0x7cd7, 0x7ce8, 0x826e, 0x66a8, 0x7fbf,
02944 0x7fce, 0x7fd5, 0x7fe5, 0x7fe1, 0x7fe6, 0x7fe9, 0x7fee, 0x7ff3,
02945 0x7cf8, 0x7d77, 0x7da6, 0x7dae, 0x7e47, 0x7e9b, 0x9eb8, 0x9eb4,
02946 0x8d73, 0x8d84, 0x8d94, 0x8d91, 0x8db1, 0x8d67, 0x8d6d, 0x8c47,
02947 0x8c49, 0x914a, 0x9150, 0x914e, 0x914f, 0x9164,
02948 /* 0xf5 */
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02954 0x9ba4, 0x9ba5, 0x9ba6, 0x9ba7, 0x9ba8, 0x9ba9, 0x9baa, 0x9bab,
02955 0x9bac, 0x9bad, 0x9bae, 0x9baf, 0x9bb0, 0x9bb1, 0x9bb2, 0x9bb3,
02956 0x9bb4, 0x9bb5, 0x9bb6, 0x9bb7, 0x9bb8, 0x9bb9, 0x9bba, 0x9bbb,
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02960 0x9bd4, 0x9bd5, 0x9bd6, 0x9bd7, 0x9bd8, 0x9bd9, 0x9bda, 0x9bdb,
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02962 0x9174, 0x9179, 0x918c, 0x9185, 0x9190, 0x918d, 0x9191, 0x91a2,
02963 0x91a3, 0x91aa, 0x91ad, 0x91ae, 0x91af, 0x91b5, 0x91b4, 0x91ba,
02964 0x8c55, 0x9e7e, 0x8db8, 0x8deb, 0x8e05, 0x8e59, 0x8e69, 0x8db5,
02965 0x8dbf, 0x8dbc, 0x8dba, 0x8dc4, 0x8dd6, 0x8dd7, 0x8dda, 0x8dde,
02966 0x8dce, 0x8dcf, 0x8ddb, 0x8dc6, 0x8dec, 0x8df7, 0x8df8, 0x8de3,
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02968 0x8e2c, 0x8e2e, 0x8e23, 0x8e2f, 0x8e3a, 0x8e40, 0x8e39, 0x8e35,
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02971 0x8e90, 0x8e9c, 0x8e9e, 0x8c78, 0x8c82, 0x8c8a, 0x8c85, 0x8c98,
02972 0x8c94, 0x659b, 0x89d6, 0x89de, 0x89da, 0x89dc,
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02987 0x96ef, 0x9706, 0x9701, 0x9708, 0x970f, 0x970e, 0x972a, 0x972d,
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02998 /* 0xf7 */
02999 0x9c3c, 0x9c3d, 0x9c3e, 0x9c3f, 0x9c40, 0x9c41, 0x9c42, 0x9c43,
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03007 0x9c7d, 0x9c7e, 0x9c80, 0x9c83, 0x9c84, 0x9c89, 0x9c8a, 0x9c8c,
03008 0x9c8f, 0x9c93, 0x9c96, 0x9c97, 0x9c98, 0x9c99, 0x9c9d, 0x9caa,
03009 0x9cac, 0x9caf, 0x9cb9, 0x9cbe, 0x9cbf, 0x9cc0, 0x9cc1, 0x9cc2,
03010 0x9cc8, 0x9cc9, 0x9cd1, 0x9cd2, 0x9cda, 0x9cdb, 0x9ce0, 0x9ce1,
03011 0x9ccc, 0x9ccd, 0x9cce, 0x9ccf, 0x9cd0, 0x9cd3, 0x9cd4, 0x9cd5,
03012 0x9cd7, 0x9cd8, 0x9cd9, 0x9cdc, 0x9cdd, 0x9cdf, 0x9ce2, 0x977c,
03013 0x9785, 0x9791, 0x9792, 0x9794, 0x97af, 0x97ab, 0x97a3, 0x97b2,
03014 0x97b4, 0x97ab1, 0x97ab0, 0x97ab7, 0x9e58, 0x97ab6, 0x97aba, 0x97abc,
03015 0x97ac1, 0x97ac0, 0x97ac5, 0x97ac2, 0x97acb, 0x97acc, 0x97ad1, 0x97b45,
03016 0x97b43, 0x97b47, 0x97b49, 0x97b48, 0x97b4d, 0x97b51, 0x97b5e, 0x97b5d,

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03017 0x992e, 0x9955, 0x9954, 0x9adf, 0x9ae1, 0x9ae6, 0x9aef, 0x9aeb,
03018 0x9afb, 0x9aed, 0x9af9, 0x9b08, 0x9b0f, 0x9b13, 0x9b1f, 0x9b23,
03019 0x9ebd, 0x9ebe, 0x9e3b, 0x9e82, 0x9e87, 0x9e88, 0x9e8b, 0x9e92,
03020 0x93d6, 0x9e9d, 0x9e9f, 0x9edb, 0x9edc, 0x9edd, 0x9ee0, 0x9edf,
03021 0x9ee2, 0x9ee9, 0x9ee7, 0x9ee5, 0x9eea, 0x9eef, 0x9f22, 0x9f2c,
03022 0x9f2f, 0x9f39, 0x9f37, 0x9f3d, 0x9f3e, 0x9f44,
03023 /* 0xf8 */
03024 0x9ce3, 0x9ce4, 0x9ce5, 0x9ce6, 0x9ce7, 0x9ce8, 0x9ce9, 0x9cea,
03025 0x9ceb, 0x9cec, 0x9ced, 0x9cee, 0x9cef, 0x9cf0, 0x9cf1, 0x9cf2,
03026 0x9cf3, 0x9cf4, 0x9cf5, 0x9cf6, 0x9cf7, 0x9cf8, 0x9cf9, 0x9cfa,
03027 0x9cfb, 0x9cfc, 0x9cfd, 0x9cfe, 0x9cff, 0x9d00, 0x9d01, 0x9d02,
03028 0x9d03, 0x9d04, 0x9d05, 0x9d06, 0x9d07, 0x9d08, 0x9d09, 0x9d0a,
03029 0x9d0b, 0x9d0c, 0x9d0d, 0x9d0e, 0x9d0f, 0x9d10, 0x9d11, 0x9d12,
03030 0x9d13, 0x9d14, 0x9d15, 0x9d16, 0x9d17, 0x9d18, 0x9d19, 0x9d1a,
03031 0x9d1b, 0x9d1c, 0x9d1d, 0x9d1e, 0x9d1f, 0x9d20, 0x9d21, 0x9d22,
03032 0x9d23, 0x9d24, 0x9d25, 0x9d26, 0x9d27, 0x9d28, 0x9d29, 0x9d2a,
03033 0x9d2b, 0x9d2c, 0x9d2d, 0x9d2e, 0x9d2f, 0x9d30, 0x9d31, 0x9d32,
03034 0x9d33, 0x9d34, 0x9d35, 0x9d36, 0x9d37, 0x9d38, 0x9d39, 0x9d3a,
03035 0x9d3b, 0x9d3c, 0x9d3d, 0x9d3e, 0x9d3f, 0x9d40, 0x9d41, 0x9d42,
03036 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03037 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03038 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03039 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03040 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03041 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03042 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03043 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03044 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03045 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03046 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03047 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03048 /* 0xf9 */
03049 0x9d43, 0x9d44, 0x9d45, 0x9d46, 0x9d47, 0x9d48, 0x9d49, 0x9d4a,
03050 0x9d4b, 0x9d4c, 0x9d4d, 0x9d4e, 0x9d4f, 0x9d50, 0x9d51, 0x9d52,
03051 0x9d53, 0x9d54, 0x9d55, 0x9d56, 0x9d57, 0x9d58, 0x9d59, 0x9d5a,
03052 0x9d5b, 0x9d5c, 0x9d5d, 0x9d5e, 0x9d5f, 0x9d60, 0x9d61, 0x9d62,
03053 0x9d63, 0x9d64, 0x9d65, 0x9d66, 0x9d67, 0x9d68, 0x9d69, 0x9d6a,
03054 0x9d6b, 0x9d6c, 0x9d6d, 0x9d6e, 0x9d6f, 0x9d70, 0x9d71, 0x9d72,
03055 0x9d73, 0x9d74, 0x9d75, 0x9d76, 0x9d77, 0x9d78, 0x9d79, 0x9d7a,
03056 0x9d7b, 0x9d7c, 0x9d7d, 0x9d7e, 0x9d7f, 0x9d80, 0x9d81, 0x9d82,
03057 0x9d83, 0x9d84, 0x9d85, 0x9d86, 0x9d87, 0x9d88, 0x9d89, 0x9d8a,
03058 0x9d8b, 0x9d8c, 0x9d8d, 0x9d8e, 0x9d8f, 0x9d90, 0x9d91, 0x9d92,
03059 0x9d93, 0x9d94, 0x9d95, 0x9d96, 0x9d97, 0x9d98, 0x9d99, 0x9da0,
03060 0x9da1, 0x9da2, 0x9da3, 0x9da4, 0x9da5, 0x9da6, 0x9da7, 0x9da8, 0x9da9,
03061 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03062 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03063 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03064 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03065 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03066 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03067 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03068 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03069 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03070 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03071 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03072 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03073 /* 0xfa */
03074 0x9da3, 0x9da4, 0x9da5, 0x9da6, 0x9da7, 0x9da8, 0x9da9, 0x9daa,
03075 0x9dab, 0x9dac, 0x9dad, 0x9dae, 0x9daf, 0x9db0, 0x9db1, 0x9db2,
03076 0x9db3, 0x9db4, 0x9db5, 0x9db6, 0x9db7, 0x9db8, 0x9db9, 0x9dba,
03077 0x9dbb, 0x9dbc, 0x9dbd, 0x9dbe, 0x9dbf, 0x9dc0, 0x9dc1, 0x9dc2,
03078 0x9dc3, 0x9dc4, 0x9dc5, 0x9dc6, 0x9dc7, 0x9dc8, 0x9dc9, 0x9dca,
03079 0x9dcb, 0x9dcc, 0x9dcd, 0x9dce, 0x9dcf, 0x9dd0, 0x9dd1, 0x9dd2,
03080 0x9dd3, 0x9dd4, 0x9dd5, 0x9dd6, 0x9dd7, 0x9dd8, 0x9dd9, 0x9dda,
03081 0x9ddb, 0x9ddc, 0x9ddd, 0x9dde, 0x9ddf, 0x9de0, 0x9de1, 0x9de2,
03082 0x9de3, 0x9de4, 0x9de5, 0x9de6, 0x9de7, 0x9de8, 0x9de9, 0x9dea,
03083 0x9deb, 0x9dec, 0x9ded, 0x9dee, 0x9def, 0x9df0, 0x9df1, 0x9df2,
03084 0x9df3, 0x9df4, 0x9df5, 0x9df6, 0x9df7, 0x9df8, 0x9df9, 0x9dfa,
03085 0x9dfb, 0x9dfc, 0x9dfd, 0x9dfe, 0x9dff, 0x9e00, 0x9e01, 0x9e02,
03086 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03087 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03088 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03089 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03090 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03091 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03092 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03093 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03094 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03095 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03096 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03097 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03098 /* 0xfb */
03099 0x9e03, 0x9e04, 0x9e05, 0x9e06, 0x9e07, 0x9e08, 0x9e09, 0x9e0a,
03100 0x9e0b, 0x9e0c, 0x9e0d, 0x9e0e, 0x9e0f, 0x9e10, 0x9e11, 0x9e12,
03101 0x9e13, 0x9e14, 0x9e15, 0x9e16, 0x9e17, 0x9e18, 0x9e19, 0x9e1a,
03102 0x9e1b, 0x9e1c, 0x9e1d, 0x9e1e, 0x9e1f, 0x9e20, 0x9e21, 0x9e22,
03103 0x9e23, 0x9e24, 0x9e25, 0x9e26, 0x9e27, 0x9e28, 0x9e29, 0x9e2a,
```

```

03104 0x9e54, 0x9e56, 0x9e59, 0x9e5d, 0x9e5f, 0x9e60, 0x9e61, 0x9e62,
03105 0x9e65, 0x9e6e, 0x9e6f, 0x9e72, 0x9e74, 0x9e75, 0x9e76, 0x9e77,
03106 0x9e78, 0x9e79, 0x9e7a, 0x9e7b, 0x9e7c, 0x9e7d, 0x9e80, 0x9e81,
03107 0x9e83, 0x9e84, 0x9e85, 0x9e86, 0x9e89, 0x9e8a, 0x9e8c, 0x9e8d,
03108 0x9e8e, 0x9e8f, 0x9e90, 0x9e91, 0x9e94, 0x9e95, 0x9e96, 0x9e97,
03109 0x9e98, 0x9e99, 0x9e9a, 0x9e9b, 0x9e9c, 0x9e9e, 0x9ea0, 0x9ea1,
03110 0x9ea2, 0x9ea3, 0x9ea4, 0x9ea5, 0x9ea7, 0x9ea8, 0x9ea9, 0x9eaa,
03111 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03112 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03113 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03114 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03115 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03116 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03117 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03118 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03119 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03120 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03121 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03122 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03123 /* 0xfc */
03124 0x9eab, 0x9eac, 0x9ead, 0x9eae, 0x9eaf, 0x9eb0, 0x9eb1, 0x9eb2,
03125 0x9eb3, 0x9eb5, 0x9eb6, 0x9eb7, 0x9eb9, 0x9eba, 0x9ebc, 0x9ebf,
03126 0x9ec0, 0x9ec1, 0x9ec2, 0x9ec3, 0x9ec5, 0x9ec6, 0x9ec7, 0x9ec8,
03127 0x9eca, 0x9ecb, 0x9ecc, 0x9ed0, 0x9ed2, 0x9ed3, 0x9ed5, 0x9ed6,
03128 0x9ed7, 0x9ed9, 0x9eda, 0x9ede, 0x9ee1, 0x9ee3, 0x9ee4, 0x9ee6,
03129 0x9ee8, 0x9eeb, 0x9eec, 0x9eed, 0x9eee, 0x9ef0, 0x9ef1, 0x9ef2,
03130 0x9ef3, 0x9ef5, 0x9ef6, 0x9ef7, 0x9ef8, 0x9efa, 0x9efd,
03131 0x9eff, 0x9f00, 0x9f01, 0x9f02, 0x9f03, 0x9f04, 0x9f05, 0x9f06,
03132 0x9f07, 0x9f08, 0x9f09, 0x9f0a, 0x9f0c, 0x9f0f, 0x9f11, 0x9f12,
03133 0x9f14, 0x9f15, 0x9f16, 0x9f18, 0x9f1a, 0x9f1b, 0x9f1c, 0x9f1d,
03134 0x9f1e, 0x9f1f, 0x9f21, 0x9f23, 0x9f24, 0x9f25, 0x9f26, 0x9f27,
03135 0x9f28, 0x9f29, 0x9f2a, 0x9f2b, 0x9f2d, 0x9f2e, 0x9f30, 0x9f31,
03136 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03137 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03138 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03139 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03140 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03141 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03142 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03143 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03144 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03145 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03146 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03147 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03148 /* 0xfd */
03149 0x9f32, 0x9f33, 0x9f34, 0x9f35, 0x9f36, 0x9f38, 0x9f3a, 0x9f3c,
03150 0x9f3f, 0x9f40, 0x9f41, 0x9f42, 0x9f43, 0x9f45, 0x9f46, 0x9f47,
03151 0x9f48, 0x9f49, 0x9f4a, 0x9f4b, 0x9f4c, 0x9f4d, 0x9f4e, 0x9f4f,
03152 0x9f52, 0x9f53, 0x9f54, 0x9f55, 0x9f56, 0x9f57, 0x9f58, 0x9f59,
03153 0x9f5a, 0x9f5b, 0x9f5c, 0x9f5d, 0x9f5e, 0x9f5f, 0x9f60, 0x9f61,
03154 0x9f62, 0x9f63, 0x9f64, 0x9f65, 0x9f66, 0x9f67, 0x9f68, 0x9f69,
03155 0x9f6a, 0x9f6b, 0x9f6c, 0x9f6d, 0x9f6e, 0x9f6f, 0x9f70, 0x9f71,
03156 0x9f72, 0x9f73, 0x9f74, 0x9f75, 0x9f76, 0x9f77, 0x9f78, 0x9f79,
03157 0x9f7a, 0x9f7b, 0x9f7c, 0x9f7d, 0x9f7e, 0x9f81, 0x9f82, 0x9f8d,
03158 0x9f8e, 0x9f8f, 0x9f90, 0x9f91, 0x9f92, 0x9f93, 0x9f94, 0x9f95,
03159 0x9f96, 0x9f97, 0x9f98, 0x9f9c, 0x9f9d, 0x9f9e, 0x9fa1, 0x9fa2,
03160 0x9fa3, 0x9fa4, 0x9fa5, 0x9fa6, 0x9fa7, 0x9fa8, 0x9fa9, 0x9faa,
03161 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03162 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03163 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03164 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03165 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03166 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03167 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03168 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03169 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03170 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03171 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03172 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
03173 /* 0xfe */
03174 0xfa0c, 0xfa0d, 0xfa0e, 0xfa0f, 0xfa11, 0xfa13, 0xfa14, 0xfa18,
03175 0xfa1f, 0xfa20, 0xfa21, 0xfa23, 0xfa24, 0xfa27, 0xfa28, 0xfa29,
03176 };
03177
03178 static int
03179 cp936ext_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
03180 {
03181     unsigned char c1 = s[0];
03182     if ((c1 >= 0x81 && c1 <= 0xfe)) {
03183         if (n >= 2) {
03184             unsigned char c2 = s[1];
03185             if ((c2 >= 0x40 && c2 < 0x7f) || (c2 >= 0x80 && c2 < 0xff)) {
03186                 unsigned int i = 190 * (c1 - 0x81) + (c2 - (c2 >= 0x80 ? 0x41 : 0x40));
03187                 unsigned short wc = 0xffff;
03188                 {
03189                     if (i < 23766)
03190                         wc = cp936ext_2uni_page81[i];

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03278 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa845, 0xalad, 0x0000, /*0x20-0x27*/
03279 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x28-0x2f*/
03280 0xaleb, 0x0000, 0x0000, 0xale4, 0xale5, 0x0000, 0xa846, 0x0000, 0x0000, /*0x30-0x37*/
03281 0x0000, 0x0000, 0x0000, 0xalf9, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x38-0x3f*/
03282 };
03283 static const unsigned short cp936ext_page0420[160] = {
03284 0x0000, 0x0000, 0x0000, 0xale6, 0x0000, 0xa847, 0x0000, 0x0000, 0x0000, /*0x00-0x07*/
03285 0x0000, 0xa848, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x08-0x0f*/
03286 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xaled, 0x0000, 0x0000, /*0x10-0x17*/
03287 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x18-0x1f*/
03288 0x0000, 0xa959, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x20-0x27*/
03289 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x28-0x2f*/
03290 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x30-0x37*/
03291 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x38-0x3f*/
03292 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x40-0x47*/
03293 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x48-0x4f*/
03294 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x50-0x57*/
03295 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x58-0x5f*/
03296 0xa2f1, 0xa2f2, 0xa2f3, 0xa2f4, 0xa2f5, 0xa2f6, 0xa2f7, 0xa2f8, /*0x60-0x67*/
03297 0xa2f9, 0xa2fa, 0xa2fb, 0xa2fc, 0x0000, 0x0000, 0x0000, 0x0000, /*0x68-0x6f*/
03298 0xa2a1, 0xa2a2, 0xa2a3, 0xa2a4, 0xa2a5, 0xa2a6, 0xa2a7, 0xa2a8, /*0x70-0x77*/
03299 0xa2a9, 0xa2aa, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x78-0x7f*/
03300 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x80-0x87*/
03301 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x88-0x8f*/
03302 0xalfb, 0xalfc, 0xalfa, 0xalfd, 0x0000, 0x0000, 0xa849, 0xa84a, /*0x90-0x97*/
03303 0xa84b, 0xa84c, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x98-0x9f*/
03304 };
03305 static const unsigned short cp936ext_page0441[184] = {
03306 0xalca, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa1c7, /*0x08-0x0f*/
03307 0x0000, 0xalcb, 0x0000, 0x0000, 0x0000, 0x0000, 0xa84d, 0x0000, 0x0000, /*0x10-0x17*/
03308 0x0000, 0x0000, 0xalcc, 0x0000, 0x0000, 0xald8, 0xalde, 0xa84e, /*0x18-0x1f*/
03309 0xalcf, 0x0000, 0x0000, 0xa84f, 0x0000, 0xalce, 0x0000, 0xa1c4, /*0x20-0x27*/
03310 0xalc5, 0xalc9, 0xalc8, 0xald2, 0x0000, 0x0000, 0xald3, 0x0000, /*0x28-0x2f*/
03311 0x0000, 0x0000, 0x0000, 0x0000, 0xale0, 0xaldf, 0xalc3, 0xa1cb, /*0x30-0x37*/
03312 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xald7, 0x0000, 0x0000, /*0x38-0x3f*/
03313 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x40-0x47*/
03314 0xald6, 0x0000, 0x0000, 0x0000, 0xald5, 0x0000, 0x0000, 0x0000, /*0x48-0x4f*/
03315 0x0000, 0x0000, 0xa850, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x50-0x57*/
03316 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x58-0x5f*/
03317 0xald9, 0xald4, 0x0000, 0x0000, 0xaldc, 0xaldd, 0xa851, 0xa852, /*0x60-0x67*/
03318 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xalda, 0xa1db, /*0x68-0x6f*/
03319 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x70-0x77*/
03320 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x78-0x7f*/
03321 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x80-0x87*/
03322 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x88-0x8f*/
03323 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa892, 0x0000, 0x0000, /*0x90-0x97*/
03324 0x0000, 0xald1, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x98-0x9f*/
03325 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xalcd, 0x0000, 0x0000, /*0xa0-0xa7*/
03326 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xa8-0xaf*/
03327 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xb0-0xb7*/
03328 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa853, /*0xb8-0xbf*/
03329 };
03330 static const unsigned short cp936ext_page048c[64] = {
03331 0xa2d9, 0xa2da, 0xa2db, 0xa2dc, 0xa2dd, 0xa2de, 0xa2df, 0xa2e0, /*0x60-0x67*/
03332 0xa2e1, 0xa2e2, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x68-0x6f*/
03333 0x0000, 0x0000, 0x0000, 0x0000, 0xa2c5, 0xa2c6, 0xa2c7, 0xa2c8, /*0x70-0x77*/
03334 0xa2c9, 0xa2ca, 0xa2cb, 0xa2cc, 0xa2cd, 0xa2ce, 0xa2cf, 0xa2d0, /*0x78-0x7f*/
03335 0xa2d1, 0xa2d2, 0xa2d3, 0xa2d4, 0xa2d5, 0xa2d6, 0xa2d7, 0xa2d8, /*0x80-0x87*/
03336 0xa2b1, 0xa2b2, 0xa2b3, 0xa2b4, 0xa2b5, 0xa2b6, 0xa2b7, 0xa2b8, /*0x88-0x8f*/
03337 0xa2b9, 0xa2ba, 0xa2bb, 0xa2bc, 0xa2bd, 0xa2be, 0xa2bf, 0xa2c0, /*0x90-0x97*/
03338 0xa2c1, 0xa2c2, 0xa2c3, 0xa2c4, 0x0000, 0x0000, 0x0000, 0x0000, /*0x98-0x9f*/
03339 };
03340 static const unsigned short cp936ext_page04a0[232] = {
03341 0xa9a4, 0xa9a5, 0xa9a6, 0xa9a7, 0xa9a8, 0xa9a9, 0xa9aa, 0xa9ab, /*0x00-0x07*/
03342 0xa9ac, 0xa9ad, 0xa9ae, 0xa9af, 0xa9b0, 0xa9b1, 0xa9b2, 0xa9b3, /*0x08-0x0f*/
03343 0xa9b4, 0xa9b5, 0xa9b6, 0xa9b7, 0xa9b8, 0xa9b9, 0xa9ba, 0xa9bb, /*0x10-0x17*/
03344 0xa9bc, 0xa9bd, 0xa9be, 0xa9bf, 0xa9c0, 0xa9c1, 0xa9c2, 0xa9c3, /*0x18-0x1f*/
03345 0xa9c4, 0xa9c5, 0xa9c6, 0xa9c7, 0xa9c8, 0xa9c9, 0xa9ca, 0xa9cb, /*0x20-0x27*/
03346 0xa9cc, 0xa9cd, 0xa9ce, 0xa9cf, 0xa9d0, 0xa9d1, 0xa9d2, 0xa9d3, /*0x28-0x2f*/
03347 0xa9d4, 0xa9d5, 0xa9d6, 0xa9d7, 0xa9d8, 0xa9d9, 0xa9da, 0xa9db, /*0x30-0x37*/
03348 0xa9dc, 0xa9dd, 0xa9de, 0xa9df, 0xa9e0, 0xa9e1, 0xa9e2, 0xa9e3, /*0x38-0x3f*/
03349 0xa9e4, 0xa9e5, 0xa9e6, 0xa9e7, 0xa9e8, 0xa9e9, 0xa9ea, 0xa9eb, /*0x40-0x47*/
03350 0xa9ec, 0xa9ed, 0xa9ee, 0xa9ef, 0x0000, 0x0000, 0x0000, 0x0000, /*0x48-0x4f*/
03351 0xa854, 0xa855, 0xa856, 0xa857, 0xa858, 0xa859, 0xa85a, 0xa85b, /*0x50-0x57*/
03352 0xa85c, 0xa85d, 0xa85e, 0xa85f, 0xa860, 0xa861, 0xa862, 0xa863, /*0x58-0x5f*/
03353 0xa864, 0xa865, 0xa866, 0xa867, 0xa868, 0xa869, 0xa86a, 0xa86b, /*0x60-0x67*/
03354 0xa86c, 0xa86d, 0xa86e, 0xa86f, 0xa870, 0xa871, 0xa872, 0xa873, /*0x68-0x6f*/
03355 0xa874, 0xa875, 0xa876, 0xa877, 0x0000, 0x0000, 0x0000, 0x0000, /*0x70-0x77*/
03356 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x78-0x7f*/
03357 0x0000, 0xa878, 0xa879, 0xa87a, 0xa87b, 0xa87c, 0xa87d, 0xa87e, /*0x80-0x87*/
03358 0xa880, 0xa881, 0xa882, 0xa883, 0xa884, 0xa885, 0xa886, 0xa887, /*0x88-0x8f*/
03359 0x0000, 0x0000, 0x0000, 0xa888, 0xa889, 0xa88a, 0x0000, 0x0000, /*0x90-0x97*/
03360 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x98-0x9f*/
03361 0xalf6, 0xalf5, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xa0-0xa7*/
03362 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xa8-0xaf*/
03363 0x0000, 0x0000, 0xalf8, 0xalf7, 0x0000, 0x0000, 0x0000, 0x0000, /*0xb0-0xb7*/
03364 0x0000, 0x0000, 0x0000, 0x0000, 0xa88b, 0xa88c, 0x0000, 0x0000, /*0xb8-0xbf*/

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03365 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x1f4, 0x1f3, /*0xc0-0xc7*/
03366 0x0000, 0x0000, 0x0000, 0x1f0, 0x0000, 0x0000, 0x1f2, 0x1f1, /*0xc8-0xcf*/
03367 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xd0-0xd7*/
03368 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xd8-0xdf*/
03369 0x0000, 0x0000, 0xa88d, 0xa88e, 0xa88f, 0xa890, 0x0000, 0x0000, /*0xe0-0xe7*/
03370 };
03371 static const unsigned short cp936ext_page04c0[72] = {
03372 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x1ef, 0x1ee, 0x0000, /*0x00-0x07*/
03373 0x0000, 0xa891, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x08-0x0f*/
03374 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x10-0x17*/
03375 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x18-0x1f*/
03376 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x20-0x27*/
03377 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x28-0x2f*/
03378 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x30-0x37*/
03379 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x38-0x3f*/
03380 0x1e2, 0x0000, 0x1e1, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x40-0x47*/
03381 };
03382 static const unsigned short cp936ext_page0600[304] = {
03383 0xa1a1, 0xa1a2, 0xa1a3, 0xa1a8, 0x0000, 0xa1a9, 0xa965, 0xa996, /*0x00-0x07*/
03384 0xa1b4, 0xa1b5, 0xa1b6, 0xa1b7, 0xa1b8, 0xa1b9, 0xa1ba, 0xa1bb, /*0x08-0x0f*/
03385 0xa1be, 0xa1bf, 0xa893, 0xa1fe, 0xa1b2, 0xa1b3, 0xa1bc, 0xa1bd, /*0x10-0x17*/
03386 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa894, 0xa895, 0x0000, /*0x18-0x1f*/
03387 0x0000, 0xa940, 0xa941, 0xa942, 0xa943, 0xa944, 0xa945, 0xa946, /*0x20-0x27*/
03388 0xa947, 0xa948, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x28-0x2f*/
03389 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x30-0x37*/
03390 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x38-0x3f*/
03391 0x0000, 0xa4a1, 0xa4a2, 0xa4a3, 0xa4a4, 0xa4a5, 0xa4a6, 0xa4a7, /*0x40-0x47*/
03392 0xa4a8, 0xa4a9, 0xa4aa, 0xa4ab, 0xa4ac, 0xa4ad, 0xa4ae, 0xa4af, /*0x48-0x4f*/
03393 0xa4b0, 0xa4b1, 0xa4b2, 0xa4b3, 0xa4b4, 0xa4b5, 0xa4b6, 0xa4b7, /*0x50-0x57*/
03394 0xa4b8, 0xa4b9, 0xa4ba, 0xa4bb, 0xa4bc, 0xa4bd, 0xa4be, 0xa4bf, /*0x58-0x5f*/
03395 0xa4c0, 0xa4c1, 0xa4c2, 0xa4c3, 0xa4c4, 0xa4c5, 0xa4c6, 0xa4c7, /*0x60-0x67*/
03396 0xa4c8, 0xa4c9, 0xa4ca, 0xa4cb, 0xa4cc, 0xa4cd, 0xa4ce, 0xa4cf, /*0x68-0x6f*/
03397 0xa4d0, 0xa4d1, 0xa4d2, 0xa4d3, 0xa4d4, 0xa4d5, 0xa4d6, 0xa4d7, /*0x70-0x77*/
03398 0xa4d8, 0xa4d9, 0xa4da, 0xa4db, 0xa4dc, 0xa4dd, 0xa4de, 0xa4df, /*0x78-0x7f*/
03399 0xa4e0, 0xa4e1, 0xa4e2, 0xa4e3, 0xa4e4, 0xa4e5, 0xa4e6, 0xa4e7, /*0x80-0x87*/
03400 0xa4e8, 0xa4e9, 0xa4ea, 0xa4eb, 0xa4ec, 0xa4ed, 0xa4ee, 0xa4ef, /*0x88-0x8f*/
03401 0xa4f0, 0xa4f1, 0xa4f2, 0xa4f3, 0x0000, 0x0000, 0x0000, 0x0000, /*0x90-0x97*/
03402 0x0000, 0x0000, 0x0000, 0xa961, 0xa962, 0xa966, 0xa967, 0x0000, /*0x98-0x9f*/
03403 0x0000, 0xa5a1, 0xa5a2, 0xa5a3, 0xa5a4, 0xa5a5, 0xa5a6, 0xa5a7, /*0xa0-0xa7*/
03404 0xa5a8, 0xa5a9, 0xa5aa, 0xa5ab, 0xa5ac, 0xa5ad, 0xa5ae, 0xa5af, /*0xa8-0xaf*/
03405 0xa5b0, 0xa5b1, 0xa5b2, 0xa5b3, 0xa5b4, 0xa5b5, 0xa5b6, 0xa5b7, /*0xb0-0xb7*/
03406 0xa5b8, 0xa5b9, 0xa5ba, 0xa5bb, 0xa5bc, 0xa5bd, 0xa5be, 0xa5bf, /*0xb8-0xbf*/
03407 0xa5c0, 0xa5c1, 0xa5c2, 0xa5c3, 0xa5c4, 0xa5c5, 0xa5c6, 0xa5c7, /*0xc0-0xc7*/
03408 0xa5c8, 0xa5c9, 0xa5ca, 0xa5cb, 0xa5cc, 0xa5cd, 0xa5ce, 0xa5cf, /*0xc8-0xcf*/
03409 0xa5d0, 0xa5d1, 0xa5d2, 0xa5d3, 0xa5d4, 0xa5d5, 0xa5d6, 0xa5d7, /*0xd0-0xd7*/
03410 0xa5d8, 0xa5d9, 0xa5da, 0xa5db, 0xa5dc, 0xa5dd, 0xa5de, 0xa5df, /*0xd8-0xdf*/
03411 0xa5e0, 0xa5e1, 0xa5e2, 0xa5e3, 0xa5e4, 0xa5e5, 0xa5e6, 0xa5e7, /*0xe0-0xe7*/
03412 0xa5e8, 0xa5e9, 0xa5ea, 0xa5eb, 0xa5ec, 0xa5ed, 0xa5ee, 0xa5ef, /*0xe8-0xef*/
03413 0xa5f0, 0xa5f1, 0xa5f2, 0xa5f3, 0xa5f4, 0xa5f5, 0xa5f6, 0x0000, /*0xf0-0xf7*/
03414 0x0000, 0x0000, 0x0000, 0x0000, 0xa960, 0xa963, 0xa964, 0x0000, /*0xf8-0xff*/
03415 /* 0x3100 */
03416 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa8c5, 0xa8c6, 0xa8c7, /*0x00-0x07*/
03417 0xa8c8, 0xa8c9, 0xa8ca, 0xa8cb, 0xa8cc, 0xa8cd, 0xa8ce, 0xa8cf, /*0x08-0x0f*/
03418 0xa8d0, 0xa8d1, 0xa8d2, 0xa8d3, 0xa8d4, 0xa8d5, 0xa8d6, 0xa8d7, /*0x10-0x17*/
03419 0xa8d8, 0xa8d9, 0xa8da, 0xa8db, 0xa8dc, 0xa8dd, 0xa8de, 0xa8df, /*0x18-0x1f*/
03420 0xa8e0, 0xa8e1, 0xa8e2, 0xa8e3, 0xa8e4, 0xa8e5, 0xa8e6, 0xa8e7, /*0x20-0x27*/
03421 0xa8e8, 0xa8e9, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x28-0x2f*/
03422 };
03423 static const unsigned short cp936ext_page0644[24] = {
03424 0xa2e5, 0xa2e6, 0xa2e7, 0xa2e8, 0xa2e9, 0xa2ea, 0xa2eb, 0xa2ec, /*0x20-0x27*/
03425 0xa2ed, 0xa2ee, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x28-0x2f*/
03426 0x0000, 0xa95a, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x30-0x37*/
03427 };
03428 static const unsigned short cp936ext_page0671[80] = {
03429 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa94a, 0xa94b, /*0x88-0x8f*/
03430 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x90-0x97*/
03431 0x0000, 0x0000, 0x0000, 0x0000, 0xa94c, 0xa94d, 0xa94e, 0x0000, /*0x98-0x9f*/
03432 0x0000, 0xa94f, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xa0-0xaf*/
03433 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xa8-0xaf*/
03434 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xb0-0xb7*/
03435 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xb8-0xbf*/
03436 0x0000, 0x0000, 0x0000, 0x0000, 0xa950, 0x0000, 0x0000, 0x0000, /*0xc0-0xc7*/
03437 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xa951, 0x0000, /*0xc8-0xcf*/
03438 0x0000, 0xa952, 0xa953, 0x0000, 0x0000, 0xa954, 0x0000, 0x0000, /*0xd0-0xd7*/
03439 };
03440 static const unsigned short cp936ext_page09c0[20904] = {
03441 0xd2bb, 0xb6a1, 0x8140, 0xc6df, 0x8141, 0x8142, 0x8143, 0xcdf2, /*0x00-0x07*/
03442 0xd5c9, 0xc8fd, 0xc9cf, 0xcfc2, 0xd8a2, 0xb2bb, 0xd3eb, 0x8144, /*0x08-0x0f*/
03443 0xd8a4, 0xb3f3, 0x8145, 0xd7a8, 0xc7d2, 0xd8a7, 0xcac0, 0x8146, /*0x10-0x17*/
03444 0xc7f0, 0xb1fb, 0xd2b5, 0xb4d4, 0xb6ab, 0xcbbf, 0xd8a9, 0x8147, /*0x18-0x1f*/
03445 0x8148, 0x8149, 0xb6aa, 0x814a, 0xc1bd, 0xd1cf, 0x814b, 0xc9a5, /*0x20-0x27*/
03446 0xd8ad, 0x814c, 0xb8f6, 0xd1be, 0xe3dc, 0xd6d0, 0x814d, 0x814e, /*0x28-0x2f*/
03447 0xb7e1, 0x814f, 0xb4ae, 0x8150, 0xc1d9, 0x8151, 0xd8bc, 0x8152, /*0x30-0x37*/
03448 0xcde8, 0xb5a4, 0xceaa, 0xd6f7, 0x8153, 0xc0f6, 0xbed9, 0xd8af, /*0x38-0x3f*/
03449 0x8154, 0x8155, 0x8156, 0xc4cb, 0x8157, 0xbec3, 0x8158, 0xd8b1, /*0x40-0x47*/
03450 0xc3b4, 0xd2e5, 0x8159, 0xd6ae, 0xcda, 0xd5a7, 0xbaf5, 0xb7a6, /*0x48-0x4f*/
03451 0xc0d6, 0x815a, 0xc6b9, 0xc5d2, 0xc7c7, 0x815b, 0xb9d4, 0x815c, /*0x50-0x57*/
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03452 0xb3cb, 0xd2d2, 0x815d, 0x815e, 0xd8bf, 0xbec5, 0xc6f2, 0xd2b2, /*0x58-0x5f*/
03453 0xcfb0, 0xcfe7, 0x815f, 0x8160, 0x8161, 0x8162, 0xcae9, 0x8163, /*0x60-0x67*/
03454 0x8164, 0xd8c0, 0x8165, 0x8166, 0x8167, 0x8168, 0x8169, 0x816a, /*0x68-0x6f*/
03455 0xc2f2, 0xc2d2, 0x816b, 0xc8e9, 0x816c, 0x816d, 0x816e, 0x816f, /*0x70-0x77*/
03456 0x8170, 0x8171, 0x8172, 0x8173, 0x8174, 0x8175, 0xc7ac, 0x8176, /*0x78-0x7f*/
03457 0x8177, 0x8178, 0x8179, 0x817a, 0x817b, 0x817c, 0xc1cb, 0x817d, /*0x80-0x87*/
03458 0xd3e8, 0xd5f9, 0x817e, 0xcac2, 0xb6fe, 0xd8a1, 0xd3da, 0xbff7, /*0x88-0x8f*/
03459 0x8180, 0xd4c6, 0xbba5, 0xd8c1, 0xcee5, 0xbeae, 0x8181, 0x8182, /*0x90-0x97*/
03460 0xd8a8, 0xd88b, 0xd1c7, 0xd0a9, 0x8184, 0x8185, 0x8186, 0xd8bd, /*0x98-0x9f*/
03461 0xd9ef, 0xcdf6, 0xbfba, 0x8187, 0xbdbb, 0xbaa5, 0xd2e0, 0xb2fa, /*0xa0-0xa7*/
03462 0xbae0, 0xc4b6, 0x8188, 0xcfed, 0xbea9, 0xcda4, 0xc1c1, 0x8189, /*0xa8-0xaf*/
03463 0x818a, 0x818b, 0xc7d7, 0xd9f1, 0x818c, 0xd9f4, 0x818d, 0x818e, /*0xb0-0xb7*/
03464 0x818f, 0x8190, 0xc8cb, 0xd8e9, 0x8191, 0x8192, 0x8193, 0xd2da, /*0xb8-0xbf*/
03465 0xcab2, 0xc8ca, 0xd8ec, 0xd8ea, 0xd8c6, 0xbd6f, 0xc6cd, 0xb3f0, /*0xc0-0xc7*/
03466 0x8194, 0xd8eb, 0xbdf1, 0xbde9, 0x8195, 0xc8d4, 0xb4d3, 0x8196, /*0xc8-0xcf*/
03467 0x8197, 0xc2d8, 0x8198, 0xb2d6, 0xd7d0, 0xcacb, 0xcbfb, 0xd5cc, /*0xd0-0xd7*/
03468 0xb8b6, 0xcfc9, 0x8199, 0x819a, 0x819b, 0xd9da, 0xd8f0, 0xc7aa, /*0xd8-0xdf*/
03469 0x819c, 0xd8ee, 0x819d, 0xb4fa, 0xc1ee, 0xd2d4, 0x819e, 0x819f, /*0xe0-0xef*/
03470 0xd8ed, 0x81a0, 0xd2c7, 0xd8ef, 0xc3c7, 0x81a1, 0x81a2, 0x81a3, /*0xe8-0xef*/
03471 0xd1f6, 0x81a4, 0xd6d9, 0xd8f2, 0x81a5, 0xd8f5, 0xbcf6, 0xbcd9, /*0xf0-0xf7*/
03472 0x81a6, 0x81a7, 0x81a8, 0xc8ce, 0x81a9, 0xb7dd, 0x81aa, 0xb7c2, /*0xf8-0xff*/
03473 /* 0x4f00 */
03474 0x81ab, 0xc6f3, 0x81ac, 0x81ad, 0x81ae, 0x81af, 0x81b0, 0x81b1, /*0x00-0x07*/
03475 0x81b2, 0xd8f8, 0xd2c1, 0x81b3, 0x81b4, 0xccee9, 0xbcbf, 0xb7fc, /*0x08-0x0f*/
03476 0xb7a5, 0xd0dd, 0x81b5, 0x81b6, 0x81b7, 0x81b8, 0x81b9, 0xd6da, /*0x10-0x17*/
03477 0xd3c5, 0xbbe7, 0xbbe1, 0xd8f1, 0x81ba, 0x81bb, 0xc9a1, 0xcdb0, /*0x18-0x1f*/
03478 0xb4ab, 0x81bc, 0xd8f3, 0x81bd, 0xc9cb, 0xd8f6, 0xc2d7, 0xd8f7, /*0x20-0x27*/
03479 0x81be, 0x81bf, 0xcdb1, 0xd8f9, 0x81c0, 0x81c1, 0x81c2, 0xb2ae, /*0x28-0x2f*/
03480 0xb9c0, 0x81c3, 0xd9a3, 0x81c4, 0xb0e9, 0x81c5, 0xc1e6, 0x81c6, /*0x30-0x37*/
03481 0xc9ec, 0x81c7, 0xc9c5, 0x81c8, 0xc9c6, 0xd9a4, 0x81c9, 0x81ca, /*0x38-0x3f*/
03482 0x81cb, 0x81cc, 0x81cd, 0xb5e8, 0x81ce, 0x81cf, 0xb5ab, 0x81d0, /*0x40-0x47*/
03483 0x81d1, 0x81d2, 0x81d3, 0x81d4, 0x81d5, 0xcbeb, 0xb5cd, 0xd7a1, /*0x48-0x4f*/
03484 0xd7f4, 0x81d3, 0x81d6, 0xcce5, 0x81d7, 0xbace, 0x81d8, 0xd9a2, /*0x50-0x57*/
03485 0xd9dc, 0xd3e0, 0xd8fd, 0xb7f0, 0xd7f7, 0xd8fe, 0xd8fa, 0xd9a1, /*0x58-0x5f*/
03486 0xc4e3, 0x81d9, 0x81da, 0xd3b6, 0xd8f4, 0xd9dd, 0x81db, 0xd8fb, /*0x60-0x67*/
03487 0x81dc, 0xc5e5, 0x81dd, 0x81de, 0xc0d0, 0x81df, 0x81e0, 0xd1f0, /*0x68-0x6f*/
03488 0xb0db, 0x81e1, 0x81e2, 0xbcd1, 0xd9a6, 0x81e3, 0xd9a5, 0x81e4, /*0x70-0x77*/
03489 0x81e5, 0x81e6, 0x81e7, 0xd9ac, 0xd9ae, 0x81e8, 0xd9ab, 0xcab9, /*0x78-0x7f*/
03490 0x81e9, 0x81ea, 0x81eb, 0xd9a9, 0xd6b6, 0x81ec, 0x81ed, 0x81ee, /*0x80-0x87*/
03491 0xb3de, 0xd9a8, 0x81ef, 0xc0fd, 0x81f0, 0xcacc, 0x81f1, 0xd9aa, /*0x88-0x8f*/
03492 0x81f2, 0xd9a7, 0x81f3, 0x81f4, 0xd9b0, 0x81f5, 0x81f6, 0xb6b1, /*0x90-0x97*/
03493 0x81f7, 0x81f8, 0x81f9, 0xb9a9, 0x81fa, 0xd2c0, 0x81fb, 0x81fc, /*0x98-0x9f*/
03494 0xcfc0, 0x81fd, 0x81fe, 0xc2c2, 0x8240, 0xbdc4, 0xd5ec, 0xb2e0, /*0xa0-0xa7*/
03495 0xc7c8, 0xbfbf, 0xd9ad, 0x8241, 0xd9af, 0x8242, 0xccee, 0xbaee, /*0xa8-0xaf*/
03496 0x8243, 0x8244, 0x8245, 0x8246, 0x8247, 0xc7d6, 0x8248, 0x8249, /*0xb0-0xb7*/
03497 0x824a, 0x824b, 0x824c, 0x824d, 0x824e, 0x824f, 0x8250, 0xb1e3, /*0xb8-0xbf*/
03498 0x8251, 0x8252, 0x8253, 0xb4d9, 0xb6ed, 0xd9b4, 0x8254, 0x8255, /*0xc0-0xc7*/
03499 0x8256, 0x8257, 0xbfa1, 0x8258, 0x8259, 0x825a, 0xd9de, 0xc7ce, /*0xc8-0xcf*/
03500 0xc0fe, 0xd9b8, 0x825b, 0x825c, 0x825d, 0x825e, 0x825f, 0xcbd7, /*0xd0-0xd7*/
03501 0xb7fd, 0x8260, 0xd9b5, 0x8261, 0xd9b7, 0xb1a3, 0xd3e1, 0xd9b9, /*0xd8-0xdf*/
03502 0x8262, 0xd0c5, 0x8263, 0xd9b6, 0x8264, 0x8265, 0xd9b1, 0x8266, /*0xe0-0xe7*/
03503 0xd9b2, 0xc1a9, 0xd9b3, 0x8267, 0x8268, 0xbcf3, 0xd0de, 0xb8a9, /*0xe8-0xef*/
03504 0x8269, 0xbbee3, 0x826a, 0xd9bd, 0x826b, 0x826c, 0x826d, 0x826e, /*0xf0-0xf7*/
03505 0xd9ba, 0x826f, 0xb0b3, 0x8270, 0x8271, 0x8272, 0xd9c2, 0x8273, /*0xf8-0xff*/
03506 /* 0x5000 */
03507 0x8274, 0x8275, 0x8276, 0x8277, 0x8278, 0x8279, 0x827a, 0x827b, /*0x00-0x07*/
03508 0x827c, 0x827d, 0x827e, 0x8280, 0xd9c4, 0xb1b6, 0x8281, 0xd9bf, /*0x08-0x0f*/
03509 0x8282, 0x8283, 0xb5b9, 0x8284, 0xbef3, 0x8285, 0x8286, 0x8287, /*0x10-0x17*/
03510 0xccec8, 0xbaf2, 0xd2d0, 0x8288, 0xd9c3, 0x8289, 0x828a, 0xbde8, /*0x18-0x1f*/
03511 0x828b, 0xb3ab, 0x828c, 0x828d, 0x828e, 0xd9c5, 0xbbeb, 0x828f, /*0x20-0x27*/
03512 0xd9c6, 0xd9bb, 0xc4df, 0x8290, 0xd9be, 0xd9c1, 0xd9c0, 0x8291, /*0x28-0x2f*/
03513 0x8292, 0x8293, 0x8294, 0x8295, 0x8296, 0x8297, 0x8298, 0x8299, /*0x30-0x37*/
03514 0x829a, 0x829b, 0xd5ae, 0x829c, 0xd6b5, 0x829d, 0xc7e3, 0x829e, /*0x38-0x3f*/
03515 0x829f, 0x82a0, 0x82a1, 0xd9c8, 0x82a2, 0x82a3, 0x82a4, 0xbcd9, /*0x40-0x47*/
03516 0xd9ca, 0x82a5, 0x82a6, 0x82a7, 0xd9cb, 0x82a8, 0xd9cb, 0xc6ab, /*0x48-0x4f*/
03517 0x82a9, 0x82aa, 0x82ab, 0x82ac, 0x82ad, 0xd9c9, 0x82ae, 0x82af, /*0x50-0x57*/
03518 0x82b0, 0x82b1, 0xd7f6, 0x82b2, 0xcda3, 0x82b3, 0x82b4, 0x82b5, /*0x58-0x5f*/
03519 0x82b6, 0x82b7, 0x82b8, 0x82b9, 0x82ba, 0xbda1, 0x82bb, 0x82bc, /*0x60-0x67*/
03520 0x82bd, 0x82be, 0x82bf, 0x82c0, 0xd9cc, 0x82c1, 0x82c2, 0x82c3, /*0x68-0x6f*/
03521 0x82c4, 0x82c5, 0x82c6, 0x82c7, 0x82c8, 0x82c9, 0xc5bc, 0xcdb5, /*0x70-0x77*/
03522 0x82ca, 0x82cb, 0x82cc, 0xd9cd, 0x82cd, 0x82ce, 0xd9ce, 0xb3a5, /*0x78-0x7f*/
03523 0xbffe, 0x82cf, 0x82d0, 0x82d1, 0x82d2, 0xb8b5, 0x82d3, 0x82d4, /*0x80-0x87*/
03524 0xc0fc, 0x82d5, 0x82d6, 0x82d7, 0x82d8, 0xb0f8, 0x82d9, 0x82da, /*0x88-0x8f*/
03525 0x82db, 0x82dc, 0x82dd, 0x82de, 0x82df, 0x82e0, 0x82e1, 0x82e2, /*0x90-0x97*/
03526 0x82e3, 0x82e4, 0x82e5, 0x82e6, 0x82e7, 0x82e8, 0x82e9, 0x82ea, /*0x98-0x9f*/
03527 0x82eb, 0x82ec, 0x82ed, 0xb4f6, 0x82ee, 0xd9ce, 0x82ef, 0xd9cf, /*0xa0-0xa7*/
03528 0xb4a2, 0xd9d0, 0x82ef, 0x82f0, 0xb4df, 0x82f1, 0x82f2, 0x82f3, 0x82f4, /*0xa8-0xaf*/
03529 0x82f5, 0x82f6, 0xb0c1, 0x82f7, 0x82f8, 0x82f9, 0x82fa, 0x82fb, /*0xb0-0xb7*/
03530 0x82fc, 0x82fd, 0xd9d1, 0xc9b5, 0x82fe, 0x8340, 0x8341, 0x8342, /*0xb8-0xbf*/
03531 0x8343, 0x8344, 0x8345, 0x8346, 0x8347, 0x8348, 0x8349, 0x834a, /*0xc0-0xc7*/
03532 0x834b, 0x834c, 0x834d, 0x834e, 0x834f, 0x8350, 0x8351, 0xcff1, /*0xc8-0xcf*/
03533 0x8352, 0x8353, 0x8354, 0x8355, 0x8356, 0x8357, 0xd9d2, 0x8358, /*0xd0-0xd7*/
03534 0x8359, 0x835a, 0xc1c5, 0x835b, 0x835c, 0x835d, 0x835e, 0x835f, /*0xd8-0xdf*/
03535 0x8360, 0x8361, 0x8362, 0x8363, 0x8364, 0x8365, 0xd9d6, 0xc9ae, /*0xe0-0xe7*/
03536 0x8366, 0x8367, 0x8368, 0x8369, 0xd9d5, 0xd9d4, 0xd9d3, 0x836a, /*0xe8-0xef*/
03537 0x836b, 0x836c, 0x836d, 0xbcd9, 0x836e, 0xbda9, 0x836f, 0x8370, /*0xf0-0xf7*/
03538 0x8371, 0x8372, 0x8373, 0xc6a7, 0x8374, 0x8375, 0x8376, 0x8377, /*0xf8-0xff*/

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03539 /* 0x5100 */
03540 0x8378, 0x8379, 0x837a, 0x837b, 0x837c, 0x837d, 0xd9d3, 0xd9d8, /*0x00-0x07*/
03541 0x837e, 0x8380, 0x8381, 0xd9d9, 0x8382, 0x8383, 0x8384, 0x8385, /*0x08-0x0f*/
03542 0x8386, 0x8387, 0xc8e5, 0x8388, 0x8389, 0x838a, 0x838b, 0x838c, /*0x10-0x17*/
03543 0x838d, 0x838e, 0x838f, 0x8390, 0x8391, 0x8392, 0x8393, 0x8394, /*0x18-0x1f*/
03544 0x8395, 0xc0dc, 0x8396, 0x8397, 0x8398, 0x8399, 0x839a, 0x839b, /*0x20-0x27*/
03545 0x839c, 0x839d, 0x839e, 0x839f, 0x83a0, 0x83a1, 0x83a2, 0x83a3, /*0x28-0x2f*/
03546 0x83a4, 0x83a5, 0x83a6, 0x83a7, 0x83a8, 0x83a9, 0x83aa, 0x83ab, /*0x30-0x37*/
03547 0x83ac, 0x83ad, 0x83ae, 0x83af, 0x83b0, 0x83b1, 0x83b2, 0xb6f9, /*0x38-0x3f*/
03548 0xd8a3, 0xd4ca, 0x83b3, 0xd4aa, 0xd0d6, 0xb3e4, 0xd5d7, 0x83b4, /*0x40-0x47*/
03549 0xcfc8, 0xb9e2, 0x83b5, 0xbfcf, 0x83b6, 0xc3e2, 0x83b7, 0x83b8, /*0x48-0x4f*/
03550 0x83b9, 0xb6d2, 0x83ba, 0x83bb, 0xc0dc, 0xd9ee, 0xd9f0, 0x83bc, /*0x50-0x57*/
03551 0x83bd, 0x83be, 0xb5b3, 0x83bf, 0xb6b5, 0x83c0, 0x83c1, 0x83c2, /*0x58-0x5f*/
03552 0x83c3, 0x83c4, 0xbea4, 0x83c5, 0x83c6, 0xc8eb, 0x83c7, 0x83c8, /*0x60-0x67*/
03553 0xc8ab, 0x83c9, 0x83ca, 0xb9ab, 0xc1f9, 0xd9e2, 0x83cb, /*0x68-0x6f*/
03554 0xc0bc, 0xb9b2, 0x83cc, 0xb9d8, 0xd0cb, 0xb1f8, 0xc6e4, 0xbdf, /*0x70-0x77*/
03555 0xb5e4, 0xd7c8, 0x83cd, 0xd1f8, 0xbce6, 0xcade, 0x83ce, 0x83cf, /*0x78-0x7f*/
03556 0xbcb2, 0xd9e6, 0xd8e7, 0x83d0, 0x83d1, 0xc4da, 0x83d2, 0x83d3, /*0x80-0x87*/
03557 0xb8d4, 0xc8bd, 0x83d4, 0x83d5, 0xb2e1, 0xd4d9, 0x83d6, 0x83d7, /*0x88-0x8f*/
03558 0x83d8, 0x83d9, 0xc3b0, 0x83da, 0x83db, 0xc3e1, 0xdaa2, 0xc8df, /*0x90-0x97*/
03559 0x83dc, 0xd0bd, 0x83dd, 0xbefc, 0xc5a9, 0x83de, 0x83df, 0x83e0, /*0x98-0x9f*/
03560 0xb9da, 0x83e1, 0xdaa3, 0x83e2, 0xd4a9, 0xdaa4, 0x83e3, 0x83e4, /*0xa0-0xa7*/
03561 0x83e5, 0x83e6, 0x83e7, 0xd9fb, 0xb6ac, 0x83e8, 0x83e9, 0xb7eb, /*0xa8-0xaf*/
03562 0xb1f9, 0xd9fc, 0xb3e5, 0xb3f6, 0x83ea, 0xbff6, 0xd2b2, 0xc0e4, /*0xb0-0xb7*/
03563 0x83eb, 0x83ec, 0x83ed, 0xb6b3, 0xd9fe, 0xd9fd, 0x83ee, 0x83ef, /*0xb8-0xbf*/
03564 0xbebb, 0x83f0, 0x83f1, 0x83f2, 0xc6e0, 0x83f3, 0xd7bc, 0xdaa1, /*0xc0-0xc7*/
03565 0x83f4, 0xc1b9, 0x83f5, 0xb5f2, 0xc1e8, 0x83f6, 0x83f7, 0xbcf5, /*0xc8-0xcf*/
03566 0x83f8, 0xb4d5, 0x83f9, 0x83fa, 0x83fb, 0x83fc, 0x83fd, 0x83fe, /*0xd0-0xd7*/
03567 0x8440, 0x8441, 0x8442, 0xc1dd, 0x8443, 0xc4fd, 0x8444, 0x8445, /*0xd8-0xdf*/
03568 0xbcb8, 0xb7b2, 0x8446, 0x8447, 0xb7ef, 0x8448, 0x8449, 0x844a, /*0xe0-0xe7*/
03569 0x844b, 0x844c, 0x844d, 0xd9ec, 0x844e, 0xc6be, 0x844f, 0xbfad, /*0xe8-0xef*/
03570 0xbcb, 0x8450, 0x8451, 0xb5ca, 0x8452, 0xdbc9, 0xd0d7, 0x8453, /*0xf0-0xf7*/
03571 0xcdb9, 0xb0bc, 0xb3f6, 0xbbf7, 0xdbca, 0xbaaf, 0x8454, 0xd4e4, /*0xf8-0xff*/
03572 /* 0x5200 */
03573 0xb5b6, 0xb5f3, 0xd8d6, 0xc8d0, 0x8455, 0x8456, 0xb7d6, 0xc7d0, /*0x00-0x07*/
03574 0xd8d7, 0x8457, 0xbfaf, 0x8458, 0x8459, 0xd8db, 0xd8d8, 0x845a, /*0x08-0x0f*/
03575 0x845b, 0xd0cc, 0xbbae, 0x845c, 0x845d, 0x845e, 0xebbe, 0xc1d0, /*0x10-0x17*/
03576 0xc1f5, 0xd4f2, 0xb8d5, 0xb4b4, 0x845f, 0xb3f5, 0x8460, 0x8461, /*0x18-0x1f*/
03577 0xc9be, 0x8462, 0x8463, 0x8464, 0xc5d0, 0x8465, 0x8466, 0x8467, /*0x20-0x27*/
03578 0xc5d9, 0xc0fb, 0x8468, 0xb1f0, 0x8469, 0xd8d9, 0xb9ce, 0x846a, /*0x28-0x2f*/
03579 0xb5bd, 0x846b, 0x846c, 0xd8da, 0x846d, 0x846e, 0xd6c6, 0xcba2, /*0x30-0x37*/
03580 0xc8af, 0xc9b2, 0xb4cc, 0xbfcc, 0x846f, 0xb9f4, 0x8470, 0xd8db, /*0x38-0x3f*/
03581 0xd8dc, 0xb6e7, 0xbcc1, 0xccea, 0x8471, 0x8472, 0x8473, 0x8474, /*0x40-0x47*/
03582 0x8475, 0x8476, 0xcff7, 0x8477, 0xd8dd, 0xc7b0, 0x8478, 0x8479, /*0x48-0x4f*/
03583 0xb9d0, 0xbda3, 0x847a, 0x847b, 0xc0de, 0x847c, 0xc6ca, 0x847d, /*0x50-0x57*/
03584 0x847e, 0x8480, 0x8481, 0x8482, 0xd8e0, 0x8483, 0xd8de, 0x8484, /*0x58-0x5f*/
03585 0x8485, 0xd8df, 0x8486, 0x8487, 0x8488, 0xb0fe, 0x8489, 0xbee7, /*0x60-0x67*/
03586 0x848a, 0xc8aa, 0xbcf4, 0x848b, 0x848c, 0x848d, 0x848e, 0x848f, /*0x68-0x6f*/
03587 0x848f, 0x8490, 0xb8ee, 0x8491, 0x8492, 0x8493, 0x8494, 0x8495, /*0x70-0x77*/
03588 0x8496, 0x8497, 0x8498, 0x8499, 0x849a, 0xd8e2, 0x849b, 0xbdc, /*0x78-0x7f*/
03589 0x849c, 0xd8e3, 0x849d, 0x849e, 0x849f, 0x84a0, 0x84a1, /*0x80-0x87*/
03590 0xc5fc, 0x84a2, 0x84a3, 0x84a4, 0x84a5, 0x84a6, 0x84a7, 0x84a8, /*0x88-0x8f*/
03591 0xd8e5, 0x84a9, 0x84aa, 0xd8e6, 0x84ab, 0x84ac, 0x84ad, 0x84ae, /*0x90-0x97*/
03592 0x84af, 0x84b0, 0x84b1, 0xc1a6, 0x84b2, 0xc8b0, 0xb0ec, 0xb9a6, /*0x98-0x9f*/
03593 0xbcd3, 0xcelf, 0xd8bd, 0xc1d3, 0x84b3, 0x84b4, 0x84b5, 0x84b6, /*0xa0-0xaf*/
03594 0xb6af, 0xd6fa, 0xc5ac, 0xbdd9, 0xbbe, 0xbbf, 0x84b7, 0x84b8, /*0xa8-0xaf*/
03595 0x84b9, 0xc0f8, 0xbea2, 0xc0cd, 0x84ba, 0x84bb, 0x84bc, 0x84bd, /*0xb0-0xb7*/
03596 0x84be, 0x84bf, 0x84c0, 0x84c1, 0x84c2, 0x84c3, 0xdbc0, 0xcac6, /*0xb8-0xbf*/
03597 0x84c4, 0x84c5, 0x84c6, 0xb2aa, 0x84c7, 0x84c8, 0x84c9, 0xd3c2, /*0xc0-0xc7*/
03598 0x84ca, 0xc3e3, 0x84cb, 0xd1ab, 0x84cc, 0x84cd, 0x84ce, 0x84cf, /*0xc8-0xcf*/
03599 0xdbc2, 0x84d0, 0xc0d5, 0x84d1, 0x84d2, 0x84d3, 0xdbc3, 0x84d4, /*0xd0-0xd7*/
03600 0xbfb1, 0x84d5, 0x84d6, 0x84d7, 0x84d8, 0x84d9, 0x84da, 0xc4bc, /*0xd8-0xdf*/
03601 0x84db, 0x84dc, 0x84dd, 0x84de, 0xc7da, 0x84df, 0x84e0, 0x84e1, /*0xe0-0xe7*/
03602 0x84e2, 0x84e3, 0x84e4, 0x84e5, 0x84e6, 0x84e7, 0x84e8, 0x84e9, /*0xe8-0xef*/
03603 0xdbc4, 0x84ea, 0x84eb, 0x84ec, 0x84ed, 0x84ee, 0x84ef, 0x84f0, /*0xf0-0xf7*/
03604 0x84f1, 0xd9e8, 0xc9d7, 0x84f2, 0x84f3, 0x84f4, 0xb9b4, 0xcfe0, /*0xf8-0xff*/
03605 /* 0x5300 */
03606 0xd4c8, 0x84f5, 0x84f6, 0x84f7, 0x84f8, 0xb0fc, 0xb4d2, 0x84f9, /*0x00-0x07*/
03607 0xd0d9, 0x84fa, 0x84fb, 0x84fc, 0x84fd, 0xd9e9, 0x84fe, 0xdec, /*0x08-0x0f*/
03608 0xd9eb, 0x8540, 0x8541, 0x8542, 0x8543, 0xd8b0, 0xbba, 0xb1b1, /*0x10-0x17*/
03609 0x8544, 0xb3d7, 0xd8ce, 0x8545, 0x8546, 0xd4d1, 0x8547, 0x8548, /*0x18-0x1f*/
03610 0xbdb3, 0xbfe, 0x8549, 0xcfb, 0x854a, 0x854b, 0xd8d0, 0x854c, /*0x20-0x27*/
03611 0x854d, 0x854e, 0xb7cb, 0x854f, 0x8550, 0x8551, 0xd8d1, 0x8552, /*0x28-0x2f*/
03612 0x8553, 0x8554, 0x8555, 0x8556, 0x8557, 0x8558, 0x8559, 0x855a, /*0x30-0x37*/
03613 0x855b, 0xc6a5, 0xc7f8, 0xd2bd, 0x855c, 0x855d, 0xd8d2, 0xc4e4, /*0x38-0x3f*/
03614 0x855e, 0xc8aa, 0x855f, 0xc7a7, 0x8560, 0xd8a6, 0x8561, 0xc9fd, /*0x40-0x47*/
03615 0xc7ee, 0xbdb, 0xb0eb, 0x8562, 0x8563, 0x8564, 0xbba, 0xd0ad, /*0x48-0x4f*/
03616 0x8565, 0xb1b0, 0xd7e4, 0xd7bf, 0x8566, 0xb5a5, 0xc2f4, 0xc4cf, /*0x50-0x57*/
03617 0x8567, 0x8568, 0xb2a9, 0x8569, 0xb2b7, 0x856a, 0xb1e5, 0xdfb2, /*0x58-0x5f*/
03618 0xd5bc, 0xbfa8, 0xc2ac, 0xd8d5, 0xc2b1, 0x856b, 0xd8d4, 0xcd4, /*0x60-0x67*/
03619 0x856c, 0xdae0, 0x856d, 0xcce0, 0x856e, 0x856f, 0xd8b4, 0xc3ae, /*0x68-0x6f*/
03620 0xd3a1, 0xc8a3, 0x8570, 0xbcb4, 0xc8b4, 0xc2d1, 0x8571, 0xbee, /*0x70-0x77*/
03621 0xd0b6, 0x8572, 0xdae1, 0x8573, 0x8574, 0x8575, 0x8576, 0xc7e4, /*0x78-0x7f*/
03622 0x8577, 0x8578, 0xb3a7, 0x8579, 0xb6f2, 0xcfc, 0xc0fa, 0x857a, /*0x80-0x87*/
03623 0x857b, 0xc0f7, 0x857c, 0xd1b9, 0xd1e1, 0xd8c7, 0x857d, 0x857e, /*0x88-0x8f*/
03624 0x8580, 0x8581, 0x8582, 0x8583, 0x8584, 0xb2de, 0x8585, 0x8586, /*0x90-0x97*/
03625 0xc0e5, 0x8587, 0xbaf1, 0x8588, 0x8589, 0xd8c8, 0x858a, 0xd4ad, /*0x98-0x9f*/
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03626 0x858b, 0x858c, 0xcfe1, 0xd8c9, 0x858d, 0xd8ca, 0xcfc3, 0x858e, /*0xa0-0xa7*/
03627 0xb3f8, 0xbec7, 0x858f, 0x8590, 0x8591, 0x8592, 0xd8cb, 0x8593, /*0xa8-0xaf*/
03628 0x8594, 0x8595, 0x8596, 0x8597, 0x8598, 0x8599, 0xd8cc, 0x859a, /*0xb0-0xb7*/
03629 0x859b, 0x859c, 0x859d, 0xc8a5, 0x859e, 0x859f, 0x85a0, 0xcfd8, /*0xb8-0xbf*/
03630 0x85a1, 0xc8fe, 0xb2ce, 0x85a2, 0x85a3, 0x85a4, 0x85a5, 0x85a6, /*0xc0-0xc7*/
03631 0xd3d6, 0xb2e6, 0xbcb0, 0xd3d1, 0xc8ab, 0xb7b4, 0x85a7, 0x85a8, /*0xc8-0xcf*/
03632 0x85a9, 0xb7a2, 0x85aa, 0x85ab, 0xcae5, 0x85ac, 0xc8a1, 0xcadc, /*0xd0-0xd7*/
03633 0xb1e4, 0xd0f0, 0x85ad, 0xc5d1, 0x85ae, 0x85af, 0x85b0, 0xd8c5, /*0xd8-0xdf*/
03634 0xb5fe, 0x85b1, 0x85b2, 0xbfda, 0xb9c5, 0xbee4, 0xc1ed, 0x85b3, /*0xe0-0xe7*/
03635 0xdfb6, 0xdfb5, 0xd6bb, 0xbdd0, 0xd5d9, 0xb0c8, 0xb6a3, 0xbfc9, /*0xe8-0xef*/
03636 0xccca8, 0xdfb3, 0xcab7, 0xd3d2, 0x85b4, 0xd8cf, 0xd2b6, 0xbac5, /*0xf0-0xf7*/
03637 0xcbb6, 0xcbb6, 0x85b5, 0xdfb7, 0xb5f0, 0xdfb4, 0x85b6, 0x85b7, /*0xf8-0xff*/
03638 /* 0x5400 */
03639 0x85b8, 0xd3f5, 0x85b9, 0xb3d4, 0xb8f7, 0x85ba, 0xdfba, 0x85bb, /*0x00-0x07*/
03640 0xbacf, 0xbcaa, 0xb5f5, 0x85bc, 0xcdac, 0xc3fb, 0xbaf3, 0xc0f4, /*0x08-0x0f*/
03641 0xcdc2, 0xcff2, 0xdfb8, 0xcfc5, 0x85bd, 0xc2c0, 0xdfb9, 0xc2f0, /*0x10-0x17*/
03642 0x85be, 0x85bf, 0x85c0, 0xbefd, 0x85c1, 0xc1df, 0xcdcc, 0xd2f7, /*0x18-0x1f*/
03643 0xb7cd, 0x85c1, 0x85c2, 0xdfc4, 0x85c3, 0x85c4, 0xb7f1, 0xb0c9, /*0x20-0x27*/
03644 0xb6d6, 0xb7d4, 0x85c5, 0xbaac, 0xccfd, 0xbfda, 0xcbb1, 0xc6f4, /*0x28-0x2f*/
03645 0x85c6, 0xd6a8, 0xdfc5, 0x85c7, 0xcee2, 0xb3b3, 0x85c8, 0x85c9, /*0x30-0x37*/
03646 0xcfcf, 0xb4b5, 0x85ca, 0xcfc7, 0xbaf0, 0x85cb, 0xcee1, 0x85cc, /*0x38-0x3f*/
03647 0xd1bd, 0x85cd, 0x85ce, 0xdfc0, 0x85cf, 0x85d0, 0xb4f4, 0x85d1, /*0x40-0x47*/
03648 0xb3ca, 0x85d2, 0xb8e6, 0xdfbb, 0x85d3, 0x85d4, 0x85d5, 0x85d6, /*0x48-0x4f*/
03649 0xc4c5, 0x85d7, 0xdfbc, 0xdfbe, 0xc5bb, 0xdfbf, 0xdfc2, /*0x50-0x57*/
03650 0xd4b1, 0xdfc3, 0x85d8, 0xc7ba, 0xcdc8, 0x85d9, 0x85da, 0x85db, /*0x58-0x5f*/
03651 0x85dc, 0x85dd, 0xc4d8, 0x85de, 0xdfca, 0x85df, 0xdfc1, 0x85e0, /*0x60-0x67*/
03652 0xd6dc, 0x85e1, 0x85e2, 0x85e3, 0x85e4, 0x85e5, 0x85e6, 0x85e7, /*0x68-0x6f*/
03653 0x85e8, 0xdfc9, 0xdfda, 0xceb6, 0x85e9, 0xbac7, 0xdfce, 0xdfc8, /*0x70-0x77*/
03654 0xc5de, 0x85ea, 0x85eb, 0xc9eb, 0xbaf4, 0xc3fc, 0x85ec, 0x85ed, /*0x78-0x7f*/
03655 0xbed7, 0x85ee, 0xdfc6, 0x85ef, 0xdfcd, 0x85f0, 0xc5d5, 0x85f1, /*0x80-0x87*/
03656 0x85f2, 0x85f3, 0x85f4, 0xd5a6, 0xbacd, 0x85f5, 0xbecc, 0xd3bd, /*0x88-0x8f*/
03657 0xb8c0, 0x85f6, 0xd6e4, 0x85f7, 0xdfc7, 0xb9be, 0xbfa7, 0x85f8, /*0x90-0x97*/
03658 0x85f9, 0xc1fc, 0xdfcb, 0xdfc1, 0x85fa, 0xdfd0, 0x85fb, 0x85fc, /*0x98-0x9f*/
03659 0x85fd, 0x85fe, 0x8640, 0xdfdb, 0xdfe5, 0x8641, 0xdfd7, 0xdfd6, /*0xa0-0xa7*/
03660 0xd7c9, 0xdfc3, 0xdfc4, 0xe5eb, 0xd2a7, 0xdfd2, 0x8642, 0xbfa9, /*0xa8-0xaf*/
03661 0x8643, 0x8644, 0x8645, 0xbfc8, 0xdfd4, 0x8646, 0x8647, 0x8648, /*0xb0-0xb7*/
03662 0xcfcc, 0x8648, 0x8649, 0xdfdd, 0x864a, 0xd1ca, 0x864b, 0xdfde, /*0xb8-0xbf*/
03663 0xb0a7, 0xc6b7, 0xdfd3, 0x864c, 0xbae5, 0x864d, 0xb6df, 0xcddb, /*0xc0-0xc7*/
03664 0xb9fe, 0xd4d5, 0x864e, 0x864f, 0xdfdf, 0xcfcf, 0xb0a5, 0xdfef, /*0xc8-0xcf*/
03665 0xdfd1, 0xd1c6, 0xdfd5, 0xdfd8, 0xdfd9, 0xdfdc, 0x8650, 0xbba9, /*0xd0-0xd7*/
03666 0x8651, 0xdfef, 0xdfef, 0x8652, 0xdfef, 0xdfef, 0xdfef, 0xd3b4, /*0xd8-0xdf*/
03667 0x8653, 0x8654, 0x8655, 0x8656, 0x8657, 0xb8e7, 0xc5b6, 0xdfef, /*0xe0-0xe7*/
03668 0xc9da, 0xc1a8, 0xc4c4, 0x8658, 0x8659, 0xbfd6, 0xcff8, 0x865a, /*0xe8-0xef*/
03669 0x865b, 0x865c, 0xd5dc, 0xdfef, 0x865d, 0x865e, 0x865f, 0x8660, /*0xf0-0xf7*/
03670 0x8661, 0x8662, 0xb2b8, 0xbad6, 0xdfef, 0x8663, 0xbad6, 0x8664, 0xd8c1, /*0xf8-0xff*/
03671 /* 0x5500 */
03672 0x8665, 0xd1e4, 0x8666, 0x8667, 0x8668, 0x8669, 0xcbf4, 0xb4bd, /*0x00-0x07*/
03673 0x866a, 0xb0a6, 0x866b, 0x866c, 0x866d, 0x866e, 0x866f, 0xdf1f, /*0x08-0x0f*/
03674 0xccc6, 0xdff2, 0x8670, 0x8671, 0xdfed, 0x8672, 0x8673, 0x8674, /*0x10-0x17*/
03675 0x8675, 0x8676, 0x8677, 0xdfef, 0x8678, 0x8679, 0x867a, 0x867b, /*0x18-0x1f*/
03676 0xdfef, 0x867c, 0xdfef, 0xdfef, 0x867d, 0x867e, 0x867f, 0xdf1f, /*0x20-0x27*/
03677 0x8680, 0x8681, 0xdfef, 0x8682, 0xbba3, 0x8683, 0xcadb, 0xcea8, /*0x28-0x2f*/
03678 0xe0a7, 0xb3aa, 0x8684, 0xe0a6, 0x8685, 0x8686, 0x8687, 0xe0a1, /*0x30-0x37*/
03679 0x8688, 0x8689, 0x868a, 0x868b, 0xdfef, 0x868c, 0xcdc9, 0xdfc1, /*0x38-0x3f*/
03680 0x868d, 0xdfef, 0x868e, 0xbfd0, 0xd7c4, 0x868f, 0xc9cc, 0x8690, /*0x40-0x47*/
03681 0x8691, 0xdfef, 0xb0a1, 0x8692, 0x8693, 0x8694, 0x8695, 0x8696, /*0x48-0x4f*/
03682 0xdfef, 0x8697, 0x8698, 0x8699, 0x869a, 0xdfef, 0xe0a2, 0x869b, /*0x50-0x57*/
03683 0x869c, 0x869d, 0x869e, 0x869f, 0xe0a8, 0x86a0, 0x86a1, 0x86a2, /*0x58-0x5f*/
03684 0x86a3, 0xb7c8, 0x86a4, 0x86a5, 0xc6a1, 0xc9b6, 0xc0b2, 0xdf1f, /*0x60-0x67*/
03685 0x86a6, 0x86a7, 0xc5be, 0x86a8, 0xd8c4, 0xdfef, 0xc4f6, 0x86a9, /*0x68-0x6f*/
03686 0x86aa, 0x86ab, 0x86ac, 0x86ad, 0x86ae, 0xe0a3, 0xe0a4, 0xe0a5, /*0x70-0x77*/
03687 0xd0a5, 0x86af, 0x86b0, 0xe0b4, 0xcce4, 0x86b1, 0xe0b1, 0x86b2, /*0x78-0x7f*/
03688 0xbfa6, 0xe0af, 0xcceb, 0xe0ab, 0xc9c6, 0xc9b3, 0x86b4, 0xc0ae, /*0x80-0x87*/
03689 0xe0ae, 0xbaed, 0xbab0, 0xe0a9, 0x86b5, 0x86b6, 0x86b7, 0xdf1f, /*0x88-0x8f*/
03690 0x86b8, 0xe0b3, 0x86b9, 0x86ba, 0xe0b8, 0x86bb, 0x86bc, 0x86bd, /*0x90-0x97*/
03691 0xb4ad, 0xe0b9, 0x86be, 0x86bf, 0xcfb2, 0xbac8, 0x86c0, 0xe0b0, /*0x98-0x9f*/
03692 0x86c1, 0x86c2, 0x86c3, 0x86c4, 0x86c5, 0x86c6, 0x86c7, 0xd0fa, /*0xa0-0xa7*/
03693 0x86c8, 0x86c9, 0x86ca, 0x86cb, 0x86cc, 0x86cd, 0x86ce, 0x86cf, /*0xa8-0xaf*/
03694 0x86d0, 0xe0ac, 0x86d1, 0xd4fb, 0x86d2, 0xdf1f, 0x86d3, 0xc5e7, /*0xb0-0xb7*/
03695 0x86d4, 0xe0ad, 0x86d5, 0xd3f7, 0x86d6, 0xe0b6, 0xe0b7, 0x86d7, /*0xb8-0xbf*/
03696 0x86d8, 0x86d9, 0x86da, 0x86db, 0xe0c4, 0xd0e1, 0x86dc, 0x86dd, /*0xc0-0xc7*/
03697 0x86de, 0xe0bc, 0x86df, 0x86e0, 0xe0c9, 0xe0ca, 0x86e1, 0x86e2, /*0xc8-0xcf*/
03698 0x86e3, 0xe0be, 0xe0aa, 0xc9a4, 0xe0c1, 0x86e4, 0xe0b2, 0x86e5, /*0xd0-0xd7*/
03699 0x86e6, 0x86e7, 0x86e8, 0x86e9, 0xcac8, 0xe0c3, 0x86ea, 0xe0b5, /*0xd8-0xdf*/
03700 0x86eb, 0xcceb, 0x86ec, 0xcbc3, 0xe0cd, 0xe0c6, 0xe0c2, 0x86ed, /*0xe0-0xe7*/
03701 0xe0cb, 0x86ee, 0xe0ba, 0xe0bf, 0xe0c0, 0x86ef, 0x86f0, 0xe0c5, /*0xe8-0xef*/
03702 0x86f1, 0x86f2, 0xe0c7, 0xe0c8, 0x86f3, 0xe0cc, 0x86f4, 0xe0bb, /*0xf0-0xf7*/
03703 0x86f5, 0x86f6, 0x86f7, 0x86f8, 0x86f9, 0xcdb4, 0xe0d5, 0x86fa, /*0xf8-0xff*/
03704 /* 0x5600 */
03705 0xe0d6, 0xe0d2, 0x86fb, 0x86fc, 0x86fd, 0x86fe, 0x8740, 0x8741, /*0x00-0x07*/
03706 0xe0d0, 0xbcce, 0x8742, 0x8743, 0xe0d1, 0x8744, 0xb8c2, 0xd8c5, /*0x08-0x0f*/
03707 0x8745, 0x8746, 0x8747, 0x8748, 0x8749, 0x874a, 0x874b, 0x874c, /*0x10-0x17*/
03708 0xd0ea, 0x874d, 0x874e, 0xc2ef, 0x874f, 0x8750, 0xe0cf, 0xe0bd, /*0x18-0x1f*/
03709 0x8751, 0x8752, 0x8753, 0xe0d4, 0xe0d3, 0x8754, 0x8755, 0xe0d7, /*0x20-0x27*/
03710 0x8756, 0x8757, 0x8758, 0x8759, 0xe0dc, 0xe0d8, 0x875a, 0x875b, /*0x28-0x2f*/
03711 0x875c, 0xd6f6, 0xb3b0, 0x875d, 0xd7ec, 0x875e, 0xcbb6, 0x875f, /*0x30-0x37*/
03712 0x8760, 0xe0da, 0x8761, 0xcfeb, 0x8762, 0x8763, 0x8764, 0xbad9, /*0x38-0x3f*/

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03713 0x8765, 0x8766, 0x8767, 0x8768, 0x8769, 0x876a, 0x876b, 0x876c, /*0x40-0x47*/
03714 0x876d, 0x876e, 0x876f, 0x8770, 0xe0e1, 0xe0dd, 0xd2ad, 0x8771, /*0x48-0x4f*/
03715 0x8772, 0x8773, 0x8774, 0x8775, 0xe0e2, 0x8776, 0x8777, 0xe0db, /*0x50-0x57*/
03716 0xe0d9, 0xe0df, 0x8778, 0x8779, 0xe0e0, 0x877a, 0x877b, 0x877c, /*0x58-0x5f*/
03717 0x877d, 0x877e, 0xe0de, 0x8780, 0xe0e4, 0x8781, 0x8782, 0x8783, /*0x60-0x67*/
03718 0xc6f7, 0xd8ac, 0xd4eb, 0xe0e6, 0xcac9, 0x8784, 0x8785, 0x8786, /*0x68-0x6f*/
03719 0x8787, 0xe0e5, 0x8788, 0x8789, 0x878a, 0x878b, 0xb8c1, 0x878c, /*0x70-0x77*/
03720 0x878d, 0x878e, 0x878f, 0xe0e7, 0xe0e8, 0x8790, 0x8791, 0x8792, /*0x78-0x7f*/
03721 0x8793, 0x8794, 0x8795, 0x8796, 0x8797, 0xe0e9, 0xe0e3, 0x8798, /*0x80-0x87*/
03722 0x8799, 0x879a, 0x879b, 0x879c, 0x879d, 0x879e, 0xbabf, 0xcce7, /*0x88-0x8f*/
03723 0x879f, 0x87a0, 0x87a1, 0xe0ea, 0x87a2, 0x87a3, 0x87a4, 0x87a5, /*0x90-0x97*/
03724 0x87a6, 0x87a7, 0x87a8, 0x87a9, 0x87aa, 0x87ab, 0x87ac, 0x87ad, /*0x98-0x9f*/
03725 0x87ae, 0x87af, 0x87b0, 0xcff9, 0x87b1, 0x87b2, 0x87b3, 0x87b4, /*0xa0-0xaf*/
03726 0x87b5, 0x87b6, 0x87b7, 0x87b8, 0x87b9, 0x87ba, 0x87bb, 0xe0eb, /*0xab-0xaf*/
03727 0x87bc, 0x87bd, 0x87be, 0x87bf, 0x87c0, 0x87c1, 0x87c2, 0xc8c2, /*0xb0-0xbf*/
03728 0x87c3, 0x87c4, 0x87c5, 0x87c6, 0xbdc0, 0x87c7, 0x87c8, 0x87c9, /*0xb8-0xbf*/
03729 0x87ca, 0x87cb, 0x87cc, 0x87cd, 0x87ce, 0x87cf, 0x87d0, 0x87d1, /*0xc0-0xcf*/
03730 0x87d2, 0x87d3, 0xc4d2, 0x87d4, 0x87d5, 0x87d6, 0x87d7, 0x87d8, /*0xc8-0xcf*/
03731 0x87d9, 0x87da, 0x87db, 0x87dc, 0xe0ec, 0x87dd, 0x87de, 0xe0ed, /*0xd0-0xd7*/
03732 0x87df, 0x87e0, 0xc7f4, 0xcbbc4, 0x87e1, 0xe0ee, 0xbbd8, 0xd8b6, /*0xd8-0xdf*/
03733 0xd2f2, 0xe0ef, 0xcdc5, 0x87e2, 0xb6da, 0x87e3, 0x87e4, 0x87e5, /*0xe0-0xef*/
03734 0x87e6, 0x87e7, 0x87e8, 0xe0f1, 0x87e9, 0xd4b0, 0x87ea, 0x87eb, /*0xe8-0xef*/
03735 0xc0a7, 0xb4d1, 0x87ec, 0x87ed, 0xcea7, 0xe0f0, 0x87ee, 0x87ef, /*0xf0-0xf7*/
03736 0x87f0, 0xe0f2, 0xb9cc, 0x87f1, 0x87f2, 0xb9fa, 0xcdbc, 0xe0f3, /*0xf8-0xff*/
03737 /* 0x5700 */
03738 0x87f3, 0x87f4, 0x87f5, 0xc6d4, 0xe0f4, 0x87f6, 0xd4b2, 0x87f7, /*0x00-0x07*/
03739 0xc8a6, 0xe0f6, 0xe0f5, 0x87f8, 0xe0f5, 0x87f9, 0x87fa, 0x87fb, /*0x08-0x0f*/
03740 0x87fd, 0x87fe, 0x8840, 0x8841, 0x8842, 0x8843, 0x8844, 0x8845, /*0x10-0x17*/
03741 0x8846, 0x8847, 0x8848, 0x8849, 0xe0f7, 0x884a, 0x884b, 0xcdc1, /*0x18-0x1f*/
03742 0x884c, 0x884d, 0x884e, 0xc8a5, 0x884f, 0x8850, 0x8851, 0x8852, /*0x20-0x27*/
03743 0xd4da, 0xdbd7, 0xdbd9, 0x8853, 0xdbd8, 0xb9e7, 0xdbdc, 0xdbdd, /*0x28-0x2f*/
03744 0xb5d8, 0x8854, 0x8855, 0xdbda, 0x8856, 0x8857, 0x8858, 0x8859, /*0x30-0x37*/
03745 0x885a, 0xdbdb, 0xb3a1, 0xdbdf, 0x885b, 0x885c, 0xbbf8, 0x885d, /*0x38-0x3f*/
03746 0xdbb7, 0x885e, 0xdbbe, 0x885f, 0x8860, 0x8861, 0x8862, 0xbef9, /*0x40-0x47*/
03747 0x8863, 0x8864, 0xb7bb, 0x8865, 0xdbd0, 0xc8ae, 0xbfb2, 0xbbb5, /*0x48-0x4f*/
03748 0xd7f8, 0xbfd3, 0x8866, 0x8867, 0x8868, 0x8869, 0x886a, 0xbfe9, /*0x50-0x57*/
03749 0x886b, 0x886c, 0xbce1, 0xc8cb3, 0xdbde, 0xb0d3, 0xc8eeb, 0xb7d8, /*0x58-0x5f*/
03750 0xd7b9, 0xc6c2, 0x886d, 0x886e, 0xc0a4, 0x886f, 0xc8cb9, 0x8870, /*0x60-0x67*/
03751 0xdbbe7, 0xdbel1, 0xc6ba, 0xdbe3, 0x8871, 0xdbe8, 0x8872, 0xc5f7, /*0x68-0x6f*/
03752 0x8873, 0x8874, 0x8875, 0xdbea, 0x8876, 0x8877, 0xdbe9, 0xbfc0, /*0x70-0x77*/
03753 0x8878, 0x8879, 0x887a, 0xdbe6, 0xdbe5, 0x887b, 0x887c, 0x887d, /*0x78-0x7f*/
03754 0x887e, 0x8880, 0x8881, 0xc0ac, 0xc2a2, 0xdbe2, 0xdbe4, 0x8881, /*0x80-0x87*/
03755 0x8882, 0x8883, 0x8884, 0xd0cd, 0xdbed, 0x8885, 0x8886, 0x8887, /*0x88-0x8f*/
03756 0x8888, 0x8889, 0xc0dd, 0xdbf2, 0x888a, 0x888b, 0x888c, 0x888d, /*0x90-0x97*/
03757 0x888e, 0x888f, 0x8890, 0xb6e2, 0x8891, 0x8892, 0x8893, 0x8894, /*0x98-0x9f*/
03758 0xdbf3, 0xdbd2, 0xb9b8, 0xd4ab, 0xdbec, 0x8895, 0xbfd1, 0xdbf0, /*0xa0-0xaf*/
03759 0x8896, 0xdbd1, 0x8897, 0xb5e6, 0x8898, 0xdbeb, 0xbfe5, 0x8899, /*0xab-0xaf*/
03760 0x889a, 0x889b, 0xdbee, 0x889c, 0xdbf1, 0x889d, 0x889e, 0x889f, /*0xb0-0xbf*/
03761 0xdbf9, 0x88a0, 0x88a1, 0x88a2, 0x88a3, 0x88a4, 0x88a5, 0x88a6, /*0xb8-0xbf*/
03762 0x88a7, 0x88a8, 0xb9a1, 0xb0a3, 0x88a9, 0x88aa, 0x88ab, 0x88ac, /*0xc0-0xcf*/
03763 0x88ad, 0x88ae, 0x88af, 0xc2f1, 0x88b0, 0x88b1, 0xb3c7, 0xdbef, /*0xc8-0xcf*/
03764 0x88b2, 0x88b3, 0xdbf8, 0x88b4, 0xc6d2, 0xdbf4, 0x88b5, 0x88b6, /*0xd0-0xd7*/
03765 0xdbf5, 0xdbf7, 0xdbf6, 0x88b7, 0x88b8, 0xdbfe, 0x88b9, 0xd3f2, /*0xd8-0xdf*/
03766 0xb2ba, 0x88ba, 0x88bb, 0x88bc, 0xdbfd, 0x88bd, 0x88be, 0x88bf, /*0xe0-0xef*/
03767 0x88c0, 0x88c1, 0x88c2, 0x88c3, 0x88c4, 0xdca4, 0x88c5, 0xdbfb, /*0xe8-0xef*/
03768 0x88c6, 0x88c7, 0x88c8, 0x88c9, 0xdbfa, 0x88ca, 0x88cb, 0x88cc, /*0xf0-0xf7*/
03769 0xdbfc, 0xc5e0, 0xbbf9, 0x88cd, 0x88ce, 0xdca3, 0x88cf, 0x88d0, /*0xf8-0xff*/
03770 /* 0x5800 */
03771 0xdca5, 0x88d1, 0xc8c3, 0x88d2, 0x88d3, 0x88d4, 0xb6d1, 0xddc0, /*0x00-0x07*/
03772 0x88d5, 0x88d6, 0x88d7, 0xdca1, 0x88d8, 0xdca2, 0x88d9, 0x88da, /*0x08-0x0f*/
03773 0x88db, 0xc7b5, 0x88dc, 0x88dd, 0x88de, 0xb6e9, 0x88df, 0x88e0, /*0x10-0x17*/
03774 0x88e1, 0xdca7, 0x88e2, 0x88e3, 0x88e4, 0x88e5, 0xdca6, 0x88e6, /*0x18-0x1f*/
03775 0xdca9, 0xb1a4, 0x88e7, 0x88e8, 0xb5cc, 0x88e9, 0x88ea, 0x88eb, /*0x20-0x27*/
03776 0x88ec, 0x88ed, 0xbfb0, 0x88ee, 0x88ef, 0x88f0, 0x88f1, 0x88f2, /*0x28-0x2f*/
03777 0xd1df, 0x88f3, 0x88f4, 0x88f5, 0x88f6, 0xb6c2, 0x88f7, 0x88f8, /*0x30-0x37*/
03778 0x88f9, 0x88fa, 0x88fb, 0x88fc, 0x88fd, 0x88fe, 0x8940, 0x8941, /*0x38-0x3f*/
03779 0x8942, 0x8943, 0x8944, 0x8945, 0xdca8, 0x8946, 0x8947, 0x8948, /*0x40-0x47*/
03780 0x8949, 0x894a, 0x894b, 0x894c, 0xc8fa, 0xebf3, 0x894d, 0x894e, /*0x48-0x4f*/
03781 0x894f, 0xc8dc, 0x8950, 0x8951, 0xc8fe, 0x8952, 0x8953, 0x8954, /*0x50-0x57*/
03782 0xc8c1, 0x8955, 0x8956, 0x8957, 0x8958, 0x8959, 0xc8fb, 0x895a, /*0x58-0x5f*/
03783 0x895b, 0x895c, 0x895d, 0x895e, 0x895f, 0xdca9, 0x8960, 0x8961, /*0x60-0x67*/
03784 0x8962, 0x8963, 0x8964, 0xc8ee, 0xdcab, 0x8965, 0x8966, 0x8967, /*0x68-0x6f*/
03785 0x8968, 0x8969, 0x896a, 0x896b, 0x896c, 0x896d, 0x896e, 0x896f, /*0x70-0x77*/
03786 0x8970, 0x8971, 0x8972, 0x8973, 0x8974, 0x8975, 0xdbd3, 0x8976, /*0x78-0x7f*/
03787 0xdcaf, 0xdcac, 0x8977, 0xbef3, 0x8978, 0xc8fb, 0x8979, 0x897a, /*0x80-0x87*/
03788 0x897b, 0xdcad, 0x897c, 0x897d, 0x897e, 0x8980, 0x8981, 0x8982, /*0x88-0x8f*/
03789 0x8983, 0x8984, 0xc9ca, 0xc4b9, 0x8985, 0x8986, 0x8987, 0x8988, /*0x90-0x97*/
03790 0x8989, 0xc7bd, 0xdcae, 0x898a, 0x898b, 0x898c, 0xd4f6, 0xd0e6, /*0x98-0x9f*/
03791 0x898d, 0x898e, 0x898f, 0x8990, 0x8991, 0x8992, 0x8993, 0x8994, /*0xa0-0xaf*/
03792 0xc4ab, 0xb6d5, 0x8995, 0x8996, 0x8997, 0x8998, 0x8999, 0x899a, /*0xab-0xaf*/
03793 0x899b, 0x899c, 0x899d, 0x899e, 0x899f, 0x89a0, 0x89a1, 0x89a2, /*0xb0-0xbf*/
03794 0x89a3, 0x89a4, 0x89a5, 0x89a6, 0xdbd4, 0x89a7, 0x89a8, 0x89a9, /*0xb8-0xbf*/
03795 0x89aa, 0xb1da, 0x89ab, 0x89ac, 0x89ad, 0xdbd5, 0x89ae, 0x89af, /*0xc0-0xcf*/
03796 0x89b0, 0x89b1, 0x89b2, 0x89b3, 0x89b4, 0x89b5, 0x89b6, 0x89b7, /*0xc8-0xcf*/
03797 0x89b8, 0xdbdf, 0x89b9, 0x89ba, 0x89bb, 0xbabe, 0x89bc, 0x89bd, /*0xd0-0xd7*/
03798 0x89be, 0x89bf, 0x89c0, 0x89c1, 0x89c2, 0x89c3, 0x89c4, 0x89c5, /*0xd8-0xdf*/
03799 0x89c6, 0x89c7, 0x89c8, 0x89c9, 0xc8c0, 0x89ca, 0x89cb, 0x89cc, /*0xe0-0xef*/
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03800 0x89cd, 0x89ce, 0x89cf, 0xcabf, 0xc8c9, 0x89d0, 0xd7b3, 0x89d1, /*0xe8-0xef*/
03801 0xc9f9, 0x89d2, 0x89d3, 0xbfc7, 0x89d4, 0x89d5, 0xbaf8, 0x89d6, /*0xf0-0xf7*/
03802 0x89d7, 0xd2bc, 0x89d8, 0x89d9, 0x89da, 0x89db, 0x89dc, 0x89dd, /*0xf8-0xff*/
03803 /* 0x5900 */
03804 0x89de, 0x89df, 0xe2ba, 0x89e0, 0xb4a6, 0x89e1, 0x89e2, 0xb1b8, /*0x00-0x07*/
03805 0x89e3, 0x89e4, 0x89e5, 0x89e6, 0x89e7, 0xb8b4, 0x89e8, 0xcfc4, /*0x08-0x0f*/
03806 0x89e9, 0x89ea, 0x89eb, 0x89ec, 0xd9e7, 0xcfa6, 0xcde2, 0x89ed, /*0x10-0x17*/
03807 0x89ee, 0xd9ed, 0xb6e0, 0x89ef, 0xd2b9, 0x89f0, 0x89f1, 0xb9bb, /*0x18-0x1f*/
03808 0x89f2, 0x89f3, 0x89f4, 0x89f5, 0xe2b9, 0xe2b7, 0x89f6, 0xb4f3, /*0x20-0x27*/
03809 0x89f7, 0xccec, 0xccab, 0xb7f2, 0x89f8, 0xd8b2, 0xd1eb, 0xbabb, /*0x28-0x2f*/
03810 0x89f9, 0xcaa7, 0x89fa, 0x89fb, 0xcdb7, 0x89fc, 0x89fd, 0xd2c4, /*0x30-0x37*/
03811 0xbfe4, 0xbcd0, 0xb6e1, 0x89fe, 0xdec5, 0x8a40, 0x8a41, 0x8a42, /*0x38-0x3f*/
03812 0x8a43, 0xdec6, 0xdbbc, 0x8a44, 0xd1d9, 0x8a45, 0x8a46, 0xc6e6, /*0x40-0x47*/
03813 0xc4ce, 0xb7ee, 0x8a47, 0xb7dc, 0x8a48, 0x8a49, 0xbffc, 0xd7e0, /*0x48-0x4f*/
03814 0x8a4a, 0xc6f5, 0x8a4b, 0x8a4c, 0xb1bc, 0xdec8, 0xbdb1, 0xccd7, /*0x50-0x57*/
03815 0xdeca, 0x8a4d, 0xdec9, 0x8a4e, 0x8a4f, 0x8a50, 0x8a51, 0x8a52, /*0x58-0x5f*/
03816 0xb5ec, 0x8a53, 0xc9dd, 0x8a54, 0x8a55, 0xb0c2, 0x8a56, 0x8a57, /*0x60-0x67*/
03817 0x8a58, 0x8a59, 0x8a5a, 0x8a5b, 0x8a5c, 0x8a5d, 0x8a5e, 0x8a5f, /*0x68-0x6f*/
03818 0x8a60, 0x8a61, 0x8a62, 0xc5ae, 0xc5ab, 0x8a63, 0xc4cc, 0x8a64, /*0x70-0x77*/
03819 0xbce9, 0xcbfd, 0x8a65, 0x8a66, 0x8a67, 0xbac3, 0x8a68, 0x8a69, /*0x78-0x7f*/
03820 0x8a6a, 0xe5f9, 0xc8e7, 0xe5fa, 0xcdfd, 0x8a6b, 0xd7b1, 0xb8be, /*0x80-0x87*/
03821 0xc2e8, 0x8a6c, 0xc8d1, 0x8a6d, 0x8a6e, 0xe5fb, 0x8a6f, 0x8a70, /*0x88-0x8f*/
03822 0x8a71, 0x8a72, 0xb6ca, 0xbccb, 0x8a73, 0x8a74, 0xd1fd, 0xe6a1, /*0x90-0x97*/
03823 0x8a75, 0xc3ee, 0x8a76, 0x8a77, 0x8a78, 0x8a79, 0xe6a4, 0x8a7a, /*0x98-0x9f*/
03824 0x8a7b, 0x8a7c, 0x8a7d, 0xe5fe, 0xe6a5, 0xcd77, 0x8a7e, 0x8a80, /*0xa0-0xa7*/
03825 0xb7c1, 0xe5fc, 0xe5fd, 0xe6a3, 0x8a81, 0x8a82, 0xc4dd, 0xe6a8, /*0xa8-0xaf*/
03826 0x8a83, 0x8a84, 0xe6a7, 0x8a85, 0x8a86, 0x8a87, 0x8a88, 0x8a89, /*0xb0-0xb7*/
03827 0x8a8a, 0xc3c3, 0x8a8b, 0xc6de, 0x8a8c, 0x8a8d, 0xe6aa, 0x8a8e, /*0xb8-0xbf*/
03828 0x8a8f, 0x8a90, 0x8a91, 0x8a92, 0x8a93, 0x8a94, 0xc4b7, 0x8a95, /*0xc0-0xc7*/
03829 0x8a96, 0x8a97, 0xe6a2, 0xcabc, 0x8a98, 0x8a99, 0x8a9a, 0x8a9b, /*0xc8-0xcf*/
03830 0xbde3, 0xb9c3, 0xe6a6, 0xd0d5, 0xceaf, 0x8a9c, 0x8a9d, 0xe6a9, /*0xd0-0xd7*/
03831 0xe6b0, 0x8a9e, 0xd2a6, 0x8a9f, 0xbdaa, 0xe6ad, 0x8aa0, 0x8aa1, /*0xd8-0xdf*/
03832 0x8aa2, 0x8aa3, 0x8aa4, 0xe6a5, 0xc0d1, 0x8aa6, 0x8aa7, 0x8aa8, /*0xe0-0xe7*/
03833 0xd2cc, 0x8aa8, 0x8aa9, 0x8aaa, 0xbca7, 0x8aab, 0x8aac, 0x8aad, /*0xe8-0xef*/
03834 0x8aae, 0x8aae, 0x8ab0, 0x8ab1, 0x8ab2, 0x8ab3, 0x8ab4, 0x8ab5, /*0xf0-0xf7*/
03835 0x8ab6, 0xe6b1, 0x8ab7, 0xd2f6, 0x8ab8, 0x8ab9, 0x8aba, 0xd7cb, /*0xf8-0xff*/
03836 /* 0x5a00 */
03837 0x8abb, 0xcdfe, 0x8abc, 0xcdde, 0xc2a6, 0xe6ab, 0xe6ac, 0xbdbf, /*0x00-0x07*/
03838 0xe6ae, 0xe6b3, 0x8abd, 0x8abe, 0xe6b2, 0x8abf, 0x8ac0, 0x8ac1, /*0x08-0x0f*/
03839 0x8ac2, 0xe6b6, 0x8ac3, 0xe6b8, 0x8ac4, 0x8ac5, 0x8ac6, 0x8ac7, /*0x10-0x17*/
03840 0xc4ef, 0x8ac8, 0x8ac9, 0x8aca, 0xc4c8, 0x8acb, 0x8acc, 0xbee, /*0x18-0x1f*/
03841 0xc9ef, 0x8acd, 0x8ace, 0xe6b7, 0x8acf, 0xb6f0, 0x8ad0, 0x8ad1, /*0x20-0x27*/
03842 0x8ad2, 0xc3e4, 0x8ad3, 0x8ad4, 0x8ad5, 0x8ad6, 0x8ad7, 0x8ad8, /*0x28-0x2f*/
03843 0x8ad9, 0xd3e9, 0xe6b4, 0x8ada, 0xe6b5, 0x8adb, 0xc8a2, 0x8adc, /*0x30-0x37*/
03844 0x8add, 0x8ade, 0x8adf, 0x8ae0, 0xe6bd, 0x8ae1, 0x8ae2, 0x8ae3, /*0x38-0x3f*/
03845 0xe6b9, 0x8ae4, 0x8ae5, 0x8ae6, 0x8ae7, 0x8ae8, 0xc6c5, 0x8ae9, /*0x40-0x47*/
03846 0x8aea, 0xcdf1, 0xe6bb, 0x8aeb, 0x8aec, 0x8aed, 0x8aee, 0x8aef, /*0x48-0x4f*/
03847 0x8af0, 0x8af1, 0x8af2, 0x8af3, 0x8af4, 0xe6bc, 0x8af5, 0x8af6, /*0x50-0x57*/
03848 0x8af7, 0x8af8, 0xbbe9, 0x8af9, 0x8afa, 0x8afb, 0x8afc, 0x8afd, /*0x58-0x5f*/
03849 0x8afe, 0x8b40, 0xe6be, 0x8b41, 0x8b42, 0x8b43, 0x8b44, 0xe6ba, /*0x60-0x67*/
03850 0x8b45, 0x8b46, 0xc0b7, 0x8b47, 0x8b48, 0x8b49, 0x8b4a, 0x8b4b, /*0x68-0x6f*/
03851 0x8b4c, 0x8b4d, 0x8b4e, 0x8b4f, 0xd3a4, 0xe6bf, 0xc9f4, 0xe6c3, /*0x70-0x77*/
03852 0x8b50, 0x8b51, 0xe6c4, 0x8b52, 0x8b53, 0x8b54, 0x8b55, 0xd0f6, /*0x78-0x7f*/
03853 0x8b56, 0x8b57, 0x8b58, 0x8b59, 0x8b5a, 0x8b5b, 0x8b5c, 0x8b5d, /*0x80-0x87*/
03854 0x8b5e, 0x8b5f, 0x8b60, 0x8b61, 0x8b62, 0x8b63, 0x8b64, 0x8b65, /*0x88-0x8f*/
03855 0x8b66, 0x8b67, 0xc3bd, 0x8b68, 0x8b69, 0x8b6a, 0x8b6b, 0x8b6c, /*0x90-0x97*/
03856 0x8b6d, 0x8b6e, 0xc3c4, 0xe6c2, 0xe6bf, 0x8b70, 0x8b71, 0x8b72, /*0x98-0x9f*/
03857 0x8b73, 0x8b74, 0x8b75, 0x8b76, 0x8b77, 0x8b78, 0x8b79, 0x8b7a, /*0xa0-0xa7*/
03858 0x8b7b, 0x8b7c, 0xe6c1, 0x8b7d, 0x8b7e, 0x8b7f, 0x8b80, 0x8b81, 0x8b82, /*0xa8-0xaf*/
03859 0x8b83, 0x8b84, 0xe6c7, 0xcfb1, 0x8b85, 0xebf4, 0x8b86, 0x8b87, /*0xb0-0xb7*/
03860 0xe6ca, 0x8b88, 0x8b89, 0x8b8a, 0x8b8b, 0x8b8c, 0xe6c5, 0x8b8d, /*0xb8-0xbf*/
03861 0x8b8e, 0xbcd, 0xc9a9, 0x8b8f, 0x8b90, 0x8b91, 0x8b92, 0x8b93, /*0xc0-0xc7*/
03862 0x8b94, 0xbcb5, 0x8b95, 0x8b96, 0xcfd3, 0x8b97, 0x8b98, 0x8b99, /*0xc8-0xcf*/
03863 0x8b9a, 0x8b9b, 0xe6c8, 0x8b9c, 0xe6c9, 0x8b9d, 0xe6ce, 0x8b9e, /*0xd0-0xd7*/
03864 0xe6d0, 0x8b9f, 0x8ba0, 0x8ba1, 0xe6d1, 0x8ba2, 0x8ba3, 0x8ba4, /*0xd8-0xdf*/
03865 0xe6cb, 0xb5d5, 0x8ba5, 0xe6cc, 0x8ba6, 0x8ba7, 0xe6cf, 0x8ba8, /*0xe0-0xe7*/
03866 0x8ba9, 0xc4bd, 0x8baa, 0xe6c6, 0x8bab, 0x8bac, 0x8bad, 0x8bae, /*0xe8-0xef*/
03867 0x8baf, 0xe6cd, 0x8bb0, 0x8bb1, 0x8bb2, 0x8bb3, 0x8bb4, 0x8bb5, /*0xf0-0xf7*/
03868 0x8bb6, 0x8bb7, 0x8bb8, 0x8bb9, 0x8bba, 0x8bbb, 0x8bbc, 0x8bbd, /*0xf8-0xff*/
03869 /* 0x5b00 */
03870 0x8bbe, 0x8bbf, 0x8bc0, 0x8bc1, 0x8bc2, 0x8bc3, 0x8bc4, 0x8bc5, /*0x00-0x07*/
03871 0x8bc6, 0xe6d2, 0x8bc7, 0x8bc8, 0x8bc9, 0x8bca, 0x8bcb, 0x8bcc, /*0x08-0x0f*/
03872 0x8bcd, 0x8bce, 0x8bcf, 0x8bd0, 0x8bd1, 0x8bd2, 0xe6d4, 0xe6d3, /*0x10-0x17*/
03873 0x8bd3, 0x8bd4, 0x8bd5, 0x8bd6, 0x8bd7, 0x8bd8, 0x8bd9, 0x8bda, /*0x18-0x1f*/
03874 0x8bdb, 0x8bdc, 0x8bdd, 0x8bde, 0x8bdf, 0x8be0, 0x8be1, 0x8be2, /*0x20-0x27*/
03875 0x8be3, 0x8be4, 0x8be5, 0x8be6, 0x8be7, 0x8be8, 0x8be9, 0x8bea, /*0x28-0x2f*/
03876 0x8beb, 0x8bec, 0xe6d5, 0x8bed, 0xd9f8, 0x8bee, 0x8bef, 0xe6d6, /*0x30-0x37*/
03877 0x8bf0, 0x8bf1, 0x8bf2, 0x8bf3, 0x8bf4, 0x8bf5, 0x8bf6, 0x8bf7, /*0x38-0x3f*/
03878 0xe6d7, 0x8bf8, 0x8bf9, 0xbfa, 0x8bfb, 0x8bfc, 0x8bfd, 0x8bfe, /*0x40-0x47*/
03879 0x8c40, 0x8c41, 0x8c42, 0x8c43, 0x8c44, 0x8c45, 0x8c46, 0x8c47, /*0x48-0x4f*/
03880 0xd7d3, 0xe6dd, 0x8c48, 0xe6de, 0xbfd7, 0xd4d0, 0x8c49, 0xd7d6, /*0x50-0x57*/
03881 0xb4e6, 0xcbeef, 0xe6da, 0xd8c3, 0xd7ce, 0xd0a2, 0x8c4a, 0xc3cf, /*0x58-0x5f*/
03882 0x8c4b, 0x8c4c, 0xe6df, 0xbce, 0xb9c2, 0xe6db, 0xd1a7, 0x8c4d, /*0x60-0x67*/
03883 0x8c4e, 0xbaa2, 0xc2cf, 0x8c4f, 0xd8ab, 0x8c50, 0x8c51, 0x8c52, /*0x68-0x6f*/
03884 0xcaeb, 0xe5ee, 0xc8c3, 0xe6dc, 0x8c54, 0xb7f5, 0x8c55, 0x8c56, /*0x70-0x77*/
03885 0x8c57, 0x8c58, 0x8c59, 0x8c5a, 0xc4f5, 0x8c5b, 0x8c5c, 0x8c5d, /*0x78-0x7f*/
03886 0xe5b2, 0xc4fe, 0x8c5d, 0xcbf, 0xe5b3, 0xd5ac, 0x8c5e, 0xd3ee, /*0x80-0x87*/

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03887 0xcad8, 0xb0b2, 0x8c5f, 0xcbce, 0xcdea, 0x8c60, 0x8c61, 0xbaea, /*0x88-0x8f*/
03888 0x8c62, 0x8c63, 0x8c64, 0xe5b5, 0x8c65, 0xe5b4, 0x8c66, 0xd7da, /*0x90-0x97*/
03889 0xb9d9, 0xd6e6, 0xb6a8, 0xcdf0, 0xd2cb, 0x1a6, 0xcab5, 0x8c67, /*0x98-0x9f*/
03890 0xb3e8, 0xc9f3, 0xbfcd, 0xd0fb, 0xcad2, 0xe5b6, 0xbbc2, 0x8c68, /*0xa0-0xa7*/
03891 0x8c69, 0x8c6a, 0xcfdc, 0xb9ac, 0x8c6b, 0x8c6c, 0x8c6d, 0x8c6e, /*0xa8-0xaf*/
03892 0xd4d7, 0x8c6f, 0x8c70, 0xbaa6, 0xd1e7, 0xcffc, 0xbcd2, 0x8c71, /*0xb0-0xbf*/
03893 0xe5b7, 0xc8dd, 0x8c72, 0x8c73, 0x8c74, 0xbfed, 0xb1f6, 0xcbde, /*0xb8-0xbf*/
03894 0x8c75, 0x8c76, 0xbcc5, 0x8c77, 0xbcc4, 0xd2fa, 0xc3dc, 0xbfdc, /*0xc0-0xc7*/
03895 0x8c78, 0x8c79, 0x8c7a, 0x8c7b, 0xb8bb, 0x8c7c, 0x8c7d, 0x8c7e, /*0xc8-0xcf*/
03896 0xc3c2, 0x8c80, 0xbaae, 0xd4a2, 0x8c81, 0x8c82, 0x8c83, 0x8c84, /*0xd0-0xd7*/
03897 0x8c85, 0x8c86, 0x8c87, 0x8c88, 0x8c89, 0xc7de, 0xc4af, 0xb2ec, /*0xd8-0xdf*/
03898 0x8c8a, 0xb9d1, 0x8c8b, 0x8c8c, 0xe5bb, 0xc1c8, 0x8c8d, 0x8c8e, /*0xe0-0xef*/
03899 0xd5af, 0x8c8f, 0x8c90, 0x8c91, 0x8c92, 0x8c93, 0xe5bc, 0x8c94, /*0xe8-0xef*/
03900 0xe5be, 0x8c95, 0x8c96, 0x8c97, 0x8c98, 0x8c99, 0x8c9a, 0x8c9b, /*0xf0-0xf7*/
03901 0xb4e7, 0xb6d4, 0xcbc2, 0xd1b0, 0xb5bc, 0x8c9c, 0x8c9d, 0xcad9, /*0xf8-0xff*/
03902 /* 0x5c00 */
03903 0x8c9e, 0xb7e2, 0x8c9f, 0x8ca0, 0xc9e4, 0x8ca1, 0xbdab, 0x8ca2, /*0x00-0x07*/
03904 0x8ca3, 0xcbebe, 0xd7f0, 0x8ca4, 0x8ca5, 0x8ca6, 0x8ca7, 0xd0a1, /*0x08-0x0f*/
03905 0x8ca8, 0xc9d9, 0x8ca9, 0x8caa, 0xb6fb, 0xe6d8, 0xbce2, 0x8cab, /*0x10-0x17*/
03906 0xb3be, 0x8cac, 0xc9d0, 0x8cad, 0xe6d9, 0xb3a2, 0x8cae, 0x8caf, /*0x18-0x1f*/
03907 0x8cb0, 0x8cb1, 0x8cb2, 0x8cb3, 0xd3c8, 0xd3c9, 0xd3ca, 0xd3cb, /*0x20-0x27*/
03908 0x8cb4, 0x8cb5, 0x8cb6, 0x8cb7, 0x8cb8, 0x8cb9, 0x8cba, /*0x28-0x2f*/
03909 0x8cbb, 0xbecf, 0x8cbc, 0x8cbd, 0xd3ca, 0x8cbe, 0x8cbf, 0x8cc0, /*0x30-0x37*/
03910 0xcaac, 0xd2fc, 0xb3df, 0xe5ea, 0xc4e1, 0xbea1, 0xc3e2, 0xc4f2, /*0x38-0x3f*/
03911 0xbcd6, 0xc6a8, 0xb2e3, 0x8cc1, 0x8cc2, 0xbcd3, 0x8cc3, 0x8cc4, /*0x40-0x47*/
03912 0xc7fc, 0xccebe, 0xbdec, 0xcdd, 0x8cc5, 0x8cc6, 0xcaba, 0xc6c1, /*0x48-0x4f*/
03913 0xe5ec, 0xd0bc, 0x8cc7, 0x8cc8, 0x8cc9, 0xd5b9, 0x8cca, 0x8ccb, /*0x50-0x57*/
03914 0x8ccc, 0xe5ed, 0x8ccd, 0x8cce, 0x8ccf, 0x8cd0, 0xc4f4, 0x8cd1, /*0x58-0x5f*/
03915 0xc4c0, 0xc2c5, 0x8cd2, 0xe5ef, 0x8cd3, 0xc2c4, 0xe5f0, 0x8cd4, /*0x60-0x67*/
03916 0x8cd5, 0x8cd6, 0x8cd7, 0x8cd8, 0x8cd9, 0x8cda, 0xe5f1, 0xc4cd, /*0x68-0x6f*/
03917 0x8cdb, 0xc9bd, 0x8cdc, 0x8cdd, 0x8cde, 0x8cdf, 0x8ce0, 0x8ce1, /*0x70-0x77*/
03918 0x8ce2, 0xd2d9, 0xela8, 0x8ce3, 0x8ce4, 0x8ce5, 0x8ce6, 0xd3ec, /*0x78-0x7f*/
03919 0x8ce7, 0xcbea, 0xc6f1, 0x8ce8, 0x8ce9, 0x8cea, 0x8ceb, 0x8cec, /*0x80-0x87*/
03920 0xelac, 0x8ced, 0x8cee, 0x8cef, 0xela7, 0xela9, 0x8cf0, 0x8cf1, /*0x88-0x8f*/
03921 0xela8, 0xela9, 0x8cf2, 0x8cf3, 0xb2ed, 0x8cf4, 0xela8, 0xb8da, /*0x90-0x97*/
03922 0xelad, 0xelae, 0xelb0, 0xb5ba, 0xelb1, 0x8cf5, 0x8cf6, 0x8cf7, /*0x98-0x9f*/
03923 0x8cf8, 0x8cf9, 0xelb3, 0xelb8, 0x8cfa, 0x8cfb, 0x8cfc, 0x8cfd, /*0xa0-0xaf*/
03924 0x8cfe, 0xd1d2, 0x8d40, 0xelb6, 0xelb5, 0xc1eb, 0x8d41, 0x8d42, /*0xa8-0xaf*/
03925 0x8d43, 0xelb7, 0x8d44, 0xd4c0, 0x8d45, 0xelb2, 0x8d46, 0xelba, /*0xb0-0xbf*/
03926 0xb0b6, 0x8d47, 0x8d48, 0x8d49, 0x8d4a, 0xelb4, 0x8d4b, 0xbff9, /*0xb8-0xbf*/
03927 0x8d4c, 0xelb9, 0x8d4d, 0x8d4e, 0xelbb, 0x8d4f, 0x8d50, 0x8d51, /*0xc0-0xc7*/
03928 0x8d52, 0x8d53, 0x8d54, 0xelbe, 0x8d55, 0x8d56, 0x8d57, 0x8d58, /*0xc8-0xcf*/
03929 0x8d59, 0x8d5a, 0xelbc, 0x8d5b, 0x8d5c, 0x8d5d, 0x8d5e, 0x8d5f, /*0xd0-0xd7*/
03930 0x8d60, 0xd6c5, 0x8d61, 0x8d62, 0x8d63, 0x8d64, 0x8d65, 0x8d66, /*0xd8-0xdf*/
03931 0x8d67, 0xcfbf, 0x8d68, 0x8d69, 0xelbd, 0xelbf, 0xc2cd, 0x8d6a, /*0xe0-0xef*/
03932 0xb6eb, 0x8d6b, 0xd3f8, 0x8d6c, 0x8d6d, 0xc7cd, 0x8d6e, 0x8d6f, /*0xe8-0xef*/
03933 0xb7e5, 0x8d70, 0x8d71, 0x8d72, 0x8d73, 0x8d74, 0x8d75, 0x8d76, /*0xf0-0xf7*/
03934 0x8d77, 0x8d78, 0x8d79, 0xbefe, 0x8d7a, 0x8d7b, 0x8d7c, 0x8d7d, /*0xf8-0xff*/
03935 /* 0x5d00 */
03936 0x8d7e, 0x8d80, 0xelc0, 0xelc1, 0x8d81, 0x8d82, 0xelc7, 0xb3e7, /*0x00-0x07*/
03937 0x8d83, 0x8d84, 0x8d85, 0x8d86, 0x8d87, 0x8d88, 0xc6e9, 0x8d89, /*0x08-0x0f*/
03938 0x8d8a, 0x8d8b, 0x8d8c, 0x8d8d, 0xb4de, 0x8d8e, 0xd1c2, 0x8d8f, /*0x10-0x17*/
03939 0x8d90, 0x8d91, 0x8d92, 0xelc8, 0x8d93, 0x8d94, 0xelc6, 0x8d95, /*0x18-0x1f*/
03940 0x8d96, 0x8d97, 0x8d98, 0x8d99, 0xelc5, 0x8d9a, 0xelc3, 0xelc2, /*0x20-0x27*/
03941 0x8d9b, 0xb1c0, 0x8d9c, 0x8d9d, 0x8d9e, 0xd5b8, 0xelc4, 0x8d9f, /*0x28-0x2f*/
03942 0x8da0, 0x8da1, 0x8da2, 0x8da3, 0xelcb, 0x8da4, 0x8da5, 0x8da6, /*0x30-0x37*/
03943 0x8da7, 0x8da8, 0x8da9, 0x8daa, 0xelcc, 0xelca, 0x8dac, /*0x38-0x3f*/
03944 0x8dad, 0x8dae, 0x8daf, 0x8db0, 0x8db1, 0x8db2, 0x8db3, 0xeffa, /*0x40-0x47*/
03945 0x8db4, 0x8db5, 0xeldd, 0xeldd, 0xc7b6, 0x8db6, 0x8db7, 0x8db8, /*0x48-0x4f*/
03946 0x8db9, 0x8dba, 0x8dbb, 0x8dbc, 0x8dbe, 0x8dbd, 0x8dbf, 0x8dc0, /*0x50-0x57*/
03947 0xelc9, 0x8dc1, 0x8dc2, 0xelce, 0x8dc3, 0xeldd, 0x8dc4, 0x8dc5, /*0x58-0x5f*/
03948 0x8dc6, 0x8dc7, 0x8dc8, 0x8dc9, 0x8dca, 0x8dcb, 0x8dcc, 0x8dcd, /*0x60-0x67*/
03949 0x8dce, 0xeldd, 0x8dcf, 0xeldd, 0xeldd, 0x8dd0, 0x8dd1, 0xelcf, /*0x68-0x6f*/
03950 0x8dd2, 0x8dd3, 0x8dd4, 0x8dd5, 0xeldd, 0x8dd6, 0x8dd7, 0x8dd8, /*0x70-0x77*/
03951 0x8dd9, 0x8dda, 0x8ddb, 0x8ddc, 0x8ddd, 0x8dde, 0x8ddf, 0x8de0, /*0x78-0x7f*/
03952 0x8de1, 0x8de2, 0xelde, 0x8de3, 0x8de4, 0x8de5, 0x8de6, 0x8de7, /*0x80-0x87*/
03953 0x8de8, 0x8de9, 0x8dea, 0x8deb, 0x8dec, 0x8ded, 0x8dee, 0x8def, /*0x88-0x8f*/
03954 0x8df0, 0x8df1, 0x8df2, 0x8df3, 0x8df4, 0x8df5, 0x8df6, 0x8df7, /*0x90-0x97*/
03955 0x8df8, 0x8df9, 0x8dfa, 0x8dfb, 0x8dfd, 0x8dfe, 0x8dff, 0x8dfe, /*0x98-0x9f*/
03956 0x8dfe, 0x8e40, 0x8e41, 0x8e42, 0x8e43, 0x8e44, 0x8e45, 0x8e46, /*0xa0-0xaf*/
03957 0x8e47, 0x8e48, 0x8e49, 0x8e4a, 0x8e4b, 0x8e4c, 0x8e4d, 0x8e4e, /*0xa8-0xaf*/
03958 0x8e4f, 0x8e50, 0x8e51, 0x8e52, 0x8e53, 0x8e54, 0x8e55, 0xelda, /*0xb0-0xbf*/
03959 0x8e56, 0x8e57, 0x8e58, 0x8e59, 0x8e5a, 0x8e5b, 0x8e5c, 0x8e5d, /*0xb8-0xbf*/
03960 0x8e5e, 0x8e5f, 0x8e60, 0x8e61, 0x8e62, 0xeldb, 0x8e63, 0x8e64, /*0xc0-0xcf*/
03961 0x8e65, 0x8e66, 0x8e67, 0x8e68, 0x8e69, 0x8e6a, 0x8e6b, /*0xc8-0xcf*/
03962 0x8e6c, 0x8e6d, 0x8e6e, 0x8e6f, 0x8e70, 0x8e71, 0x8e72, 0x8e73, /*0xd0-0xdf*/
03963 0x8e74, 0x8e75, 0x8e76, 0xe77d, 0x8e77, 0xb4a8, 0xd6dd, 0x8e78, /*0xd8-0xdf*/
03964 0x8e79, 0xd1b2, 0xb3b2, 0x8e7a, 0x8e7b, 0xb9a4, 0xd7f3, 0xc7c9, /*0xe0-0xef*/
03965 0xbede, 0xb9ae, 0x8e7c, 0xc7d7, 0x8e7d, 0x8e7e, 0xb2ee, 0xdbcf, /*0xe8-0xef*/
03966 0x8e80, 0xbcb8, 0xd2d1, 0xc7c8, 0xb0cd, 0x8e81, 0x8e82, 0xc7ef, /*0xf0-0xf7*/
03967 0x8e83, 0x8e84, 0x8e85, 0x8e86, 0x8e87, 0xd9e3, 0xbded, 0x8e88, /*0xf8-0xff*/
03968 /* 0x5e00 */
03969 0x8e89, 0xb1d2, 0xcad0, 0xb2bc, 0x8e8a, 0xcba7, 0xb7ab, 0x8e8b, /*0x00-0x07*/
03970 0xc8a6, 0x8e8c, 0x8e8d, 0x8e8e, 0xcfa3, 0x8e8f, 0x8e90, 0xe0f8, /*0x08-0x0f*/
03971 0xd5ca, 0xe0fb, 0x8e91, 0x8e92, 0xe0fa, 0xc5c1, 0xc7cf, 0x8e93, /*0x10-0x17*/
03972 0xc1b1, 0xe0f9, 0xd6e3, 0xb2af, 0xd6c4, 0xb5db, 0x8e94, 0x8e95, /*0x18-0x1f*/
03973 0x8e96, 0x8e97, 0x8e98, 0x8e99, 0x8e9a, 0x8e9b, 0xb4f8, 0xd6a1, /*0x20-0x27*/
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03974 0x8e9c, 0x8e9d, 0x8e9e, 0x8e9f, 0x8ea0, 0xcfaf, 0xb0ef, 0x8ea1, /*0x28-0x2f*/
03975 0x8ea2, 0xe0fc, 0x8ea3, 0x8ea4, 0x8ea5, 0x8ea6, 0x8ea7, 0x8ea8, 0x8ea9, /*0x30-0x37*/
03976 0xb3a3, 0x8ea8, 0x8ea9, 0xe0fd, 0xe0fe, 0xc3b1, 0x8ea8, 0x8ea9, /*0x38-0x3f*/
03977 0x8eac, 0x8ead, 0xc3dd, 0x8eae, 0xela2, 0xb7f9, 0x8eaf, 0x8eb0, /*0x40-0x47*/
03978 0x8eb1, 0x8eb2, 0x8eb3, 0x8eb4, 0xbbcf, 0x8eb5, 0x8eb6, 0x8eb7, /*0x48-0x4f*/
03979 0x8eb8, 0x8eb9, 0x8eba, 0x8eba, 0x8ebb, 0xela3, 0xc4bb, 0x8ebc, 0x8ebd, /*0x50-0x57*/
03980 0x8ebe, 0x8ebf, 0x8ec0, 0xela4, 0x8ec1, 0x8ec2, 0xela5, 0x8ec3, /*0x58-0x5f*/
03981 0x8ec4, 0xela6, 0xb4b1, 0x8ec5, 0x8ec6, 0x8ec7, 0x8ec8, 0x8ec9, /*0x60-0x67*/
03982 0x8eca, 0x8ecb, 0x8ecc, 0x8ecd, 0x8ece, 0x8ecf, 0x8ed0, 0x8ed1, /*0x68-0x6f*/
03983 0x8ed2, 0x8ed3, 0xb8c9, 0xc6bd, 0xc4ea, 0x8ed4, 0xb2a2, 0x8ed5, /*0x70-0x77*/
03984 0xd0d2, 0x8ed6, 0xe7db, 0xbbc3, 0xd3d7, 0xd3c4, 0x8ed7, 0xb9e3, /*0x78-0x7f*/
03985 0xe2cf, 0x8ed8, 0x8ed9, 0x8eda, 0xd7af, 0x8edb, 0xc7ec, 0xb1d3, /*0x80-0x87*/
03986 0x8edc, 0x8edd, 0xb4b2, 0xe2d1, 0x8ede, 0x8edf, 0x8ee0, 0xd0f2, /*0x88-0x8f*/
03987 0xc2ae, 0xe2d0, 0x8ee1, 0xbfe2, 0xd3a6, 0xb5d7, 0xe2d2, 0xb5ea, /*0x90-0x97*/
03988 0x8ee2, 0xc3cd, 0xb8fd, 0x8ee3, 0xb8ae, 0x8ee4, 0xc5d3, 0xb7cf, /*0x98-0x9f*/
03989 0xe2d4, 0x8ee5, 0x8ee6, 0x8ee7, 0x8ee8, 0xe2d3, 0xb6c8, 0xd7f9, /*0xa0-0xa7*/
03990 0x8ee9, 0x8eea, 0x8eeb, 0x8eec, 0x8eed, 0xcda5, 0x8eee, 0x8eef, /*0xa8-0xaf*/
03991 0x8ef0, 0x8ef1, 0x8ef2, 0xe2d8, 0x8ef3, 0xe2d6, 0xcfac, 0xbfb5, /*0xb0-0xb7*/
03992 0xd3b9, 0xe2d5, 0x8ef4, 0x8ef5, 0x8ef6, 0x8ef7, 0xe2d7, 0x8ef8, /*0xb8-0xbf*/
03993 0x8ef9, 0x8efa, 0x8efb, 0x8efc, 0x8efd, 0x8efe, 0x8ff0, 0x8ff1, /*0xc0-0xc7*/
03994 0x8ff2, 0xc1ae, 0xc0c8, 0x8ff3, 0x8ff4, 0x8ff5, 0x8ff6, 0x8ff7, /*0xc8-0xcf*/
03995 0x8ff8, 0xe2db, 0xe2da, 0xc0aa, 0x8ff9, 0x8ffa, 0xc1ce, 0x8ff4b, /*0xd0-0xd7*/
03996 0x8ff4c, 0x8ff4d, 0x8ff4e, 0xe2dc, 0x8ff4f, 0x8ff50, 0x8ff51, 0x8ff52, /*0xd8-0xdf*/
03997 0x8ff53, 0x8ff54, 0x8ff55, 0x8ff56, 0x8ff57, 0x8ff58, 0x8ff59, 0x8ff5a, /*0xe0-0xef*/
03998 0xe2dd, 0x8ff5b, 0xe2de, 0x8ff5c, 0x8ff5d, 0x8ff5e, 0x8ff5f, 0x8ff60, /*0xf0-0xf7*/
03999 0x8ff61, 0x8ff62, 0x8ff63, 0x8ff64, 0xdb8c, 0x8ff65, 0xd1d3, 0xcda2, /*0xf8-0xff*/
04000 0x8ff66, 0x8ff67, 0xbda8, 0x8ff68, 0x8ff69, 0x8ff6a, 0xdec3, 0xd8a5, /*0xf8-0xff*/
04001 /* 0x5f00 */
04002 0xbfaa, 0xdbcd, 0xd2ec, 0xc6fa, 0xc5aa, 0x8ff6b, 0x8ff6c, 0x8ff6d, /*0x00-0x07*/
04003 0xdec4, 0x8ff6e, 0xb1d7, 0xdfae, 0x8ff6f, 0x8ff70, 0x8ff71, 0xcabd, /*0x08-0x0f*/
04004 0x8ff72, 0xdfb1, 0x8ff73, 0xb9ad, 0x8ff74, 0xd2fd, 0x8ff75, 0xb8a5, /*0x10-0x17*/
04005 0xbaeb, 0x8ff76, 0x8ff77, 0xb3da, 0x8ff78, 0x8ff79, 0x8ff7a, 0xb5dc, /*0x18-0x1f*/
04006 0xd5c5, 0x8ff7b, 0x8ff7c, 0x8ff7d, 0x8ff7e, 0xc3d6, 0xcfd2, 0xbba1, /*0x20-0x27*/
04007 0x8ff80, 0xe5f3, 0xe5f2, 0x8ff81, 0x8ff82, 0xe5f4, 0x8ff83, 0xcde4, /*0x28-0x2f*/
04008 0x8ff84, 0xc8f5, 0x8ff85, 0x8ff86, 0x8ff87, 0x8ff88, 0x8ff89, 0x8ff8a, /*0x30-0x37*/
04009 0x8ff8b, 0xb5af, 0xc7bf, 0x8ff8c, 0xe5f6, 0x8ff8d, 0x8ff8e, 0x8ff8f, /*0x38-0x3f*/
04010 0xecb0, 0x8ff90, 0x8ff91, 0x8ff92, 0x8ff93, 0x8ff94, 0x8ff95, 0x8ff96, /*0x40-0x47*/
04011 0x8ff97, 0x8ff98, 0x8ff99, 0x8ff9a, 0x8ff9b, 0x8ff9c, 0x8ff9d, 0x8ff9e, /*0x48-0x4f*/
04012 0xe5e6, 0x8ff9f, 0xb9e9, 0xb5b1, 0x8ffa0, 0xc2bc, 0xe5e8, 0xe5e7, /*0x50-0x57*/
04013 0xe5e9, 0x8ffa1, 0x8ffa2, 0x8ffa3, 0x8ffa4, 0xd2cd, 0x8ffa5, 0x8ffa6, /*0x58-0x5f*/
04014 0x8ffa7, 0xe1ea, 0xd0ce, 0x8ffa8, 0xcdae, 0x8ffa9, 0xd1e5, 0x8faa, /*0x60-0x67*/
04015 0x8fab, 0xb2ca, 0xb1eb, 0x8fac, 0xb1f2, 0xc5ed, 0x8fad, 0x8fae, /*0x68-0x6f*/
04016 0xd5c3, 0xd3b0, 0x8faf, 0xe1dc, 0x8fb0, 0x8fb1, 0x8fb2, 0xe1dd, /*0x70-0x77*/
04017 0x8fb3, 0xd2db, 0x8fb4, 0xb3b9, 0xb1cb, 0x8fb5, 0x8fb6, 0x8fb7, /*0x78-0x7f*/
04018 0xcdf9, 0xd5f7, 0xe1de, 0x8fb8, 0xbcb6, 0xb4fd, 0x8fb9, 0xe1df, /*0x80-0x87*/
04019 0xbadc, 0xe1e0, 0xbbb2, 0xc2c9, 0xe1e1, 0x8fba, 0x8fbb, 0x8fbc, /*0x88-0x8f*/
04020 0xd0ec, 0x8fbd, 0xcdbd, 0x8fbe, 0x8fbf, 0xe1e2, 0x8fc0, 0xb5c3, /*0x90-0x97*/
04021 0xc5c7, 0xe1e3, 0x8fc1, 0x8fc2, 0xe1e4, 0x8fc3, 0x8fc4, 0x8fc5, /*0x98-0x9f*/
04022 0x8fc6, 0xd3f9, 0x8fc7, 0x8fc8, 0x8fc9, 0x8fca, 0x8fcb, 0x8fcc, /*0xa0-0xaf*/
04023 0xe1e5, 0x8fcd, 0xd1ad, 0x8fce, 0x8fcf, 0xe1e6, 0xcea2, 0x8fd0, /*0xa8-0xaf*/
04024 0x8fd1, 0x8fd2, 0x8fd3, 0x8fd4, 0x8fd5, 0xe1e7, 0x8fd6, 0xb5c2, /*0xb0-0xb7*/
04025 0x8fd7, 0x8fd8, 0x8fd9, 0x8fda, 0xe1e8, 0xbdb5, 0x8fdb, 0x8fdc, /*0xb8-0xbf*/
04026 0x8fdd, 0x8fde, 0x8fdf, 0xd0c4, 0xe2e0, 0xb1d8, 0xd2e4, 0x8fe0, /*0xc0-0xc7*/
04027 0x8fe1, 0xe2e1, 0x8fe2, 0x8fe3, 0xbcc9, 0xc8cc, 0x8fe4, 0xe2e3, /*0xc8-0xcf*/
04028 0xecfe, 0xecfd, 0xdfaf, 0x8fe5, 0x8fe6, 0x8fe7, 0xe2e2, 0xd6be, /*0xd0-0xd7*/
04029 0xcdfc, 0xc3ae, 0x8fe8, 0x8fe9, 0x8fea, 0xe3c3, 0x8feb, 0x8fec, /*0xd8-0xdf*/
04030 0xd6d2, 0xe2e7, 0x8fed, 0x8fee, 0xe2e8, 0x8fef, 0x8fff, 0xd3c7, /*0xe0-0xef*/
04031 0x8ff1, 0x8ff2, 0xe2ec, 0xbfec, 0x8ff3, 0xe2ed, 0xe2e5, 0x8ff4, /*0xe8-0xef*/
04032 0x8ff5, 0xb3c0, 0x8fff6, 0x8fff7, 0x8fff8, 0xc4ee, 0x8fff9, 0x8ffa, /*0xf0-0xf7*/
04033 0xe2ee, 0x8fff, 0x8fff, 0xd0c3, 0x8ffd, 0xbaf6, 0xe2e9, 0xb7de, /*0xf8-0xff*/
04034 /* 0x6000 */
04035 0xbbb3, 0xccac, 0xcbbb, 0xe2e4, 0xe2e6, 0xe2ea, 0xe2eb, 0x8ffe, /*0x00-0x07*/
04036 0x9040, 0x9041, 0xe2f7, 0x9042, 0x9043, 0xe2f4, 0xd4f5, 0xe2f3, /*0x08-0x0f*/
04037 0x9044, 0x9045, 0xc5ad, 0x9046, 0xd5fa, 0xc5c2, 0xb2c0, 0x9047, /*0x10-0x17*/
04038 0x9048, 0xe2ef, 0x9049, 0xe2f2, 0xc1af, 0xcbbc, 0x904a, 0x904b, /*0x18-0x1f*/
04039 0xb5a1, 0xe2f9, 0x904c, 0x904d, 0x904e, 0xbcb1, 0xe2f1, 0xd0d4, /*0x20-0x27*/
04040 0xd4b9, 0xe2f5, 0xb9d6, 0xe2f6, 0x904f, 0x9050, 0x9051, 0xc7d3, /*0x28-0x2f*/
04041 0x9052, 0x9053, 0x9054, 0x9055, 0x9056, 0xe2f0, 0x9057, 0x9058, /*0x30-0x37*/
04042 0x9059, 0x905a, 0x905b, 0xd7dc, 0xedal, 0x905c, 0x905d, 0xe2f8, /*0x38-0x3f*/
04043 0x905e, 0xeda5, 0xe2fe, 0xcad1, 0x905f, 0x9060, 0x9061, 0x9062, /*0x40-0x47*/
04044 0x9063, 0x9064, 0x9065, 0xc1b5, 0x9066, 0xbdb0, 0x9067, 0x9068, /*0x48-0x4f*/
04045 0xbfd6, 0x9069, 0xbae3, 0x906a, 0x906b, 0xcba1, 0x906c, 0x906d, /*0x50-0x57*/
04046 0x906e, 0xeda6, 0xeda3, 0x906f, 0x9070, 0xeda2, 0x9071, 0x9072, /*0x58-0x5f*/
04047 0x9073, 0x9074, 0xbdb6, 0xeda4, 0xd0f4, 0x9075, 0x9076, 0xeda4, /*0x60-0x67*/
04048 0xbade, 0xb6f7, 0xe3a1, 0xb6b2, 0xccf1, 0xb9a7, 0x9077, 0xcfa2, /*0x68-0x6f*/
04049 0xc7a1, 0x9078, 0x9079, 0xbfd2, 0x907a, 0x907b, 0xb6f1, 0x907c, /*0x70-0x77*/
04050 0xe2fa, 0xe2fb, 0xe2fd, 0xe2fc, 0xc4d5, 0xe3a2, 0x907d, 0xd3c1, /*0x78-0x7f*/
04051 0x907e, 0x9080, 0x9081, 0xe3a7, 0xc7c4, 0x9082, 0x9083, 0x9084, /*0x80-0x87*/
04052 0x9085, 0xcfa4, 0x9086, 0x9087, 0xe3a9, 0xbab7, 0x9088, 0x9089, /*0x88-0x8f*/
04053 0x908a, 0x908b, 0xe3a8, 0x908c, 0xbdba, 0x908d, 0xe3a3, 0x908e, /*0x90-0x97*/
04054 0x908f, 0x9090, 0xe3a4, 0xe3aa, 0x9091, 0xe3a6, 0x9092, 0xcfe2, /*0x98-0x9f*/
04055 0xd3c6, 0x9093, 0x9094, 0xbbbb, 0x9095, 0x9096, 0xd4c3, 0x9097, /*0xa0-0xaf*/
04056 0xc4fa, 0x9098, 0x9099, 0xeda8, 0xd0fc, 0xe3a5, 0x909a, 0xc3f5, /*0xa8-0xaf*/
04057 0x909b, 0xe3ad, 0xb1af, 0x909c, 0xe3b2, 0x909d, 0x909e, 0x909f, /*0xb0-0xb7*/
04058 0xbcc2, 0x90a0, 0x90a1, 0xe3ac, 0xb5bf, 0x90a2, 0x90a3, 0x90a4, /*0xb8-0xbf*/
04059 0x90a5, 0x90a6, 0x90a7, 0x90a8, 0x90a9, 0xc7e9, 0xe3b0, 0x90aa, /*0xc0-0xc7*/
04060 0x90ab, 0x90ac, 0xbeaa, 0xcdef, 0x90ad, 0x90ae, 0x90af, 0x90b0, /*0xc8-0xcf*/

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04061 0x90b1, 0xbbf3, 0x90b2, 0x90b3, 0x90b4, 0xcce8, 0x90b5, 0x90b6, /*0xd0-0xd7*/
04062 0xe3af, 0x90b7, 0xe3b1, 0x90b8, 0xcfa7, 0xe3ae, 0x90b9, 0xcea9, /*0xd8-0xdf*/
04063 0xbbdd, 0x90ba, 0x90bb, 0x90bc, 0x90bd, 0x90be, 0xb5eb, 0xbee5, /*0xe0-0xe7*/
04064 0xb2d2, 0xb3cd, 0x90bf, 0xb1b9, 0xe3ab, 0xb2d1, 0xb5ac, 0xb9df, /*0xe8-0xef*/
04065 0xb6e8, 0x90c0, 0x90c1, 0xcfeb, 0xe3b7, 0x90c2, 0xbbcc, 0x90c3, /*0xf0-0xf7*/
04066 0x90c4, 0xc8c7, 0xd0ca, 0x90c5, 0x90c6, 0x90c7, 0x90c8, 0x90c9, /*0xf8-0xff*/
04067 /* 0x6100 */
04068 0xe3b8, 0xb3ee, 0x90ca, 0x90cb, 0x90cc, 0x90cd, 0xeda9, 0x90ce, /*0x00-0x07*/
04069 0xd3fa, 0xd3e4, 0x90cf, 0x90d0, 0x90d1, 0xeda9, 0xe3b9, 0xd2e2, /*0x08-0x0f*/
04070 0x90d2, 0x90d3, 0x90d4, 0x90d5, 0x90d6, 0xe3b5, 0x90d7, 0x90d8, /*0x10-0x17*/
04071 0x90d9, 0x90da, 0xd3de, 0x90db, 0x90dc, 0x90dd, 0x90de, 0xb8d0, /*0x18-0x1f*/
04072 0xe3b3, 0x90df, 0x90e0, 0xe3b6, 0xb7df, 0x90e1, 0xe3b4, 0xc0a2, /*0x20-0x27*/
04073 0x90e2, 0x90e3, 0x90e4, 0xe3ba, 0x90e5, 0x90e6, 0x90e7, 0x90e8, /*0x28-0x2f*/
04074 0x90e9, 0x90ea, 0x90eb, 0x90ec, 0x90ed, 0x90ee, 0x90ef, 0x90f0, /*0x30-0x37*/
04075 0x90f1, 0x90f2, 0x90f3, 0x90f4, 0x90f5, 0x90f6, 0x90f7, 0xd4b8, /*0x38-0x3f*/
04076 0x90f8, 0x90f9, 0x90fa, 0x90fb, 0x90fc, 0x90fd, 0x90fe, 0x9140, /*0x40-0x47*/
04077 0xb4c8, 0x9141, 0xe3bb, 0x9142, 0xbbc5, 0x9143, 0xc9f7, 0x9144, /*0x48-0x4f*/
04078 0x9145, 0xc9e5, 0x9146, 0x9147, 0x9148, 0xc4bd, 0x9149, 0x914a, /*0x50-0x57*/
04079 0x914b, 0x914c, 0x914d, 0x914e, 0x914f, 0xedab, 0x9150, 0x9151, /*0x58-0x5f*/
04080 0x9152, 0x9153, 0xc2fd, 0x9154, 0x9155, 0x9156, 0x9157, 0xbbdb, /*0x60-0x67*/
04081 0xbfae, 0x9158, 0x9159, 0x915a, 0x915b, 0x915c, 0x915d, 0x915e, /*0x68-0x6f*/
04082 0xcxbf, 0x915f, 0x9160, 0x9161, 0x9162, 0xe3bc, 0x9163, 0xbfb6, /*0x70-0x77*/
04083 0x9164, 0x9165, 0x9166, 0x9167, 0x9168, 0x9169, 0x916a, 0x916b, /*0x78-0x7f*/
04084 0x916c, 0x916d, 0x916e, 0x916f, 0x9170, 0x9171, 0x9172, 0x9173, /*0x80-0x87*/
04085 0x9174, 0x9175, 0x9176, 0xb1ef, 0x9177, 0x9178, 0xd4f7, 0x9179, /*0x88-0x8f*/
04086 0x917a, 0x917b, 0x917c, 0x917d, 0xe3be, 0x917e, 0x9180, 0x9181, /*0x90-0x97*/
04087 0x9182, 0x9183, 0x9184, 0x9185, 0x9186, 0xeda9, 0x9187, 0x9188, /*0x98-0x9f*/
04088 0x9189, 0x918a, 0x918b, 0x918c, 0x918d, 0x918e, 0x918f, 0xe3bf, /*0xa0-0xaf*/
04089 0xbaa9, 0xedac, 0x9190, 0x9191, 0xe3bd, 0x9192, 0x9193, 0x9194, /*0xa8-0xaf*/
04090 0x9195, 0x9196, 0x9197, 0x9198, 0x9199, 0x919a, 0x919b, 0xe3c0, /*0xb0-0xbf*/
04091 0x919c, 0x919d, 0x919e, 0x919f, 0x91a0, 0x91a1, 0xbab6, 0x91a2, /*0xb8-0xbf*/
04092 0x91a3, 0x91a4, 0xb6ae, 0x91a5, 0x91a6, 0x91a7, 0x91a8, 0x91a9, /*0xc0-0xc7*/
04093 0xd0b8, 0x91aa, 0xb0c3, 0xeda9, 0x91ab, 0x91ac, 0x91ad, 0x91ae, /*0xc8-0xcf*/
04094 0x91af, 0xedaf, 0xc0c1, 0x91b0, 0xe3c1, 0x91b1, 0x91b2, 0x91b3, /*0xd0-0xd7*/
04095 0x91b4, 0x91b5, 0x91b6, 0x91b7, 0x91b8, 0x91b9, 0x91ba, 0x91bb, /*0xd8-0xdf*/
04096 0x91bc, 0x91bd, 0x91be, 0x91bf, 0x91c0, 0x91c1, 0xc5b3, 0x91c2, /*0xe0-0xe7*/
04097 0x91c3, 0x91c4, 0x91c5, 0x91c6, 0x91c7, 0x91c8, 0x91c9, 0x91ca, /*0xe8-0xef*/
04098 0x91cb, 0x91cc, 0x91cd, 0x91ce, 0x91cf, 0xe3c2, 0x91d0, 0x91d1, /*0xf0-0xf7*/
04099 0x91d2, 0x91d3, 0x91d4, 0x91d5, 0x91d6, 0x91d7, 0x91d8, 0xdcb2, /*0xf8-0xff*/
04100 /* 0x6200 */
04101 0x91d9, 0x91da, 0x91db, 0x91dc, 0x91dd, 0x91de, 0xedb0, 0x91df, /*0x00-0x07*/
04102 0xb8ea, 0x91e0, 0xccec, 0xea7, 0xd0e7, 0xc9f9, 0xc8d6, 0xcfb7, /*0x08-0x0f*/
04103 0xb3c9, 0xc2d2, 0xbde4, 0x91e1, 0x91e2, 0xe3de, 0xbbf2, 0xea8, /*0x10-0x17*/
04104 0xd5bd, 0x91e3, 0xc6dd, 0xea9, 0x91e4, 0x91e5, 0x91e6, 0xea9, /*0x18-0x1f*/
04105 0x91e7, 0xeaac, 0xeaab, 0x91e8, 0xeaad, 0xeaad, 0x91e9, 0x91ea, /*0x20-0x27*/
04106 0x91eb, 0x91ec, 0xbdd8, 0x91ed, 0xeaaf, 0x91ee, 0xc2be, 0x91ef, /*0x28-0x2f*/
04107 0x91f0, 0x91f1, 0x91f2, 0xb4c1, 0xb4f7, 0x91f3, 0x91f4, 0xbba7, /*0x30-0x37*/
04108 0x91f5, 0x91f6, 0x91f7, 0x91f8, 0x91f9, 0xece6, 0xece5, 0xb7bf, /*0x38-0x3f*/
04109 0xcbf9, 0xb1e2, 0x91fa, 0xece7, 0x91fb, 0x91fc, 0x91fd, 0xc9c8, /*0x40-0x47*/
04110 0xece8, 0xece9, 0x91fe, 0xcad6, 0xded0, 0xb2c5, 0xd4fa, 0x9240, /*0x48-0x4f*/
04111 0x9241, 0xc6cb, 0xb0c7, 0xb4f2, 0xc8d3, 0x9242, 0x9243, 0x9244, /*0x50-0x57*/
04112 0xcdd0, 0x9245, 0x9246, 0xbfb8, 0x9247, 0x9248, 0x9249, 0x924a, /*0x58-0x5f*/
04113 0x924b, 0x924c, 0x924d, 0xbfdb, 0x924e, 0x924f, 0xc7a4, 0xd6b4, /*0x60-0x67*/
04114 0x9250, 0xc0a9, 0xded1, 0xc9a8, 0xd1ef, 0xc5a4, 0xb0e7, 0xb3b6, /*0x68-0x6f*/
04115 0xc8c5, 0x9251, 0x9252, 0xb0e2, 0x9253, 0x9254, 0xb7f6, 0x9255, /*0x70-0x77*/
04116 0x9256, 0xc5fa, 0x9257, 0x9258, 0xb6f3, 0x9259, 0xd5d2, 0xb3d0, /*0x78-0x7f*/
04117 0xbcbc, 0x925a, 0x925b, 0x925c, 0xb3ad, 0x925d, 0x925e, 0x925f, /*0x80-0x87*/
04118 0x9260, 0xbef1, 0xb0d1, 0x9261, 0x9262, 0x9263, 0x9264, 0x9265, /*0x88-0x8f*/
04119 0x9266, 0xd2d6, 0xcae3, 0xd7a5, 0x9267, 0xcdb6, 0xb6b6, 0xbfb9, /*0x90-0x97*/
04120 0xd5db, 0x9268, 0xb8a7, 0xc5d7, 0x9269, 0x926a, 0x926b, 0xded2, /*0x98-0x9f*/
04121 0xbfd9, 0xc2d5, 0xc7c0, 0x926c, 0xbba4, 0xb1a8, 0x926d, 0x926e, /*0xa0-0xaf*/
04122 0xc5ea, 0x926f, 0x9270, 0xc5fb, 0xc7a7, 0x9271, 0x9272, 0x9273, /*0xa8-0xaf*/
04123 0x9274, 0xb1a7, 0x9275, 0x9276, 0x9277, 0xb5d6, 0x9278, 0x9279, /*0xb0-0xbf*/
04124 0x927a, 0xc4a8, 0x927b, 0xded3, 0xd1ba, 0xb3e9, 0x927c, 0xc3f2, /*0xb8-0xbf*/
04125 0x927d, 0x927e, 0xb7f7, 0x9280, 0xd6f4, 0xb5a3, 0xb2f0, 0xc4b4, /*0xc0-0xcf*/
04126 0xc4e9, 0xc0ad, 0xded4, 0x9281, 0xb0e8, 0xc5c4, 0xc1e0, 0x9282, /*0xc8-0xcf*/
04127 0xb9d5, 0x9283, 0xbdc, 0xcdd8, 0xb0ce, 0x9284, 0xcdcf, 0xded6, /*0xd0-0xd7*/
04128 0xbbed0, 0xd7be, 0xded5, 0xd5d0, 0xb0dd, 0x9285, 0x9286, 0xc4e2, /*0xd8-0xdf*/
04129 0x9287, 0x9288, 0xc2a3, 0xbcf0, 0x9289, 0xd3b5, 0xc0b9, 0xc5a1, /*0xe0-0xe7*/
04130 0xb2a6, 0xd4f1, 0x928a, 0x928b, 0xc0a8, 0xcac3, 0xded7, 0xd5fc, /*0xe8-0xef*/
04131 0x928c, 0xb9b0, 0x928d, 0xc8ad, 0xcba9, 0x928e, 0xded9, 0xbfbf, /*0xf0-0xf7*/
04132 0x928f, 0x9290, 0x9291, 0x9292, 0xc6b4, 0xd7a7, 0xcab0, 0xc4c3, /*0xf8-0xff*/
04133 /* 0x6300 */
04134 0x9293, 0xb3d6, 0xb9d2, 0x9294, 0x9295, 0x9296, 0x9297, 0xd6b8, /*0x00-0x07*/
04135 0xeaef, 0xb0b4, 0x9298, 0x9299, 0x929a, 0x929b, 0xbfe6, 0x929c, /*0x08-0x0f*/
04136 0x929d, 0xccf4, 0x929e, 0x929f, 0x92a0, 0x92a1, 0xcdda, 0x92a2, /*0x10-0x17*/
04137 0x92a3, 0x92a4, 0xd6bf, 0xc2c9, 0x92a5, 0xcce, 0xc2a2, 0xd0ae, /*0x18-0x1f*/
04138 0xc4d3, 0xb5b2, 0xded8, 0xd5f5, 0xbcb7, 0xbdb3, 0x92a6, 0x92a7, /*0x20-0x27*/
04139 0xb0a4, 0x92a8, 0xc5b2, 0xb4ec, 0x92a9, 0x92aa, 0x92ab, 0xd5f1, /*0x28-0x2f*/
04140 0x92ac, 0x92ad, 0xeaef, 0x92ae, 0x92af, 0x92b0, 0x92b1, 0x92b2, /*0x30-0x37*/
04141 0x92b3, 0xdeda, 0xcda6, 0x92b4, 0x92b5, 0xcdec, 0x92b6, 0x92b7, /*0x38-0x3f*/
04142 0x92b8, 0x92b9, 0xcce6, 0xdedc, 0x92ba, 0xcdb1, 0xc0a6, 0x92bb, /*0x40-0x47*/
04143 0x92bc, 0xd7bd, 0x92bd, 0xdedb, 0xb0c6, 0xbab4, 0xc9d3, 0xc4f3, /*0x48-0x4f*/
04144 0xbbee, 0x92be, 0x92bf, 0x92c0, 0x92c1, 0xb2b6, 0x92c2, 0x92c3, /*0x50-0x57*/
04145 0x92c4, 0x92c5, 0x92c6, 0x92c7, 0x92c8, 0x92c9, 0xc0cc, 0xcbf0, /*0x58-0x5f*/
04146 0x92ca, 0xbcf1, 0xbbbb, 0xb5b7, 0x92cb, 0x92cc, 0x92cd, 0xc5f5, /*0x60-0x6f*/
04147 0x92ce, 0xdee6, 0x92cf, 0x92d0, 0x92d1, 0xdee3, 0xbedd, 0x92d2, /*0x68-0x6f*/
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04148 0x92d3, 0xdedf, 0x92d4, 0x92d5, 0x92d6, 0x92d7, 0xb4b7, 0xbddd, /*0x70-0x77*/
04149 0x92d8, 0x92d9, 0xdee0, 0xc4ed, 0x92da, 0x92db, 0x92dc, 0x92dd, /*0x78-0x7f*/
04150 0xcfc6, 0x92de, 0xb5e0, 0x92df, 0x92e0, 0x92e1, 0x92e2, 0xb6de, /*0x80-0x87*/
04151 0xcada, 0xb5f4, 0xdee5, 0x92e3, 0xd5c6, 0x92e4, 0xdee1, 0xcccd, /*0x88-0x8f*/
04152 0xc6fe, 0x92e5, 0xc5c5, 0x92e6, 0x92e7, 0x92e8, 0xd2b4, 0x92e9, /*0x90-0x97*/
04153 0xbfef2, 0x92ea, 0x92ef, 0x92ec, 0x92ed, 0x92ee, 0x92ef, 0x92f0, /*0x98-0x9f*/
04154 0xc2d3, 0x92f1, 0xccbd, 0xb3b8, 0x92f2, 0xbdd3, 0x92f3, 0xbfdf, /*0xa0-0xaf*/
04155 0xc6c6, 0xd1da, 0xb4eb, 0x92f4, 0xdee4, 0xdedd, 0xdee7, 0x92f5, /*0xa8-0xaf*/
04156 0xeafe, 0x92f6, 0x92f7, 0xc2b0, 0xdee2, 0x92f8, 0x92f9, 0xd6c0, /*0xb0-0xbf*/
04157 0xb5a7, 0x92fa, 0xb2f4, 0x92fb, 0xdee8, 0x92fc, 0xdef2, 0x92fd, /*0xb8-0xbf*/
04158 0x92fe, 0x9340, 0x9341, 0x9342, 0xdead, 0x9343, 0xdef1, 0x9344, /*0xc0-0xc7*/
04159 0x9345, 0xc8e0, 0x9346, 0x9347, 0x9348, 0xd7e1, 0xdef, 0xc3e8, /*0xc8-0xcf*/
04160 0xcce1, 0x9349, 0xb2e5, 0x934a, 0x934b, 0x934c, 0xd2be, 0x934d, /*0xd0-0xd7*/
04161 0x934e, 0x934f, 0x9350, 0x9351, 0x9352, 0x9353, 0xdee, 0x9354, /*0xd8-0xdf*/
04162 0xdeb, 0xcde5, 0x9355, 0xb4a7, 0x9356, 0x9357, 0x9358, 0x9359, /*0xe0-0xef*/
04163 0x935a, 0xbfab, 0xbebe, 0x935b, 0x935c, 0xbdd2, 0x935d, 0x935e, /*0xe8-0xef*/
04164 0x935f, 0x9360, 0xdee9, 0x9361, 0xd4ae, 0x9362, 0xdede, 0x9363, /*0xf0-0xf7*/
04165 0xdea, 0x9364, 0x9365, 0x9366, 0x9367, 0xc0bf, 0x9368, 0xdec, /*0xf8-0xff*/
04166 /* 0x6400 */
04167 0xb2f3, 0xb8e9, 0xc2a7, 0x9369, 0x936a, 0xbdc1, 0x936b, 0x936c, /*0x00-0x07*/
04168 0x936d, 0x936e, 0x936f, 0xdef5, 0xdef8, 0x9370, 0x9371, 0xb2ab, /*0x08-0x0f*/
04169 0xb4a4, 0x9372, 0x9373, 0xb4ea, 0xc9a6, 0x9374, 0x9375, 0x9376, /*0x10-0x17*/
04170 0x9377, 0x9378, 0x9379, 0xdef6, 0xcbd1, 0x937a, 0xb8e3, 0x937b, /*0x18-0x1f*/
04171 0xdef7, 0xdefa, 0x937c, 0x937d, 0x937e, 0x9380, 0xdef9, 0x9381, /*0x20-0x27*/
04172 0x9382, 0x9383, 0xccc2, 0x9384, 0xb0e1, 0xb4ee, 0x9385, 0x9386, /*0x28-0x2f*/
04173 0x9387, 0x9388, 0x9389, 0x938a, 0xe5ba, 0x938b, 0x938c, 0x938d, /*0x30-0x37*/
04174 0x938e, 0x938f, 0xd0af, 0x9390, 0x9391, 0xb2eb, 0x9392, 0xeba1, /*0x38-0x3f*/
04175 0x9393, 0xdef4, 0x9394, 0x9395, 0xc9e3, 0xdef3, 0xb0da, 0xd2a1, /*0x40-0x47*/
04176 0xb1f7, 0x9396, 0xccaf, 0x9397, 0x9398, 0x9399, 0x939a, 0x939b, /*0x48-0x4f*/
04177 0x939c, 0x939d, 0xdef0, 0x939e, 0xcba4, 0x939f, 0x93a0, 0x93a1, /*0x50-0x57*/
04178 0xd5aa, 0x93a2, 0x93a3, 0x93a4, 0x93a5, 0x93a6, 0xdefb, 0x93a7, /*0x58-0x5f*/
04179 0x93a8, 0x93a9, 0x93aa, 0x93ab, 0x93ac, 0x93ad, 0x93ae, 0xb4dd, /*0x60-0x67*/
04180 0x93af, 0xc4a6, 0x93b0, 0x93b1, 0x93b2, 0xdefd, 0x93b3, 0x93b4, /*0x68-0x6f*/
04181 0x93b5, 0x93b6, 0x93b7, 0x93b8, 0x93b9, 0x93ba, 0x93bb, 0x93bc, /*0x70-0x77*/
04182 0xc3fe, 0xc4a1, 0xdfa1, 0x93bd, 0x93be, 0x93bf, 0x93c0, 0x93c1, /*0x78-0x7f*/
04183 0x93c2, 0x93c3, 0xc1cc, 0x93c4, 0xdefc, 0xbef, 0x93c5, 0xc6b2, /*0x80-0x87*/
04184 0x93c6, 0x93c7, 0x93c8, 0x93c9, 0x93ca, 0x93cb, 0x93cc, 0x93cd, /*0x88-0x8f*/
04185 0x93ce, 0xb3c5, 0xc8f6, 0x93cf, 0x93d0, 0xcbb, 0xdefe, 0x93d1, /*0x90-0x97*/
04186 0x93d2, 0xdfa4, 0x93d3, 0x93d4, 0x93d5, 0x93d6, 0xd7b2, 0x93d7, /*0x98-0x9f*/
04187 0x93d8, 0x93d9, 0x93da, 0x93db, 0xb3b7, 0x93dc, 0x93dd, 0x93de, /*0xa0-0xaf*/
04188 0x93df, 0xc1c3, 0x93e0, 0x93e1, 0xc7cb, 0xb2a5, 0xb4e9, 0x93e2, /*0xa8-0xaf*/
04189 0xd7ab, 0xc9e3, 0x93e4, 0x93e5, 0xc4ec, 0x93e6, 0xc4ec, 0x93e7, 0xdfa2, /*0xb0-0xbf*/
04190 0xdfa3, 0x93e8, 0xdfa5, 0x93e9, 0xbab3, 0x93ea, 0x93eb, 0x93ec, /*0xb8-0xbf*/
04191 0xdfa6, 0x93ed, 0xc0de, 0x93ee, 0x93ef, 0xc9c3, 0x93f0, 0x93f1, /*0xc0-0xc7*/
04192 0x93f2, 0x93f3, 0x93f4, 0x93f5, 0x93f6, 0xb2d9, 0xc7e6, 0x93f7, /*0xc8-0xcf*/
04193 0xdfa7, 0x93f8, 0xc7dc, 0x93f9, 0x93fa, 0x93fb, 0x93fc, 0xdfa8, /*0xd0-0xd7*/
04194 0xeba2, 0x93fd, 0x93fe, 0x9440, 0x9441, 0x9442, 0xcdb3, 0x9443, /*0xd8-0xdf*/
04195 0x9444, 0xdfa5, 0xdfaa, 0x9446, 0xdfa9, 0x9447, 0xd2c1, 0x9448, /*0xe0-0xef*/
04196 0x9449, 0x944a, 0x944b, 0x944c, 0x944d, 0x944e, 0x944f, 0x9450, /*0xe8-0xef*/
04197 0x9451, 0x9452, 0x9453, 0x9454, 0x9455, 0x9456, 0x9457, 0x9458, /*0xf0-0xf7*/
04198 0x9459, 0x945a, 0x945b, 0x945c, 0x945d, 0x945e, 0x945f, 0x9460, /*0xf8-0xff*/
04199 /* 0x6500 */
04200 0xc5ca, 0x9461, 0x9462, 0x9463, 0x9464, 0x9465, 0x9466, 0x9467, /*0x00-0x07*/
04201 0x9468, 0xdfab, 0x9469, 0x946a, 0x946b, 0x946c, 0x946d, 0x946e, /*0x08-0x0f*/
04202 0x946f, 0x9470, 0xd4dc, 0x9471, 0x9472, 0x9473, 0x9474, 0x9475, /*0x10-0x17*/
04203 0xc8c1, 0x9476, 0x9477, 0x9478, 0x9479, 0x947a, 0x947b, 0x947c, /*0x18-0x1f*/
04204 0x947d, 0x947e, 0x9480, 0x9481, 0x9482, 0xdfac, 0x9483, 0x9484, /*0x20-0x27*/
04205 0x9485, 0x9486, 0x9487, 0xbfef0, 0x9488, 0x9489, 0xdfad, 0xd6a7, /*0x28-0x2f*/
04206 0x948a, 0x948b, 0x948c, 0x948d, 0xebb7, 0xebb6, 0xcad5, 0x948e, /*0x30-0x37*/
04207 0xd8fc, 0xb8c4, 0x948f, 0x9490, 0x9491, 0xb7c5, 0x9492, 0xd5fe, /*0x38-0x3f*/
04208 0x9493, 0x9494, 0x9495, 0x9496, 0xb9ca, 0x9497, 0x9498, /*0x40-0x47*/
04209 0xd0a7, 0xf4cd, 0x9499, 0x949a, 0xb5d0, 0x949b, 0x949c, 0xc3f4, /*0x48-0x4f*/
04210 0x949d, 0xbec8, 0x949e, 0x949f, 0x94a0, 0xebb7, 0xb0bd, 0x94a1, /*0x50-0x57*/
04211 0x94a2, 0xbdcc, 0x94a3, 0xc1b2, 0x94a4, 0xb1d6, 0xb3a8, 0x94a5, /*0x58-0x5f*/
04212 0x94a6, 0x94a7, 0xb8d2, 0xc9a2, 0x94a8, 0x94a9, 0xb6d8, 0x94aa, /*0x60-0x67*/
04213 0x94ab, 0x94ac, 0x94ad, 0xebb8, 0xebb4, 0x94ae, 0x94af, 0x94b0, /*0x68-0x6f*/
04214 0xcafd, 0x94b1, 0xc7c3, 0x94b2, 0xd5fb, 0x94b3, 0x94b4, 0xb7f3, /*0x70-0x77*/
04215 0x94b5, 0x94b6, 0x94b7, 0x94b8, 0x94b9, 0x94ba, 0x94bb, 0x94bc, /*0x78-0x7f*/
04216 0x94bd, 0x94be, 0x94bf, 0x94c0, 0x94c1, 0x94c2, 0x94c3, 0xccec4, /*0x80-0x87*/
04217 0x94c4, 0x94c5, 0x94c6, 0xd5ab, 0xb1f3, 0x94c7, 0x94c8, 0x94c9, /*0x88-0x8f*/
04218 0xebc3, 0xb0df, 0x94ca, 0xebc5, 0x94cb, 0x94cc, 0x94cd, 0xb6b7, /*0x90-0x97*/
04219 0x94ce, 0xc1cf, 0x94cf, 0xf5fa, 0xd0b1, 0x94d0, 0x94d1, 0xd5e5, /*0x98-0x9f*/
04220 0x94d2, 0xc3cd, 0x94d3, 0x94d4, 0xbdef, 0xb3e2, 0x94d5, 0xb8ab, /*0xa0-0xaf*/
04221 0x94d6, 0xd5b6, 0x94d7, 0xedbd, 0x94d8, 0xb6cf, 0x94d9, 0xcbb9, /*0xa8-0xaf*/
04222 0xd0c2, 0x94da, 0x94db, 0x94dc, 0x94dd, 0x94de, 0x94df, 0x94e0, /*0xb0-0xbf*/
04223 0x94e1, 0xb7bd, 0x94e2, 0x94e3, 0xebc6, 0xcaa9, 0x94e4, 0x94e5, /*0xb8-0xbf*/
04224 0x94e6, 0xc5d4, 0x94e7, 0xebc9, 0xebc8, 0xc2c3, 0xebc7, 0x94e8, /*0xc0-0xc7*/
04225 0x94e9, 0x94ea, 0x94eb, 0xd0fd, 0xebca, 0x94ec, 0xebb, 0xd7e5, /*0xc8-0xcf*/
04226 0x94ed, 0x94ee, 0xebc, 0x94ef, 0x94f0, 0x94f1, 0xebc, 0xc6ec, /*0xd0-0xd7*/
04227 0x94f2, 0x94f3, 0x94f4, 0x94f5, 0x94f6, 0x94f7, 0x94f8, 0x94f9, /*0xd8-0xdf*/
04228 0xc3ede, 0x94fa, 0xbcc8, 0x94fb, 0x94fc, 0xc8d5, 0xb5a9, 0xbec9, /*0xe0-0xef*/
04229 0xd6bc, 0xd4e7, 0x94fd, 0x94fe, 0xd1ae, 0xd0f1, 0xebb, 0xebb9, /*0xe8-0xef*/
04230 0xeba, 0xbab5, 0x9540, 0x9541, 0x9542, 0x9543, 0xcab1, 0xbff5, /*0xf0-0xf7*/
04231 0x9544, 0x9545, 0xcdfa, 0x9546, 0x9547, 0x9548, 0x9549, 0x954a, /*0xf8-0xff*/
04232 /* 0x6600 */
04233 0xeac0, 0x954b, 0xb0ba, 0xeabe, 0x954c, 0x954d, 0xc0a5, 0x954e, /*0x00-0x07*/
04234 0x954f, 0x9550, 0xebb, 0x9551, 0xb2fd, 0x9552, 0xc3f7, 0xbbe8, /*0x08-0x0f*/

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04235 0x9553, 0x9554, 0x9555, 0xd2d7, 0xcef4, 0xeabf, 0x9556, 0x9557, /*0x10-0x17*/
04236 0x9558, 0xeabc, 0x9559, 0x955a, 0x955b, 0xeac3, 0x955c, 0xd0c7, /*0x18-0x1f*/
04237 0xd3b3, 0x955d, 0x955e, 0x955f, 0x9560, 0xb4ba, 0x9561, 0xc3c1, /*0x20-0x27*/
04238 0xd7f2, 0x9562, 0x9563, 0x9564, 0x9565, 0xd5d1, 0x9566, 0xcac7, /*0x28-0x2f*/
04239 0x9567, 0xeac5, 0x9568, 0x9569, 0xeac4, 0xeac7, 0xeac6, 0x956a, /*0x30-0x37*/
04240 0x956b, 0x956c, 0x956d, 0x956e, 0xd6e7, 0x956f, 0xcfd4, 0x9570, /*0x38-0x3f*/
04241 0x9571, 0xeacb, 0x9572, 0xbbce, 0x9573, 0x9574, 0x9575, 0x9576, /*0x40-0x47*/
04242 0x9577, 0x9578, 0x9579, 0xbdff, 0xc9ce, 0x957a, 0x957b, 0xeacc, /*0x48-0x4f*/
04243 0x957c, 0x957d, 0xc9b9, 0xcffe, 0xeaca, 0xd4ce, 0xeacd, 0xeacf, /*0x50-0x57*/
04244 0x957e, 0x9580, 0xcded, 0x9581, 0x9582, 0x9583, 0x9584, 0xeac9, /*0x58-0x5f*/
04245 0x9585, 0xeace, 0x9586, 0x9587, 0xceee, 0x9588, 0xbbde, 0x9589, /*0x60-0x67*/
04246 0xb3bf, 0x958a, 0x958b, 0x958c, 0x958d, 0x958e, 0xc6d5, 0x958f, /*0x68-0x6f*/
04247 0xcefa, 0x958f, 0x9590, 0x9591, 0xc7e7, 0x9592, 0xbea7, 0xead0, /*0x70-0x77*/
04248 0x9593, 0x9594, 0xd6c7, 0x9595, 0x9596, 0x9597, 0xc1c0, 0x9598, /*0x78-0x7f*/
04249 0x9599, 0x959a, 0xd4dd, 0x959b, 0xead1, 0x959c, 0x959d, 0xcfbe, /*0x80-0x87*/
04250 0x959e, 0x959f, 0x95a0, 0x95a1, 0xead2, 0x95a2, 0x95a3, 0x95a4, /*0x88-0x8f*/
04251 0x95a5, 0xcaee, 0x95a6, 0x95a7, 0x95a8, 0x95a9, 0xc5af, 0xb0b5, /*0x90-0x97*/
04252 0x95aa, 0x95ab, 0x95ac, 0x95ad, 0x95ae, 0xead4, 0x95af, 0x95b0, /*0x98-0x9f*/
04253 0x95b1, 0x95b2, 0x95b3, 0x95b4, 0x95b5, 0x95b6, 0x95b7, 0xead3, /*0xa0-0xa7*/
04254 0xf4df, 0x95b8, 0x95b9, 0x95ba, 0x95bb, 0x95bc, 0xc4ba, 0x95bd, /*0xa8-0xaf*/
04255 0x95be, 0x95bf, 0x95c0, 0x95c1, 0xb1a9, 0x95c2, 0x95c3, 0x95c4, /*0xb0-0xb7*/
04256 0x95c5, 0xe5df, 0x95c6, 0x95c7, 0x95c8, 0x95c9, 0xead5, 0x95ca, /*0xb8-0xbf*/
04257 0x95cb, 0x95cc, 0x95cd, 0x95ce, 0x95cf, 0x95d0, 0x95d1, 0x95d2, /*0xc0-0xc7*/
04258 0x95d3, 0x95d4, 0x95d5, 0x95d6, 0x95d7, 0x95d8, 0x95d9, 0x95da, /*0xc8-0xcf*/
04259 0x95db, 0x95dc, 0x95dd, 0x95de, 0x95df, 0x95e0, 0x95e1, 0x95e2, /*0xd0-0xd7*/
04260 0x95e3, 0xcaef, 0x95e4, 0xead6, 0xead7, 0xc6d8, 0x95e5, 0x95e6, /*0xd8-0xdf*/
04261 0x95e7, 0x95e8, 0x95e9, 0x95ea, 0x95eb, 0x95ec, 0xead8, 0x95ed, /*0xe0-0xe7*/
04262 0x95ee, 0xead9, 0x95ef, 0x95f0, 0x95f1, 0x95f2, 0x95f3, 0x95f4, /*0xe8-0xef*/
04263 0xd4bb, 0x95ff, 0xc7fa, 0xd2b7, 0xb8fc, 0x95f6, 0x95f7, 0xeac2, /*0xf0-0xf7*/
04264 0x95f8, 0xb2dc, 0x95f9, 0x95fa, 0xc2fc, 0x95fb, 0xd4f8, 0xcce6, /*0xf8-0xff*/
04265 /* 0x6700 */
04266 0xd7ee, 0x95fc, 0x95fd, 0x95fe, 0x9640, 0x9641, 0x9642, 0x9643, /*0x00-0x07*/
04267 0xd4c2, 0xd3d0, 0xebc3, 0xc5f3, 0x9644, 0xb7fe, 0x9645, 0x9646, /*0x08-0x0f*/
04268 0xebd4, 0x9647, 0x9648, 0x9649, 0xcbb7, 0xebde, 0x964a, 0xc0ca, /*0x10-0x17*/
04269 0x964b, 0x964c, 0x964d, 0xcdfb, 0x964e, 0xb3af, 0x964f, 0xc6da, /*0x18-0x1f*/
04270 0x9650, 0x9651, 0x9652, 0x9653, 0x9654, 0x9655, 0xebfc, 0x9656, /*0x20-0x27*/
04271 0xc4be, 0x9657, 0xc6b4, 0xc4a9, 0xb1be, 0xd4fd, 0x9658, 0xcaf5, /*0x28-0x2f*/
04272 0x9659, 0xd6ec, 0x965a, 0x965b, 0xc6d3, 0xb6e4, 0x965c, 0x965d, /*0x30-0x37*/
04273 0x965e, 0x965f, 0xbbfa, 0x9660, 0x9661, 0xd0e0, 0x9662, 0x9663, /*0x38-0x3f*/
04274 0xc9b1, 0x9664, 0xd4d3, 0xc8a8, 0x9665, 0x9666, 0xb8cb, 0x9667, /*0x40-0x47*/
04275 0xe8be, 0xc9bc, 0x9668, 0x9669, 0xe8bb, 0x966a, 0xc0ee, 0xd0d3, /*0x48-0x4f*/
04276 0xb2c4, 0xb4e5, 0x966b, 0xe8bc, 0x966c, 0x966d, 0xd5c8, 0x966e, /*0x50-0x57*/
04277 0x966f, 0x9670, 0x9671, 0x9672, 0xb6c5, 0x9673, 0xe8bd, 0xcaf8, /*0x58-0x5f*/
04278 0xb8dc, 0xccf5, 0x9674, 0x9675, 0x9676, 0xc0b4, 0x9677, 0x9678, /*0x60-0x67*/
04279 0xd1ee, 0xe8bf, 0xe8c2, 0x9679, 0x967a, 0xbabc, 0x967b, 0xb1ad, /*0x68-0x6f*/
04280 0xbddc, 0x967c, 0xeabd, 0xe8c3, 0x967d, 0xe8c6, 0x967e, 0xe8cb, /*0x70-0x77*/
04281 0x9680, 0x9681, 0x9682, 0x9683, 0xe8cc, 0x9684, 0xc9bc, 0xb0e5, /*0x78-0x7f*/
04282 0x9685, 0x9686, 0x9687, 0x9688, 0x9689, 0x968a, 0xe8c1, 0xe8c2, /*0x80-0x87*/
04283 0x968a, 0xcdf7, 0x968b, 0xe8ca, 0x968c, 0x968d, 0x968e, 0x968f, /*0x88-0x8f*/
04284 0xcef6, 0x9690, 0x9691, 0x9692, 0x9693, 0xd5ed, 0x9694, 0xc1d6, /*0x90-0x97*/
04285 0xe8c4, 0x9695, 0xc3b6, 0x9696, 0xb9fb, 0xd6a6, 0xe8c8, 0x9697, /*0x98-0x9f*/
04286 0x9698, 0x9699, 0xcae0, 0xd4e6, 0x969a, 0xe8c0, 0x969b, 0xe8c5, /*0xa0-0xa7*/
04287 0xe8c7, 0x969c, 0xc7b9, 0xb7e3, 0x969d, 0xe8c9, 0x969e, 0xbfd9, /*0xa8-0xaf*/
04288 0xe8d2, 0x969f, 0x96a0, 0xe8d7, 0x96a1, 0xe8d5, 0xbcdc, 0xbccf, /*0xb0-0xb7*/
04289 0xe8db, 0x96a2, 0x96a3, 0x96a4, 0x96a5, 0x96a6, 0x96a7, 0x96a8, /*0xb8-0xbf*/
04290 0x96a9, 0xe8de, 0x96aa, 0xe8da, 0xb1fa, 0x96ab, 0x96ac, 0x96ad, /*0xc0-0xc7*/
04291 0x96ae, 0x96af, 0x96b0, 0x96b1, 0x96b2, 0x96b3, 0x96b4, 0xb0d8, /*0xc8-0xcf*/
04292 0xc4b3, 0xb8cc, 0xc6e2, 0xc8be, 0xc8e1, 0x96b5, 0x96b6, 0x96b7, /*0xd0-0xd7*/
04293 0xe8cf, 0xe8d4, 0xe8d6, 0x96b8, 0xb9f1, 0xe8d8, 0xd7f5, 0x96b9, /*0xd8-0xdf*/
04294 0xc4fb, 0x96ba, 0xe8dc, 0x96bb, 0x96bc, 0xb2e9, 0x96bd, 0x96be, /*0xe0-0xe7*/
04295 0x96bf, 0xe8d1, 0x96c0, 0x96c1, 0xbced, 0x96c2, 0x96c3, 0xbfc2, /*0xe8-0xef*/
04296 0xe8cd, 0xd6f9, 0x96c4, 0xc1f8, 0xb2f1, 0x96c5, 0x96c6, 0x96c7, /*0xf0-0xf7*/
04297 0x96c8, 0x96c9, 0x96ca, 0x96cb, 0x96cc, 0xe8df, 0x96cd, 0xcac1, /*0xf8-0xff*/
04298 /* 0x6800 */
04299 0xe8d9, 0x96ce, 0x96cf, 0x96d0, 0x96d1, 0xd5a4, 0x96d2, 0xb1ea, /*0x00-0x07*/
04300 0xd5bb, 0xe8ce, 0xe8d0, 0xb6b0, 0xe8d3, 0x96d3, 0xe8dd, 0xc0b8, /*0x08-0x0f*/
04301 0x96d4, 0xcaf7, 0x96d5, 0xcba8, 0x96d6, 0x96d7, 0xc6dc, 0xc0f5, /*0x10-0x17*/
04302 0x96d8, 0x96d9, 0x96da, 0x96db, 0x96dc, 0xe8e9, 0x96dd, 0x96de, /*0x18-0x1f*/
04303 0x96df, 0xd0a3, 0x96e0, 0x96e1, 0x96e2, 0x96e3, 0x96e4, 0x96e5, /*0x20-0x27*/
04304 0x96e6, 0xe8f2, 0xd6ea, 0x96e7, 0x96e8, 0x96e9, 0x96ea, 0x96eb, /*0x28-0x2f*/
04305 0x96ec, 0x96ed, 0xe8e0, 0xe8e1, 0x96ee, 0x96ef, 0x96f0, 0xd1f9, /*0x30-0x37*/
04306 0xbacb, 0xb8f9, 0x96f1, 0x96f2, 0xb8f1, 0xd4d4, 0xe8ef, 0x96f3, /*0x38-0x3f*/
04307 0xe8ee, 0xe8ec, 0xb9f0, 0xccd2, 0xe8ef, 0xcae6, 0xbff2, 0x96f4, /*0x40-0x47*/
04308 0xb0b8, 0xe8f1, 0xe8f0, 0x96f5, 0xd7c0, 0x96f6, 0xe8ea, 0x96f7, /*0x48-0x4f*/
04309 0xcda9, 0xc9a3, 0x96f8, 0xbbb8, 0xbddb, 0xe8ea, 0x96f9, 0x96fa, /*0x50-0x57*/
04310 0x96fb, 0x96fc, 0x96fd, 0x96fe, 0x9740, 0x9741, 0x9742, 0x9743, /*0x58-0x5f*/
04311 0xe8e2, 0xe8e3, 0xe8e5, 0xb5b5, 0xe8e7, 0xc7c5, 0xe8e8, 0xe8e9, /*0x60-0x67*/
04312 0xbdb0, 0xd7ae, 0x9744, 0xe8f8, 0x9745, 0x9746, 0x9747, 0x9748, /*0x68-0x6f*/
04313 0x9749, 0x974a, 0x974b, 0x974c, 0xe8f5, 0x974d, 0xcdb0, 0xe8f6, /*0x70-0x77*/
04314 0x974e, 0x974f, 0x9750, 0x9751, 0x9752, 0x9753, 0x9754, 0x9755, /*0x78-0x7f*/
04315 0x9756, 0xc1ba, 0x9757, 0xe8e8, 0x9758, 0xc3b7, 0xb0f0, 0x9759, /*0x80-0x87*/
04316 0x975a, 0x975b, 0x975c, 0x975d, 0x975e, 0x975f, 0x9760, 0xe8f4, /*0x88-0x8f*/
04317 0x9761, 0x9762, 0x9763, 0xe8f7, 0x9764, 0x9765, 0x9766, 0xb9a3, /*0x90-0x97*/
04318 0x9767, 0x9768, 0x9769, 0x976a, 0x976b, 0x976c, 0x976d, 0x976e, /*0x98-0x9f*/
04319 0x976f, 0x9770, 0xc9d2, 0x9771, 0x9772, 0x9773, 0xc3ce, 0xcce0, /*0xa0-0xaf*/
04320 0xc0e6, 0x9774, 0x9775, 0x9776, 0x9777, 0xc9f3, 0x9778, 0xc9dd, /*0xa8-0xaf*/
04321 0xd0b5, 0x9779, 0x977a, 0xcae1, 0x977b, 0xe8f3, 0x977c, 0x977d, /*0xb0-0xb7*/

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04322 0x977e, 0x9780, 0x9781, 0x9782, 0x9783, 0x9784, 0x9785, 0x9786, /*0xb8-0xbf*/
04323 0xbcec, 0x9787, 0xe8f9, 0x9788, 0x9789, 0x978a, 0x978b, 0x978c, /*0xc0-0xc7*/
04324 0x978d, 0xc3de, 0x978e, 0xc6e5, 0x978f, 0xb9f7, 0x9790, 0x9791, /*0xc8-0xcf*/
04325 0x9792, 0x9793, 0xb0f4, 0x9794, 0x9795, 0xd7d8, 0x9796, 0x9797, /*0xd0-0xd7*/
04326 0xbcac, 0x9798, 0xc5ef, 0x9799, 0x979a, 0x979b, 0x979c, 0x979d, /*0xd8-0xdf*/
04327 0xccca, 0x979e, 0x979f, 0xe9a6, 0x97a0, 0x97a1, 0x97a2, 0x97a3, /*0xe0-0xef*/
04328 0x97a4, 0x97a5, 0x97a6, 0x97a7, 0x97a8, 0x97a9, 0xc9ad, 0x97aa, /*0xe8-0xef*/
04329 0xe9a2, 0xc0e2, 0x97ab, 0x97ac, 0x97ad, 0xbfc3, 0x97ae, 0x97af, /*0xf0-0xf7*/
04330 0x97b0, 0xe8fe, 0xb9d7, 0x97b1, 0xe8fb, 0x97b2, 0x97b3, 0x97b4, /*0xf8-0xff*/
04331 /* 0x6900 */
04332 0x97b5, 0xe9a4, 0x97b6, 0x97b7, 0x97b8, 0xd2ce, 0x97b9, 0x97ba, /*0x00-0x07*/
04333 0x97bb, 0x97bc, 0x97bd, 0xe9a3, 0x97be, 0xd6b2, 0xd7b5, 0x97bf, /*0x08-0x0f*/
04334 0xe9a7, 0x97c0, 0xbdb7, 0x97c1, 0x97c2, 0x97c3, 0x97c4, 0x97c5, /*0x10-0x17*/
04335 0x97c6, 0x97c7, 0x97c8, 0x97c9, 0x97ca, 0x97cb, 0x97cc, 0xe8fc, /*0x18-0x1f*/
04336 0xe8fd, 0x97cd, 0x97ce, 0x97cf, 0xe9a1, 0x97d0, 0x97d1, 0x97d2, /*0x20-0x27*/
04337 0x97d3, 0x97d4, 0x97d5, 0x97d6, 0x97d7, 0xcdd6, 0x97d8, 0x97d9, /*0x28-0x2f*/
04338 0xd2ac, 0x97da, 0x97db, 0x97dc, 0xe9b2, 0x97dd, 0x97de, 0x97df, /*0x30-0x37*/
04339 0x97e0, 0xe9a9, 0x97e1, 0x97e2, 0x97e3, 0xb4aa, 0x97e4, 0xb4bb, /*0x38-0x3f*/
04340 0x97e5, 0x97e6, 0xe9ab, 0x97e7, 0x97e8, 0x97e9, 0x97ea, 0x97eb, /*0x40-0x47*/
04341 0x97ec, 0x97ed, 0x97ee, 0x97ef, 0x97f0, 0x97f1, 0x97f2, 0x97f3, /*0x48-0x4f*/
04342 0x97f4, 0x97f5, 0x97f6, 0x97f7, 0xd0a8, 0x97f8, 0x97f9, 0xe9a5, /*0x50-0x57*/
04343 0x97fa, 0x97fb, 0xb3fe, 0x97fc, 0x97fd, 0xe9ac, 0xc0e3, 0x97fe, /*0x58-0x5f*/
04344 0xe9aa, 0x9840, 0x9841, 0xe9b9, 0x9842, 0x9843, 0xe9b8, 0x9844, /*0x60-0x67*/
04345 0x9845, 0x9846, 0x9847, 0xe9ae, 0x9848, 0x9849, 0xe9af, 0x984a, /*0x68-0x6f*/
04346 0x984b, 0xe9a8, 0x984c, 0x984d, 0x984e, 0x984f, 0x9850, 0xbfac, /*0x70-0x77*/
04347 0xe9b1, 0xe9ba, 0x9851, 0x9852, 0xc2a5, 0x9853, 0x9854, 0x9855, /*0x78-0x7f*/
04348 0xe9af, 0x9856, 0xb8c5, 0x9857, 0xe9ad, 0x9858, 0xd3dc, 0xe9b4, /*0x80-0x87*/
04349 0xe9b5, 0xe9b7, 0x9859, 0x985a, 0x985b, 0xe9c7, 0x985c, 0x985d, /*0x88-0x8f*/
04350 0x985e, 0x985f, 0x9860, 0x9861, 0xc0c6, 0xe9c5, 0x9862, 0x9863, /*0x90-0x97*/
04351 0xe9b0, 0x9864, 0x9865, 0xe9bb, 0xb0f1, 0x9866, 0x9867, 0x9868, /*0x98-0x9f*/
04352 0x9869, 0x986a, 0x986b, 0x986c, 0x986d, 0x986e, 0x986f, 0xe9bc, /*0xa0-0xaf*/
04353 0xd5a5, 0x9870, 0x9871, 0xe9be, 0x9872, 0xe9bf, 0x9873, 0x9874, /*0xa8-0xaf*/
04354 0x9875, 0xe9c1, 0x9876, 0x9877, 0xc1f1, 0x9878, 0x9879, 0xc8b6, /*0xb0-0xb7*/
04355 0x987a, 0x987b, 0x987c, 0xe9bd, 0x987d, 0x987e, 0x9880, 0x9881, /*0xb8-0xbf*/
04356 0x9882, 0xe9c2, 0x9883, 0x9884, 0x9885, 0x9886, 0x9887, 0x9888, /*0xc0-0xc7*/
04357 0x9889, 0x988a, 0xe9c3, 0x988b, 0xe9b3, 0x988c, 0xe9b6, 0x988d, /*0xc8-0xcf*/
04358 0xbbb1, 0x988e, 0x988f, 0x9890, 0xe9c0, 0x9891, 0x9892, 0x9893, /*0xd0-0xd7*/
04359 0x9894, 0x9895, 0x9896, 0xbcf7, 0x9897, 0x9898, 0x9899, 0xe9c4, /*0xd8-0xdf*/
04360 0xe9c6, 0x989a, 0x989b, 0x989c, 0x989d, 0x989e, 0x989f, 0x98a0, /*0xe0-0xef*/
04361 0x98a1, 0x98a2, 0x98a3, 0x98a4, 0x98a5, 0xe9ca, 0x98a6, 0x98a7, /*0xe8-0xef*/
04362 0x98a8, 0x98a9, 0xe9ce, 0x98aa, 0x98ab, 0x98ac, 0x98ad, 0x98ae, /*0xf0-0xf7*/
04363 0x98af, 0x98b0, 0xe9bb, 0x98b2, 0x98b3, 0xb2db, 0x98b4, 0xe9c8, /*0xf8-0xff*/
04364 /* 0x6a00 */
04365 0x98b5, 0x98b6, 0x98b7, 0x98b8, 0x98b9, 0x98ba, 0x98bb, 0x98bc, /*0x00-0x07*/
04366 0x98bd, 0x98be, 0xb7ae, 0x98bf, 0x98c0, 0x98c1, 0x98c2, 0x98c3, /*0x08-0x0f*/
04367 0x98c4, 0x98c5, 0x98c6, 0x98c7, 0x98c8, 0x98c9, 0x98ca, 0xe9cb, /*0x10-0x17*/
04368 0xe9cc, 0x98cb, 0x98cc, 0x98cd, 0x98ce, 0x98cf, 0x98d0, 0xd5c1, /*0x18-0x1f*/
04369 0x98d1, 0xc4a3, 0x98d2, 0x98d3, 0x98d4, 0x98d5, 0x98d6, 0x98d7, /*0x20-0x27*/
04370 0xe9d8, 0x98d8, 0xbae1, 0x98d9, 0x98da, 0x98db, 0x98dc, 0xe9c9, /*0x28-0x2f*/
04371 0x98dd, 0xd3a3, 0x98de, 0x98df, 0x98e0, 0xe9d4, 0x98e1, 0x98e2, /*0x30-0x37*/
04372 0x98e3, 0x98e4, 0x98e5, 0x98e6, 0x98e7, 0xe9d7, 0xe9d0, 0x98e8, /*0x38-0x3f*/
04373 0x98e9, 0x98ea, 0x98eb, 0x98ec, 0xe9cf, 0x98ed, 0x98ee, 0xc7c1, /*0x40-0x47*/
04374 0x98ef, 0x98f0, 0x98f1, 0x98f2, 0x98f3, 0x98f4, 0x98f5, 0x98f6, /*0x48-0x4f*/
04375 0xe9d2, 0x98f7, 0x98f8, 0x98f9, 0x98fa, 0x98fb, 0x98fc, 0x98fd, /*0x50-0x57*/
04376 0xe9d9, 0xb3c8, 0x98fe, 0xe9d3, 0x9940, 0x9941, 0x9942, 0x9943, /*0x58-0x5f*/
04377 0x9944, 0xcff0, 0x9945, 0x9946, 0x9947, 0xe9cd, 0x9948, 0x9949, /*0x60-0x67*/
04378 0x994a, 0x994b, 0x994c, 0x994d, 0x994e, 0x994f, 0x9950, 0x9951, /*0x68-0x6f*/
04379 0x9952, 0xb3f7, 0x9953, 0x9954, 0x9955, 0x9956, 0x9957, 0x9958, /*0x70-0x77*/
04380 0x9959, 0xe9d6, 0x995a, 0x995b, 0xe9da, 0x995c, 0x995d, 0x995e, /*0x78-0x7f*/
04381 0xccb4, 0x995f, 0x9960, 0x9961, 0xcfad, 0x9962, 0x9963, 0x9964, /*0x80-0x87*/
04382 0x9965, 0x9966, 0x9967, 0x9968, 0x9969, 0x996a, 0xe9d5, 0x996b, /*0x88-0x8f*/
04383 0xe9dc, 0xe9db, 0x996c, 0x996d, 0x996e, 0x996f, 0x9970, 0xe9de, /*0x90-0x97*/
04384 0x9971, 0x9972, 0x9973, 0x9974, 0x9975, 0x9976, 0x9977, 0x9978, /*0x98-0x9f*/
04385 0xe9d1, 0x9979, 0x997a, 0x997b, 0x997c, 0x997d, 0x997e, 0x9980, /*0xa0-0xaf*/
04386 0x9981, 0xe9dd, 0x9982, 0xe9df, 0xc3ca, 0x9983, 0x9984, 0x9985, /*0xa8-0xaf*/
04387 0x9986, 0x9987, 0x9988, 0x9989, 0x998a, 0x998b, 0x998c, 0x998d, /*0xb0-0xb7*/
04388 0x998e, 0x998f, 0x9990, 0x9991, 0x9992, 0x9993, 0x9994, 0x9995, /*0xb8-0xbf*/
04389 0x9996, 0x9997, 0x9998, 0x9999, 0x999a, 0x999b, 0x999c, 0x999d, /*0xc0-0xc7*/
04390 0x999e, 0x999f, 0x99a0, 0x99a1, 0x99a2, 0x99a3, 0x99a4, 0x99a5, /*0xc8-0xcf*/
04391 0x99a6, 0x99a7, 0x99a8, 0x99a9, 0x99aa, 0x99ab, 0x99ac, 0x99ad, /*0xd0-0xd7*/
04392 0x99ae, 0x99af, 0x99b0, 0x99b1, 0x99b2, 0x99b3, 0x99b4, 0x99b5, /*0xd8-0xdf*/
04393 0x99b6, 0x99b7, 0x99b8, 0x99b9, 0x99ba, 0x99bb, 0x99bc, 0x99bd, /*0xe0-0xef*/
04394 0x99be, 0x99bf, 0x99c0, 0x99c1, 0x99c2, 0x99c3, 0x99c4, 0x99c5, /*0xe8-0xef*/
04395 0x99c6, 0x99c7, 0x99c8, 0x99c9, 0x99ca, 0x99cb, 0x99cc, 0x99cd, /*0xf0-0xf7*/
04396 0x99ce, 0x99cf, 0x99d0, 0x99d1, 0x99d2, 0x99d3, 0x99d4, 0x99d5, /*0xf8-0xff*/
04397 /* 0x6b00 */
04398 0x99d6, 0x99d7, 0x99d8, 0x99d9, 0x99da, 0x99db, 0x99dc, 0x99dd, /*0x00-0x07*/
04399 0x99de, 0x99df, 0x99e0, 0x99e1, 0x99e2, 0x99e3, 0x99e4, 0x99e5, /*0x08-0x0f*/
04400 0x99e6, 0x99e7, 0x99e8, 0x99e9, 0x99ea, 0x99eb, 0x99ec, 0x99ed, /*0x10-0x17*/
04401 0x99ee, 0x99ef, 0x99f0, 0x99f1, 0x99f2, 0x99f3, 0x99f4, 0x99f5, /*0x18-0x1f*/
04402 0xc7b7, 0xb4ce, 0xbbb6, 0xd0c0, 0xeca3, 0x99f6, 0x99f7, 0xc5b7, /*0x20-0x27*/
04403 0x99f8, 0x99f9, 0x99fa, 0x99fb, 0x99fc, 0x99fd, 0x99fe, 0x99ff, /*0x28-0x2f*/
04404 0x9a41, 0x9a42, 0xd3fb, 0x9a43, 0x9a44, 0x9a45, 0x9a46, 0xeca4, /*0x30-0x37*/
04405 0x9a47, 0xeca5, 0xc6db, 0x9a48, 0x9a49, 0x9a4a, 0xbfee, 0x9a4b, /*0x38-0x3f*/
04406 0x9a4c, 0x9a4d, 0x9a4e, 0xeca6, 0x9a4f, 0x9a50, 0xeca7, 0xd0aa, /*0x40-0x47*/
04407 0x9a51, 0xc7b8, 0x9a52, 0x9a53, 0xb8e8, 0x9a54, 0x9a55, 0x9a56, /*0x48-0x4f*/
04408 0x9a57, 0x9a58, 0x9a59, 0x9a5a, 0x9a5b, 0x9a5c, 0x9a5d, 0x9a5e, /*0x50-0x57*/
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04409 0x9a5f, 0xecac8, 0x9a60, 0x9a61, 0x9a62, 0x9a63, 0x9a64, 0x9a65, /*0x58-0x5f*/
04410 0x9a66, 0x9a67, 0xd6b9, 0xd5fd, 0xb4cb, 0xb2bd, 0xccee4, 0xc6e7, /*0x60-0x67*/
04411 0x9a68, 0x9a69, 0xcde1, 0x9a6a, 0x9a6b, 0x9a6c, 0x9a6d, 0x9a6e, /*0x68-0x6f*/
04412 0x9a6f, 0x9a70, 0x9a71, 0x9a72, 0x9a73, 0x9a74, 0x9a75, 0x9a76, /*0x70-0x77*/
04413 0x9a77, 0xb4f5, 0x9a78, 0xcbbc0, 0xbcdf, 0x9a79, 0x9a7a, 0x9a7b, /*0x78-0x7f*/
04414 0x9a7c, 0xe9e2, 0xe9e3, 0xd1ea, 0xe9e5, 0x9a7d, 0xb4f7, 0xe9e4, /*0x80-0x87*/
04415 0x9a7e, 0xd1b3, 0xcae2, 0xb2d0, 0x9a80, 0xe9e8, 0x9a81, 0x9a82, /*0x88-0x8f*/
04416 0x9a83, 0x9a84, 0xe9e6, 0xe9e7, 0x9a85, 0x9a86, 0xd6b3, 0x9a87, /*0x90-0x97*/
04417 0x9a88, 0x9a89, 0xe9e9, 0xe9ea, 0x9a8a, 0x9a8b, 0x9a8c, 0x9a8d, /*0x98-0x9f*/
04418 0x9a8e, 0xe9eb, 0x9a8f, 0x9a90, 0x9a91, 0x9a92, 0x9a93, 0x9a94, /*0xa0-0xa7*/
04419 0x9a95, 0x9a96, 0xe9ec, 0x9a97, 0x9a98, 0x9a99, 0x9a9a, 0x9a9b, /*0xa8-0xaf*/
04420 0x9a9c, 0x9a9d, 0xc9a9, 0xecaf, 0xc5b9, 0xb6ce, 0x9a9f, 0xd2f3, /*0xb0-0xbf*/
04421 0x9aa0, 0x9aa1, 0x9aa2, 0x9aa3, 0x9aa4, 0x9aa5, 0x9aa6, 0xb5ee, /*0xb8-0xbf*/
04422 0x9aa7, 0xbbd9, 0xecb1, 0x9aa8, 0x9aa9, 0xd2e3, 0x9aaa, 0x9aab, /*0xc0-0xc7*/
04423 0x9aac, 0x9aad, 0x9aac, 0x9aaf, 0xc4b8, 0x9ab0, 0xc3bf, /*0xc8-0xcf*/
04424 0x9ab1, 0x9ab2, 0xb6be, 0xd8b9, 0xb1c8, 0xb1cf, 0xb1d1, 0xc5fe, /*0xd0-0xd7*/
04425 0x9ab3, 0xb1d0, 0x9ab4, 0xc3ab, 0x9ab5, 0x9ab6, 0x9ab7, 0x9ab8, /*0xd8-0xdf*/
04426 0x9ab9, 0xd5b1, 0x9aba, 0x9abc, 0x9abd, 0x9abe, 0x9abf, /*0xe0-0xef*/
04427 0x9ac0, 0x9ac1, 0xeba4, 0xbac1, 0x9ac2, 0x9ac3, 0x9ac4, 0xccba, /*0xe8-0xef*/
04428 0x9ac5, 0x9ac6, 0x9ac7, 0xeba5, 0x9ac8, 0xeba7, 0x9ac9, 0x9aca, /*0xf0-0xf7*/
04429 0x9acb, 0xeba8, 0x9acc, 0x9acd, 0x9ace, 0xeba6, 0x9acf, 0x9ad0, /*0xf8-0xff*/
04430 /* 0x6c00 */
04431 0x9ad1, 0x9ad2, 0x9ad3, 0x9ad4, 0x9ad5, 0xeba9, 0xebab, 0xebaa, /*0x00-0x07*/
04432 0x9ad6, 0x9ad7, 0x9ad8, 0x9ad9, 0x9ada, 0xebac, 0x9adb, 0xcacf, /*0x08-0x0f*/
04433 0xd8b5, 0xc3f1, 0x9adc, 0xc3a5, 0xc6f8, 0xebad, 0xc4ca, 0x9add, /*0x10-0x17*/
04434 0xebae, 0xebaf, 0xebb0, 0xb7d5, 0x9ade, 0x9adf, 0x9ae0, 0xb7fa, /*0x18-0x1f*/
04435 0x9ae1, 0xebb1, 0xc7e2, 0x9ae2, 0xebb3, 0x9ae3, 0xbaa4, 0xd1f5, /*0x20-0x27*/
04436 0xb0b1, 0xebb2, 0xebb4, 0x9ae4, 0x9ae5, 0x9ae6, 0xb5aa, 0xc2c8, /*0x28-0x2f*/
04437 0xc7e8, 0x9ae7, 0xebb5, 0x9ae8, 0xcbae, 0xe3df, 0x9ae9, 0x9aea, /*0x30-0x37*/
04438 0xd3c0, 0x9aeb, 0x9aeb, 0xcdf4, 0x9aed, 0x9aee, 0xd9db, 0x9aef, /*0x38-0x3f*/
04439 0xcdal, 0xd6ad, 0xc7f3, 0x9af1, 0x9af2, 0x9af3, 0xd9e0, 0xbbe3, /*0x40-0x47*/
04440 0x9af4, 0xbaba, 0xe3e2, 0x9af5, 0x9af6, 0x9af7, 0x9af8, 0x9af9, /*0x48-0x4f*/
04441 0xcfab, 0x9afa, 0x9afb, 0x9afc, 0xe3e0, 0xc9c7, 0x9afd, 0xbab9, /*0x50-0x57*/
04442 0x9afe, 0x9b40, 0x9b41, 0xd1b4, 0xe3e1, 0xc8ea, 0xb9af, 0xbdad, /*0x58-0x5f*/
04443 0xb3d8, 0xcdbd, 0x9b42, 0x9b43, 0xcc0c, 0x9b44, 0x9b45, 0x9b46, /*0x60-0x67*/
04444 0xe3e8, 0xe3e9, 0xcdf4, 0x9b47, 0x9b48, 0x9b49, 0x9b4a, 0x9b4b, /*0x68-0x6f*/
04445 0xccad, 0x9b4c, 0xbcb3, 0x9b4d, 0xe3ea, 0x9b4e, 0xe3eb, 0x9b4f, /*0x70-0x77*/
04446 0x9b50, 0xd0da, 0x9b51, 0x9b52, 0x9b53, 0xc6fb, 0xb7da, 0x9b54, /*0x78-0x7f*/
04447 0x9b55, 0xc7fd, 0xd2ca, 0xcdb6, 0x9b56, 0xe3ea, 0xe3ec, 0x9b57, /*0x80-0x87*/
04448 0xc9f2, 0xb3c1, 0x9b58, 0x9b59, 0xe3e7, 0x9b5a, 0x9b5b, 0xc6e3, /*0x88-0x8f*/
04449 0xe3e5, 0x9b5c, 0x9b5d, 0xedb3, 0xe3e6, 0x9b5e, 0x9b5f, 0x9b60, /*0x90-0x97*/
04450 0x9b61, 0xc9b3, 0x9b62, 0xc5e6, 0x9b63, 0x9b64, 0x9b65, 0xb9b5, /*0x98-0x9f*/
04451 0x9b66, 0xc3bb, 0x9b67, 0xe3e3, 0xc5bd, 0xc1a4, 0xc2d9, 0xb2d7, /*0xa0-0xaf*/
04452 0x9b68, 0xe3ed, 0xbba6, 0xc4ad, 0x9b69, 0xe3f0, 0xbeda, 0x9b6a, /*0xa8-0xaf*/
04453 0x9b6b, 0xe3ff, 0xe3f5, 0xbdad, 0x9b6c, 0x9b6d, 0x9b6e, 0x9b6f, /*0xb0-0xbf*/
04454 0xb7d0, 0xd3cd, 0x9b70, 0xd6ce, 0xd5d3, 0xb9c1, 0xd5b4, 0xd1d8, /*0xb8-0xbf*/
04455 0x9b71, 0x9b72, 0x9b73, 0x9b74, 0xd0b9, 0xc7f6, 0x9b75, 0x9b76, /*0xc0-0xc7*/
04456 0x9b77, 0xc8aa, 0xb2b4, 0x9b78, 0xc3da, 0x9b79, 0x9b7a, 0x9b7b, /*0xc8-0xcf*/
04457 0xe3ee, 0x9b7c, 0x9b7d, 0xe3fc, 0xe3ef, 0xb7a8, 0xe3f7, 0xe3f4, /*0xd0-0xd7*/
04458 0x9b7e, 0x9b80, 0x9b81, 0xb7ba, 0x9b82, 0x9b83, 0xc5a2, 0x9b84, /*0xd8-0xdf*/
04459 0xe3f6, 0xc5dd, 0xb2a8, 0xc6fc, 0x9b85, 0xc4e0, 0x9b86, 0x9b87, /*0xe0-0xef*/
04460 0xd7a2, 0x9b88, 0xc0e1, 0xe3f9, 0x9b89, 0x9b8a, 0xe3fa, 0xe3fd, /*0xe8-0xef*/
04461 0xcxca9, 0xe3f3, 0x9b8b, 0xd3be, 0x9b8c, 0xb1c3, 0xedb4, 0xe3f1, /*0xf0-0xf7*/
04462 0xe3f2, 0x9b8d, 0xe3f8, 0xd0ba, 0xc6c3, 0xd4f3, 0xe3fe, 0x9b8e, /*0xf8-0xff*/
04463 /* 0x6d00 */
04464 0x9b8f, 0xbde0, 0x9b90, 0x9b91, 0xe4a7, 0x9b92, 0x9b93, 0xe4a6, /*0x00-0x07*/
04465 0x9b94, 0x9b95, 0x9b96, 0xd1f3, 0xe4a3, 0x9b97, 0xe4a9, 0x9b98, /*0x08-0x0f*/
04466 0x9b99, 0x9b9a, 0xc8f7, 0x9b9b, 0x9b9c, 0x9b9d, 0x9b9e, 0xcfb4, /*0x10-0x17*/
04467 0x9b9f, 0xe4a8, 0xe4ae, 0xc2e5, 0x9ba0, 0x9ba1, 0xb6b4, 0x9ba2, /*0x18-0x1f*/
04468 0x9ba3, 0x9ba4, 0x9ba5, 0x9ba6, 0xbdf2, 0x9ba7, 0xb6b8, 0xe4a2, /*0x20-0x27*/
04469 0x9ba9, 0x9baa, 0xbae9, 0xe4aa, 0x9bab, 0x9bac, 0xe4ac, 0x9bad, /*0x28-0x2f*/
04470 0x9bae, 0xb6fd, 0xd6de, 0xe4b2, 0x9baf, 0xe4ad, 0x9bb0, 0x9bb1, /*0x30-0x37*/
04471 0x9bb2, 0xe4a1, 0x9bb3, 0xbbee, 0xcddd, 0xc7a2, 0xc5c9, 0x9bb4, /*0x38-0x3f*/
04472 0x9bb5, 0xc1f7, 0x9bb6, 0xe4a4, 0x9bb7, 0xc7b3, 0xbdad, 0xbdbd, /*0x40-0x47*/
04473 0xe4a5, 0x9bb8, 0xd7c7, 0xb2e2, 0x9bb9, 0xe4ab, 0xbcc3, 0xe4af, /*0x48-0x4f*/
04474 0x9bba, 0xbbbe, 0xe4b0, 0xc5a8, 0xe4b1, 0x9bbb, 0x9bbc, 0x9bbd, /*0x50-0x57*/
04475 0x9bbe, 0xd5e3, 0xbfa3, 0x9bbf, 0xe4ba, 0x9bc0, 0xe4b7, 0x9bc1, /*0x58-0x5f*/
04476 0xe4bb, 0x9bc2, 0x9bc3, 0xe4bd, 0x9bc4, 0x9bc5, 0xc6d6, 0x9bc6, /*0x60-0x67*/
04477 0x9bc7, 0xbac6, 0xc0cb, 0x9bc8, 0x9bc9, 0x9bca, 0xb8a1, 0xe4b4, /*0x68-0x6f*/
04478 0x9bcb, 0x9bcc, 0x9bcd, 0x9bce, 0xd4a1, 0x9bcf, 0x9bd0, 0xbaa3, /*0x70-0x77*/
04479 0xbdfc, 0x9bd1, 0x9bd2, 0x9bd3, 0xe4bc, 0x9bd4, 0x9bd5, 0x9bd6, /*0x78-0x7f*/
04480 0x9bd7, 0x9bd8, 0xcdbf, 0x9bd9, 0x9bda, 0xc4f9, 0x9bdb, 0x9bdc, /*0x80-0x87*/
04481 0xcffb, 0xc9e6, 0x9bdd, 0x9bde, 0xd3bf, 0x9bdf, 0xcfd1, 0x9be0, /*0x88-0x8f*/
04482 0x9be1, 0xe4b3, 0x9be2, 0xe4b8, 0xe4b9, 0xcce9, 0x9be3, 0x9be4, /*0x90-0x97*/
04483 0x9be5, 0x9be6, 0x9be7, 0xcce, 0x9be8, 0xc0d4, 0xe4b5, 0xc1b0, /*0x98-0x9f*/
04484 0xe4b6, 0xcdd0, 0x9be9, 0xbbc1, 0xb5d3, 0x9bec, 0xc8f3, 0xbda7, /*0xa0-0xaf*/
04485 0xd5c7, 0xc9ac, 0xb8a2, 0xe4ca, 0x9beb, 0x9bec, 0xe4cc, 0xd1c4, /*0xa8-0xaf*/
04486 0x9bed, 0x9bee, 0xd2ba, 0x9bef, 0x9bf0, 0xbaad, 0x9bf1, 0x9bf2, /*0xb0-0xbf*/
04487 0xbdad, 0x9bf3, 0x9bf4, 0x9bf5, 0x9bf6, 0x9bf7, 0x9bf8, 0xe4c3, /*0xb8-0xbf*/
04488 0xb5ed, 0x9bf9, 0x9bfa, 0x9bfb, 0xd7cd, 0xe4c0, 0xcffd, 0xe4bf, /*0xc0-0xcf*/
04489 0x9bfc, 0x9bfd, 0x9bfe, 0xc1dc, 0xccca, 0x9c40, 0x9c41, 0x9c42, /*0xc8-0xcf*/
04490 0x9c43, 0xcae7, 0x9c44, 0x9c45, 0x9c46, 0x9c47, 0xc4d7, 0x9c48, /*0xd0-0xd7*/
04491 0xcdd4, 0xe4c8, 0x9c49, 0x9c4a, 0x9c4b, 0xe4c7, 0xe4c1, 0x9c4c, /*0xd8-0xdf*/
04492 0xe4c4, 0xb5ad, 0x9c4d, 0x9c4e, 0xd3d9, 0x9c4f, 0xe4c6, 0x9c50, /*0xe0-0xef*/
04493 0x9c51, 0x9c52, 0x9c53, 0xd2f9, 0xb4e3, 0x9c54, 0xbbb4, 0x9c55, /*0xe8-0xef*/
04494 0x9c56, 0xc9ee, 0x9c57, 0xb4be, 0x9c58, 0x9c59, 0x9c5a, 0xbbec, /*0xf0-0xf7*/
04495 0x9c5b, 0xd1cd, 0x9c5c, 0xcdd, 0xedb5, 0x9c5d, 0x9c5e, 0x9c5f, /*0xf8-0xff*/
```

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04496 /* 0x6e00 */
04497 0x9c60, 0x9c61, 0x9c62, 0x9c63, 0x9c64, 0xc7e5, 0x9c65, 0x9c66, /*0x00-0x07*/
04498 0x9c67, 0x9c68, 0xd4a8, 0x9c69, 0xe4cb, 0xd7d5, 0xe4c2, 0x9c6a, /*0x08-0x0f*/
04499 0xbda5, 0xe4c5, 0x9c6b, 0x9c6c, 0xd3e6, 0x9c6d, 0xe4c9, 0xc9f8, /*0x10-0x17*/
04500 0x9c6e, 0x9c6f, 0xe4be, 0x9c70, 0x9c71, 0xd3e5, 0x9c72, 0x9c73, /*0x18-0x1f*/
04501 0xc7fe, 0xb6c9, 0x9c74, 0xd4fc, 0xb2b3, 0xe4d7, 0x9c75, 0x9c76, /*0x20-0x27*/
04502 0x9c77, 0xcce2, 0x9c78, 0xe4cd, 0x9c79, 0xccebc, 0x9c7a, 0xb8db, /*0x28-0x2f*/
04503 0x9c7b, 0x9c7c, 0xe4d6, 0x9c7d, 0xbfca, 0x9c7e, 0x9c80, 0x9c81, /*0x30-0x37*/
04504 0xd3ce, 0x9c82, 0xc3ec, 0x9c83, 0x9c84, 0x9c85, 0x9c86, 0x9c87, /*0x38-0x3f*/
04505 0x9c88, 0x9c89, 0x9c8a, 0xc5c8, 0xe4d8, 0x9c8b, 0x9c8c, 0x9c8d, /*0x40-0x47*/
04506 0x9c8e, 0x9c8f, 0x9c90, 0x9c91, 0x9c92, 0xcdc4, 0xe4cf, 0x9c93, /*0x48-0x4f*/
04507 0x9c94, 0x9c95, 0x9c96, 0xe4d4, 0xe4d5, 0x9c97, 0xbafe, 0x9c98, /*0x50-0x57*/
04508 0xcfe6, 0x9c99, 0x9c9a, 0xd5bf, 0x9c9b, 0x9c9c, 0x9c9d, 0xe4d2, /*0x58-0x5f*/
04509 0x9c9e, 0x9c9f, 0x9ca0, 0x9ca1, 0x9ca2, 0x9ca3, 0x9ca4, 0x9ca5, /*0x60-0x67*/
04510 0x9ca6, 0x9ca7, 0x9ca8, 0xe4d0, 0x9ca9, 0x9caa, 0xe4ce, 0x9cab, /*0x68-0x6f*/
04511 0x9cac, 0x9cad, 0x9cae, 0x9caf, 0x9cb0, 0x9cb1, 0x9cb2, 0x9cb3, /*0x70-0x77*/
04512 0x9cb4, 0x9cb5, 0x9cb6, 0x9cb7, 0x9cb8, 0x9cb9, 0xcde5, 0xcaaa, /*0x78-0x7f*/
04513 0x9cba, 0x9cbb, 0x9cbc, 0xc0a3, 0x9cbd, 0xbda6, 0xe4d3, 0x9cbe, /*0x80-0x87*/
04514 0x9cbf, 0xb8c8, 0x9cc0, 0x9cc1, 0x9cc2, 0x9cc3, 0x9cc4, 0xe4e7, /*0x88-0x8f*/
04515 0xd4b4, 0x9cc5, 0x9cc6, 0x9cc7, 0x9cc8, 0x9cc9, 0x9cca, 0x9ccb, /*0x90-0x97*/
04516 0xe4db, 0x9ccc, 0x9ccd, 0x9cce, 0xc1ef, 0x9ccf, 0x9cd0, 0xe4e9, /*0x98-0x9f*/
04517 0x9cd1, 0x9cd2, 0xd2e7, 0x9cd3, 0x9cd4, 0xe4df, 0x9cd5, 0xe4e0, /*0xa0-0xa7*/
04518 0x9cd6, 0x9cd7, 0xcfaa, 0x9cd8, 0x9cd9, 0x9cda, 0x9cdb, 0xcdbd, /*0xa8-0xaf*/
04519 0x9cdc, 0xe4da, 0xe4d1, 0x9cdd, 0xe4e5, 0x9cde, 0xc8dc, 0xe4e3, /*0xb0-0xb7*/
04520 0x9cdf, 0x9ce0, 0xc4e7, 0xe4e2, 0x9ce1, 0xe4e1, 0x9ce2, 0x9ce3, /*0xb8-0xbf*/
04521 0x9ce4, 0xb3fc, 0xe4e8, 0x9ce5, 0x9ce6, 0x9ce7, 0x9ce8, 0xb5e1, /*0xc0-0xc7*/
04522 0x9ce9, 0x9cea, 0x9ceb, 0xd7cc, 0x9cec, 0x9ced, 0x9cee, 0xe4e6, /*0xc8-0xcf*/
04523 0x9cef, 0xbbac, 0x9cf0, 0xd7d2, 0xccef, 0xebf8, 0x9cf1, 0xe4e4, /*0xd0-0xd7*/
04524 0x9cf2, 0x9cf3, 0xb9f6, 0x9cf4, 0x9cf5, 0x9cf6, 0xd6cd, 0xe4d9, /*0xd8-0xdf*/
04525 0xe4dc, 0xc2fa, 0xe4de, 0x9cf7, 0xc2cb, 0xc0c4, 0xd2d0, 0x9cf8, /*0xe0-0xe7*/
04526 0xb1f5, 0xccb2, 0x9cf9, 0x9cfa, 0x9cfb, 0x9cfc, 0x9cfd, 0x9cfe, /*0xe8-0xef*/
04527 0x9d40, 0x9d41, 0x9d42, 0x9d43, 0xb5ce, 0x9d44, 0x9d45, 0x9d46, /*0xf0-0xf7*/
04528 0x9d47, 0xe4ef, 0x9d48, 0x9d49, 0x9d4a, 0x9d4b, 0x9d4c, 0x9d4d, /*0xf8-0xff*/
04529 /* 0x6f00 */
04530 0x9d4e, 0x9d4f, 0xc6af, 0x9d50, 0x9d51, 0x9d52, 0xc6e1, 0x9d53, /*0x00-0x07*/
04531 0x9d54, 0xe4f5, 0x9d55, 0x9d56, 0x9d57, 0x9d58, 0x9d59, 0xc2a9, /*0x08-0x0f*/
04532 0x9d5a, 0x9d5b, 0x9d5c, 0xc0ec, 0xd1dd, 0xe4ee, 0x9d5d, 0x9d5e, /*0x10-0x17*/
04533 0x9d5f, 0x9d60, 0x9d61, 0x9d62, 0x9d63, 0x9d64, 0x9d65, 0x9d66, /*0x18-0x1f*/
04534 0xc4ae, 0x9d67, 0x9d68, 0x9d69, 0xe4ed, 0x9d6a, 0x9d6b, 0x9d6c, /*0x20-0x27*/
04535 0x9d6d, 0xe4f6, 0xe4f4, 0xc2fe, 0x9d6e, 0xe4dd, 0x9d6f, 0xe4f0, /*0x28-0x2f*/
04536 0x9d70, 0xc4fe, 0x9d71, 0xd5c4, 0x9d72, 0x9d73, 0xe4f1, 0x9d74, /*0x30-0x37*/
04537 0x9d75, 0x9d76, 0x9d77, 0x9d78, 0x9d79, 0x9d7a, 0xd1fa, 0x9d7b, /*0x38-0x3f*/
04538 0x9d7c, 0x9d7d, 0x9d7e, 0x9d80, 0x9d81, 0x9d82, 0xe4eb, 0xe4ec, /*0x40-0x47*/
04539 0x9d83, 0x9d84, 0x9d85, 0xe4f2, 0x9d86, 0xcceab, 0x9d87, 0x9d88, /*0x48-0x4f*/
04540 0x9d89, 0x9d8a, 0x9d8b, 0x9d8c, 0x9d8d, 0x9d8e, 0x9d8f, 0x9d90, /*0x50-0x57*/
04541 0xc5cb, 0x9d91, 0x9d92, 0x9d93, 0xc7b1, 0x9d94, 0xc2ba, 0x9d95, /*0x58-0x5f*/
04542 0x9d96, 0x9d97, 0xe4ea, 0x9d98, 0x9d99, 0x9d9a, 0xc1ca, 0x9d9b, /*0x60-0x67*/
04543 0x9d9c, 0x9d9d, 0x9d9e, 0x9d9f, 0x9da0, 0xc6b6, 0xb3b1, 0x9da1, /*0x68-0x6f*/
04544 0x9da2, 0x9da3, 0xe4fb, 0x9da4, 0xe4f3, 0x9da5, 0x9da6, 0x9da7, /*0x70-0x77*/
04545 0xe4fa, 0x9da8, 0xe4fd, 0x9da9, 0xe4fc, 0x9daa, 0x9dab, 0x9dac, /*0x78-0x7f*/
04546 0x9dad, 0x9dae, 0x9daf, 0x9db0, 0xdb3ce, 0x9db1, 0x9db2, 0x9db3, /*0x80-0x87*/
04547 0xb3ba, 0xe4f7, 0x9db4, 0x9db5, 0xe4f9, 0xe4f8, 0xc5ec, 0x9db6, /*0x88-0x8f*/
04548 0x9db7, 0x9db8, 0x9db9, 0x9dba, 0x9dbb, 0x9dbc, 0x9dbd, 0x9dbe, /*0x90-0x97*/
04549 0x9dbf, 0x9dc0, 0x9dc1, 0x9dc2, 0xc0bd, 0x9dc3, 0x9dc4, 0x9dc5, /*0x98-0x9f*/
04550 0x9dc6, 0xd4e8, 0x9dc7, 0x9dc8, 0x9dc9, 0x9dca, 0x9dcb, 0xe5a2, /*0xa0-0xa7*/
04551 0x9dcc, 0x9dcd, 0x9dce, 0x9dcf, 0x9dd0, 0x9dd1, 0x9dd2, 0x9dd3, /*0xa8-0xaf*/
04552 0x9dd4, 0x9dd5, 0x9dd6, 0xb0c4, 0x9dd7, 0x9dd8, 0xe5a4, 0x9dd9, /*0xb0-0xb7*/
04553 0x9dda, 0xe5a3, 0x9ddb, 0x9ddc, 0x9ddd, 0x9dde, 0x9ddf, 0x9de0, /*0xb8-0xbf*/
04554 0xbca4, 0x9de1, 0xe5a5, 0x9de2, 0x9de3, 0x9de4, 0x9de5, 0x9de6, /*0xc0-0xc7*/
04555 0x9de7, 0xe5a1, 0x9de8, 0x9de9, 0x9dea, 0x9deb, 0x9dec, 0x9ded, /*0xc8-0xcf*/
04556 0x9dee, 0xe4fe, 0xb1f4, 0x9def, 0x9df0, 0x9df1, 0x9df2, 0x9df3, /*0xd0-0xd7*/
04557 0x9df4, 0x9df5, 0x9df6, 0x9df7, 0x9df8, 0x9df9, 0xe5a8, 0x9dfa, /*0xd8-0xdf*/
04558 0xe5a9, 0xe5a6, 0x9dfb, 0x9dfc, 0x9dfe, 0x9e40, 0x9e41, 0x9e42, /*0xe0-0xe7*/
04559 0x9e43, 0x9e44, 0x9e45, 0x9e46, 0x9e47, 0xe5a7, 0xe5aa, /*0xe8-0xef*/
04560 0x9e48, 0x9e49, 0x9e4a, 0x9e4b, 0x9e4c, 0x9e4d, 0x9e4e, 0x9e4f, /*0xf0-0xf7*/
04561 0x9e50, 0x9e51, 0x9e52, 0x9e53, 0x9e54, 0x9e55, 0x9e56, 0x9e57, /*0xf8-0xff*/
04562 /* 0x7000 */
04563 0x9e58, 0x9e59, 0x9e5a, 0x9e5b, 0x9e5c, 0x9e5d, 0x9e5e, 0x9e5f, /*0x00-0x07*/
04564 0x9e60, 0x9e61, 0x9e62, 0x9e63, 0x9e64, 0x9e65, 0x9e66, 0x9e67, /*0x08-0x0f*/
04565 0x9e68, 0xc6d9, 0x9e69, 0x9e6a, 0x9e6b, 0x9e6c, 0x9e6d, 0x9e6e, /*0x10-0x17*/
04566 0x9e6f, 0x9e70, 0xe5ab, 0xe5ad, 0x9e71, 0x9e72, 0x9e73, 0x9e74, /*0x18-0x1f*/
04567 0x9e75, 0x9e76, 0x9e77, 0xe5ac, 0x9e78, 0x9e79, 0x9e7a, 0x9e7b, /*0x20-0x27*/
04568 0x9e7c, 0x9e7d, 0x9e7e, 0x9e80, 0x9e81, 0x9e82, 0x9e83, 0x9e84, /*0x28-0x2f*/
04569 0x9e85, 0x9e86, 0x9e87, 0x9e88, 0x9e89, 0xe5af, 0x9e8a, 0x9e8b, /*0x30-0x37*/
04570 0x9e8c, 0xe5ae, 0x9e8d, 0x9e8e, 0x9e8f, 0x9e90, 0x9e91, 0x9e92, /*0x38-0x3f*/
04571 0x9e93, 0x9e94, 0x9e95, 0x9e96, 0x9e97, 0x9e98, 0x9e99, 0x9e9a, /*0x40-0x47*/
04572 0x9e9b, 0x9e9c, 0x9e9d, 0x9e9e, 0xb9e0, 0xb9e1, 0x9ea0, 0xe5b0, /*0x48-0x4f*/
04573 0x9ea1, 0x9ea2, 0x9ea3, 0x9ea4, 0x9ea5, 0x9ea6, 0x9ea7, 0x9ea8, /*0x50-0x57*/
04574 0x9ea9, 0x9eaa, 0x9eab, 0x9eac, 0x9ead, 0x9eae, 0xe5b1, 0x9eaf, /*0x58-0x5f*/
04575 0x9eb0, 0x9eb1, 0x9eb2, 0x9eb3, 0x9eb4, 0x9eb5, 0x9eb6, 0x9eb7, /*0x60-0x67*/
04576 0x9eb8, 0x9eb9, 0x9eba, 0xbbf0, 0xece1, 0xc3f0, 0x9ebb, 0xb5c6, /*0x68-0x6f*/
04577 0xbbd2, 0x9ebc, 0x9ebd, 0x9ebe, 0x9ebf, 0xc1e9, 0xd4e6, 0x9ec0, /*0x70-0x77*/
04578 0xbec4, 0x9ec1, 0x9ec2, 0x9ec3, 0xd7c6, 0x9ec4, 0xd4d6, 0xb2d3, /*0x78-0x7f*/
04579 0xecbe, 0x9ec5, 0x9ec6, 0x9ec7, 0x9ec8, 0xeac1, 0x9ec9, 0x9eca, /*0x80-0x87*/
04580 0x9ecb, 0xc2af, 0xb4b6, 0x9ecc, 0x9ecd, 0x9ece, 0xd1d7, 0x9ecf, /*0x88-0x8f*/
04581 0x9ed0, 0x9ed1, 0x9ed2, 0xc8b2, 0xbfb3, 0xecc0, 0x9ed3, /*0x90-0x97*/
04582 0x9ed4, 0xd6cb, 0x9ed5, 0x9ed6, 0xecbf, 0xecc1, 0x9ed7, 0x9ed8, /*0x98-0x9f*/

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04583 0x9ed9, 0x9eda, 0x9edb, 0x9edc, 0x9edd, 0x9ede, 0x9edf, 0x9ee0, /*0xa0-0xa7*/
04584 0x9ee1, 0x9ee2, 0x9ee3, 0xecc5, 0xbbee6, 0xcxbf, 0xc5da, 0xbbec, /*0xa8-0xaf*/
04585 0x9ee4, 0xecc6, 0x9ee5, 0xb1fe, 0x9ee6, 0x9ee7, 0x9ee8, 0xecc4, /*0xb0-0xb7*/
04586 0xd5a8, 0xb5e3, 0x9ee9, 0xecc2, 0xc1b6, 0xb3e3, 0x9eea, 0x9eeb, /*0xb8-0xbf*/
04587 0xecc3, 0xcbb8, 0xc0c3, 0xccfe, 0x9eec, 0x9eed, 0x9eee, 0x9eef, /*0xc0-0xc7*/
04588 0xc1d2, 0x9ef0, 0xecc8, 0x9ef1, 0x9ef2, 0x9ef3, 0x9ef4, 0x9ef5, /*0xc8-0xcf*/
04589 0x9ef6, 0x9ef7, 0x9ef8, 0x9ef9, 0x9efa, 0x9efb, 0x9efc, 0x9efd, /*0xd0-0xd7*/
04590 0xbae6, 0xc0d3, 0x9efe, 0xd6f2, 0x9f40, 0x9f41, 0x9f42, 0xd1cc, /*0xd8-0xdf*/
04591 0x9f43, 0x9f44, 0x9f45, 0x9f46, 0xbfbe, 0x9f47, 0xb7b3, 0xc9d5, /*0xe0-0xe7*/
04592 0xecc7, 0xbbe2, 0x9f48, 0xcccc, 0xbdff, 0xc8c8, 0x9f49, 0xcfa9, /*0xe8-0xef*/
04593 0x9f4a, 0x9f4b, 0x9f4c, 0x9f4d, 0x9f4e, 0x9f4f, 0x9f50, 0xcde9, /*0xf0-0xf7*/
04594 0x9f51, 0xc5eb, 0x9f52, 0x9f53, 0x9f54, 0xb7e9, 0x9f55, 0x9f56, /*0xf8-0xff*/
04595 /* 0x7100 */
04596 0x9f57, 0x9f58, 0x9f59, 0x9f5a, 0x9f5b, 0x9f5c, 0x9f5d, 0x9f5e, /*0x00-0x07*/
04597 0x9f5f, 0xd1c9, 0xbab8, 0x9f60, 0x9f61, 0x9f62, 0x9f63, 0x9f64, /*0x08-0x0f*/
04598 0xecc9, 0x9f65, 0x9f66, 0xecca, 0x9f67, 0xbbc0, 0xeccb, 0x9f68, /*0x10-0x17*/
04599 0xece2, 0xb1ba, 0xb7d9, 0x9f69, 0x9f6a, 0x9f6b, 0x9f6c, 0x9f6d, /*0x18-0x1f*/
04600 0x9f6e, 0x9f6f, 0x9f70, 0x9f71, 0x9f72, 0x9f73, 0xbdb9, 0x9f74, /*0x20-0x27*/
04601 0x9f75, 0x9f76, 0x9f77, 0x9f78, 0x9f79, 0x9f7a, 0x9f7b, 0xeccc, /*0x28-0x2f*/
04602 0xd1e6, 0xeccd, 0x9f7c, 0x9f7d, 0x9f7e, 0x9f80, 0xc8bb, 0x9f81, /*0x30-0x37*/
04603 0x9f82, 0x9f83, 0x9f84, 0x9f85, 0x9f86, 0x9f87, 0x9f88, 0x9f89, /*0x38-0x3f*/
04604 0x9f8a, 0x9f8b, 0x9f8c, 0x9f8d, 0x9f8e, 0xecd1, 0x9f8f, 0x9f90, /*0x40-0x47*/
04605 0x9f91, 0x9f92, 0xecd3, 0x9f93, 0xbbcd, 0x9f94, 0xbce5, 0x9f95, /*0x48-0x4f*/
04606 0x9f96, 0x9f97, 0x9f98, 0x9f99, 0x9f9a, 0x9f9b, 0x9f9c, 0x9f9d, /*0x50-0x57*/
04607 0x9f9e, 0x9f9f, 0x9fa0, 0x9fa1, 0xeccf, 0x9fa2, 0xc9b7, 0x9fa3, /*0x58-0x5f*/
04608 0x9fa4, 0x9fa5, 0x9fa6, 0x9fa7, 0xc3ba, 0x9fa8, 0xece3, 0xd5d5, /*0x60-0x67*/
04609 0xecd0, 0x9fa9, 0x9faa, 0x9fab, 0x9fac, 0x9fad, 0xd6f3, 0x9fae, /*0x68-0x6f*/
04610 0x9faf, 0x9fb0, 0xecd2, 0xeccc, 0x9fb1, 0x9fb2, 0x9fb3, 0x9fb4, /*0x70-0x77*/
04611 0xecd4, 0x9fb5, 0xecd5, 0x9fb6, 0x9fb7, 0xc9bf, 0x9fb8, 0x9fb9, /*0x78-0x7f*/
04612 0x9fba, 0x9fbb, 0x9fbc, 0x9fbd, 0xcfa8, 0x9fbe, 0x9fbf, 0x9fc0, /*0x80-0x87*/
04613 0x9fc1, 0x9fc2, 0xd0dc, 0x9fc3, 0x9fc4, 0x9fc5, 0x9fc6, 0xd1ac, /*0x88-0x8f*/
04614 0x9fc7, 0x9fc8, 0x9fc9, 0x9fca, 0xc8db, 0x9fcb, 0x9fcc, 0x9fcd, /*0x90-0x9f*/
04615 0xecd6, 0xccef5, 0x9fce, 0x9fcf, 0x9fd0, 0x9fd1, 0x9fd2, 0xcaec, /*0x98-0x9f*/
04616 0xecda, 0x9fd3, 0x9fd4, 0x9fd5, 0x9fd6, 0x9fd7, 0x9fd8, 0x9fd9, /*0xa0-0xa7*/
04617 0xecd9, 0x9fda, 0x9fdb, 0x9fdc, 0xb0be, 0x9fdd, 0x9fde, 0x9fdf, /*0xa8-0xaf*/
04618 0x9fe0, 0x9fe1, 0x9fe2, 0xecd7, 0x9fe3, 0xecd8, 0x9fe4, 0x9fe5, /*0xb0-0xb7*/
04619 0x9fe6, 0xece4, 0x9fe7, 0x9fe8, 0x9fe9, 0x9fea, 0x9feb, 0x9fec, /*0xb8-0xbf*/
04620 0x9fed, 0x9fee, 0x9fef, 0xc8bc, 0x9ff0, 0x9ff1, 0x9ff2, 0x9ff3, /*0xc0-0xc7*/
04621 0x9ff4, 0x9ff5, 0x9ff6, 0x9ff7, 0x9ff8, 0x9ff9, 0xc1c7, 0x9ffa, /*0xc8-0xcf*/
04622 0x9ffb, 0x9ffc, 0x9ffd, 0x9ffe, 0xecdc, 0xd1e0, 0xa040, 0xa041, /*0xd0-0xd7*/
04623 0xa042, 0xa043, 0xa044, 0xa045, 0xa046, 0xa047, 0xa048, 0xa049, /*0xd8-0xdf*/
04624 0xecdb, 0xa04a, 0xa04b, 0xa04c, 0xa04d, 0xd4ef, 0xa04e, 0xecdd, /*0xe0-0xe7*/
04625 0xa04f, 0xa050, 0xa051, 0xa052, 0xa053, 0xa054, 0xdbc6, 0xa055, /*0xe8-0xef*/
04626 0xa056, 0xa057, 0xa058, 0xa059, 0xa05a, 0xa05b, 0xa05c, 0xa05d, /*0xf0-0xf7*/
04627 0xa05e, 0xecde, 0xa05f, 0xa060, 0xa061, 0xa062, 0xa063, 0xa064, /*0xf8-0xff*/
04628 /* 0x7200 */
04629 0xa065, 0xa066, 0xa067, 0xa068, 0xa069, 0xa06a, 0xb1ac, 0xa06b, /*0x00-0x07*/
04630 0xa06c, 0xa06d, 0xa06e, 0xa06f, 0xa070, 0xa071, 0xa072, 0xa073, /*0x08-0x0f*/
04631 0xa074, 0xa075, 0xa076, 0xa077, 0xa078, 0xa079, 0xa07a, 0xa07b, /*0x10-0x17*/
04632 0xa07c, 0xa07d, 0xa07e, 0xa080, 0xa081, 0xecdf, 0xa082, 0xa083, /*0x18-0x1f*/
04633 0xa084, 0xa085, 0xa086, 0xa087, 0xa088, 0xa089, 0xa08a, 0xa08b, /*0x20-0x27*/
04634 0xece0, 0xa08c, 0xd7a6, 0xa08d, 0xc5c0, 0xa08e, 0xa08f, 0xa090, /*0x28-0x2f*/
04635 0xebbc, 0xb0ae, 0xa091, 0xa092, 0xa093, 0xbf4, 0xb8b8, 0xd2af, /*0x30-0x37*/
04636 0xb0d6, 0xb5f9, 0xa094, 0xd8b3, 0xa095, 0xcba, 0xa096, 0xe3dd, /*0x38-0x3f*/
04637 0xa097, 0xa098, 0xa099, 0xa09a, 0xa09b, 0xa09c, 0xa09d, 0xc6ac, /*0x40-0x47*/
04638 0xb0e6, 0xa09e, 0xa09f, 0xa0a0, 0xc5c6, 0xebb9, 0xa0a1, 0xa0a2, /*0x48-0x4f*/
04639 0xa0a3, 0xa0a4, 0xebba, 0xa0a5, 0xa0a6, 0xa0a7, 0xebbb, 0xa0a8, /*0x50-0x57*/
04640 0xa0a9, 0xd1c0, 0xa0aa, 0xc5a3, 0xa0ab, 0xeaf2, 0xa0ac, 0xc4b2, /*0x58-0x5f*/
04641 0xa0ad, 0xc4b5, 0xc0ce, 0xa0ae, 0xa0af, 0xa0b0, 0xeaf3, 0xc4c1, /*0x60-0x67*/
04642 0xa0b1, 0xc0ef, 0xa0b2, 0xa0b3, 0xa0b4, 0xa0b5, 0xeaf4, 0xeaf5, /*0x68-0x6f*/
04643 0xa0b6, 0xa0b7, 0xc9fc, 0xa0b8, 0xa0b9, 0xc7a3, 0xa0ba, 0xa0bb, /*0x70-0x77*/
04644 0xa0bc, 0xc0cd8, 0xc0fe, 0xa0bd, 0xa0be, 0xa0bf, 0xeaf5, 0xeaf6, /*0x78-0x7f*/
04645 0xcfac, 0xc0e7, 0xa0c0, 0xa0c1, 0xeaf7, 0xa0c2, 0xa0c3, 0xa0c4, /*0x80-0x87*/
04646 0xa0c5, 0xa0c6, 0xb6bf, 0xeaf8, 0xa0c7, 0xeaf9, 0xa0c8, 0xeafa, /*0x88-0x8f*/
04647 0xa0c9, 0xa0ca, 0xeafb, 0xa0cb, 0xa0cc, 0xa0cd, 0xa0ce, 0xa0cf, /*0x90-0x97*/
04648 0xa0d0, 0xa0d1, 0xa0d2, 0xa0d3, 0xa0d4, 0xa0d5, 0xa0d6, 0xeaf1, /*0x98-0x9f*/
04649 0xa0d7, 0xa0d8, 0xa0d9, 0xa0da, 0xa0db, 0xa0dc, 0xa0dd, 0xa0de, /*0xa0-0xa7*/
04650 0xa0df, 0xa0e0, 0xa0e1, 0xa0e2, 0xc8ae, 0xeleb, 0xa0e3, 0xb7b8, /*0xa8-0xaf*/
04651 0xe1ec, 0xa0e4, 0xa0e5, 0xa0e6, 0xe1ed, 0xa0e7, 0xd7b4, 0xe1ee, /*0xb0-0xb7*/
04652 0xe1ef, 0xd3cc, 0xa0e8, 0xa0e9, 0xa0ea, 0xa0eb, 0xa0ec, 0xa0ed, /*0xb8-0xbf*/
04653 0xa0ee, 0xe1ff, 0xbff1, 0xe1f0, 0xb5d2, 0xa0ef, 0xa0f1, 0xc0c7, /*0xc0-0xc7*/
04654 0xb1b7, 0xa0f2, 0xa0f3, 0xa0f4, 0xa0f5, 0xe1f3, 0xe1f2, 0xa0f6, /*0xc8-0xcf*/
04655 0xbafc, 0xa0f7, 0xe1f4, 0xa0f8, 0xa0f9, 0xa0fa, 0xa0fb, 0xb9b7, /*0xd0-0xdf*/
04656 0xa0fc, 0xbbed1, 0xa0fd, 0xa0fe, 0xaa40, 0xaa41, 0xc4fc, 0xaa42, /*0xd8-0xdf*/
04657 0xbadd, 0xbdc6, 0xaa43, 0xaa44, 0xaa45, 0xaa46, 0xaa47, 0xaa48, /*0xe0-0xe7*/
04658 0xe1f5, 0xe1f7, 0xaa49, 0xaa4a, 0xb6c0, 0xcfc1, 0xc0aa, 0xe1f6, /*0xe8-0xef*/
04659 0xd5f8, 0xd3fc, 0xe1f8, 0xe1f9, 0xaa4b, 0xaa4c, 0xe1fa, 0xe1fb, /*0xf0-0xf7*/
04660 0xc0ea, 0xaa4d, 0xe1fe, 0xe2a1, 0xc0c7, 0xaa4e, 0xaa4f, 0xaa50, /*0xf8-0xff*/
04661 /* 0x7300 */
04662 0xaa51, 0xe1fb, 0xaa52, 0xe1fd, 0xaa53, 0xaa54, 0xaa55, 0xaa56, /*0x00-0x07*/
04663 0xaa57, 0xaa58, 0xe2a5, 0xaa59, 0xaa5a, 0xaa5b, 0xc1d4, 0xaa5c, /*0x08-0x0f*/
04664 0xaa5d, 0xaa5e, 0xaa5f, 0xe2a3, 0xaa60, 0xe2a8, 0xb2fe, 0xe2a2, /*0x10-0x17*/
04665 0xaa61, 0xaa62, 0xaa63, 0xc3cd, 0xb2c2, 0xe2a7, 0xe2a6, 0xaa64, /*0x18-0x1f*/
04666 0xaa65, 0xe2a4, 0xe2a9, 0xaa66, 0xaa67, 0xe2ab, 0xaa68, 0xaa69, /*0x20-0x27*/
04667 0xaa6a, 0xd0c9, 0xd6ed, 0xc3a8, 0xe2ac, 0xaa6b, 0xcfd7, 0xaa6c, /*0x28-0x2f*/
04668 0xaa6d, 0xe2ae, 0xaa6e, 0xaa6f, 0xaa70, 0xaa71, 0xe9e0, 0xe9e1, /*0x30-0x37*/
04669 0xe2ad, 0xe2aa, 0xaa72, 0xaa73, 0xaa74, 0xaa75, 0xbbab, 0xd4b3, /*0x38-0x3f*/

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04670 0xaa76, 0xaa77, 0xaa78, 0xaa79, 0xaa7a, 0xaa7b, 0xaa7c, 0xaa7d, /*0x40-0x47*/
04671 0xaa7e, 0xaa80, 0xaa81, 0xaa82, 0xaa83, 0xe2b0, 0xaa84, 0xaa85, /*0x48-0x4f*/
04672 0xe2af, 0xaa86, 0xe9e1, 0xaa87, 0xaa88, 0xaa89, 0xaa8a, 0xe2b1, /*0x50-0x57*/
04673 0xaa8b, 0xaa8c, 0xaa8d, 0xaa8e, 0xaa8f, 0xaa90, 0xaa91, 0xaa92, /*0x58-0x5f*/
04674 0xe2b2, 0xaa93, 0xaa94, 0xaa95, 0xaa96, 0xaa97, 0xaa98, 0xaa99, /*0x60-0x67*/
04675 0xaa9a, 0xaa9b, 0xaa9c, 0xaa9d, 0xe2b3, 0xc0ca, 0xaa9e, 0xe2b4, /*0x68-0x6f*/
04676 0xaa9f, 0xaa00, 0xab40, 0xab41, 0xab42, 0xab43, 0xab44, 0xab45, /*0x70-0x77*/
04677 0xab46, 0xab47, 0xab48, 0xab49, 0xab4a, 0xab4b, 0xe2b5, 0xab4c, /*0x78-0x7f*/
04678 0xab4d, 0xab4e, 0xab4f, 0xab50, 0xab51, 0xab52, 0xc2ca, /*0x80-0x87*/
04679 0xab53, 0xd3f1, 0xab54, 0xcdf5, 0xab55, 0xab56, 0xe7e0, 0xab57, /*0x88-0x8f*/
04680 0xab58, 0xe7e1, 0xab59, 0xab5a, 0xab5b, 0xab5c, 0xbec1, 0xab5d, /*0x90-0x97*/
04681 0xab5e, 0xab5f, 0xab60, 0xc2ea, 0xab61, 0xab62, 0xab63, 0xe7e4, /*0x98-0x9f*/
04682 0xab64, 0xab65, 0xe7e3, 0xab66, 0xab67, 0xab68, 0xab69, 0xab6a, /*0xa0-0xa7*/
04683 0xab6b, 0xcde6, 0xab6c, 0xc3b5, 0xab6d, 0xab6e, 0xe7e2, 0xbbb7, /*0xa8-0xaf*/
04684 0xcfd6, 0xab6f, 0xc1e1, 0xe7e9, 0xab70, 0xab71, 0xab72, 0xe7e8, /*0xb0-0xb7*/
04685 0xab73, 0xab74, 0xe7f4, 0xb2a3, 0xab75, 0xab76, 0xab77, 0xab78, /*0xb8-0xbf*/
04686 0xe7ea, 0xab79, 0xe7e6, 0xab7a, 0xab7b, 0xab7c, 0xab7d, 0xab7e, /*0xc0-0xc7*/
04687 0xe7ec, 0xab7b, 0xc9ba, 0xab80, 0xab81, 0xd5e4, 0xab82, 0xe7e5, /*0xc8-0xcf*/
04688 0xb7a9, 0xe7e7, 0xab83, 0xab84, 0xab85, 0xab86, 0xab87, 0xab88, /*0xd0-0xd7*/
04689 0xab89, 0xe7ee, 0xab8a, 0xab8b, 0xab8c, 0xab8d, 0xe7f3, 0xab8e, /*0xd8-0xdf*/
04690 0xd6e9, 0xab8f, 0xab90, 0xab91, 0xab92, 0xe7ed, 0xab93, 0xe7f2, /*0xe0-0xef*/
04691 0xab94, 0xe7f1, 0xab95, 0xab96, 0xab97, 0xb0e0, 0xab98, 0xab99, /*0xf0-0xf7*/
04692 0xab9a, 0xab9b, 0xe7f5, 0xab9c, 0xab9d, 0xab9e, 0xab9f, 0aba0, /*0xf8-0xff*/
04693 0xac40, 0xac41, 0xac42, 0xac43, 0xac44, 0xac45, 0xac46, 0xac47, /*0xf8-0xff*/
04694 /* 0x7400 */
04695 0xac48, 0xac49, 0xac4a, 0xc7f2, 0xac4b, 0xc0c5, 0xc0ed, 0xac4c, /*0x00-0x07*/
04696 0xac4d, 0xc1f0, 0xe7f0, 0xac4e, 0xac4f, 0xac50, 0xac51, 0xe7f6, /*0x08-0x0f*/
04697 0xcbf6, 0xac52, 0xac53, 0xac54, 0xac55, 0xac56, 0xac57, 0xac58, /*0x10-0x17*/
04698 0xac59, 0xac5a, 0xe8a2, 0xe8a1, 0xac5b, 0xac5c, 0xac5d, 0xac5e, /*0x18-0x1f*/
04699 0xac5f, 0xac60, 0xd7c1, 0xac61, 0xac62, 0xe7f9, 0xe7f9, 0xac63, /*0x20-0x27*/
04700 0xe7fb, 0xac64, 0xe7f7, 0xac65, 0xe7fe, 0xac66, 0xe7fd, 0xac67, /*0x28-0x2f*/
04701 0xe7fc, 0xac68, 0xac69, 0xc1d5, 0xc7d9, 0xc5fd, 0xc5c3, 0xac6a, /*0x30-0x37*/
04702 0xac6b, 0xac6c, 0xac6d, 0xc6e, 0xc7ed, 0xac6f, 0xac70, 0xac71, /*0x38-0x3f*/
04703 0xac72, 0xe8a3, 0xac73, 0xac74, 0xac75, 0xac76, 0xac77, 0xac78, /*0x40-0x47*/
04704 0xac79, 0xac7a, 0xac7b, 0xac7c, 0xac7d, 0xac7e, 0xac80, 0xac81, /*0x48-0x4f*/
04705 0xac82, 0xac83, 0xac84, 0xac85, 0xac86, 0xe8a6, 0xac87, 0xe8a5, /*0x50-0x57*/
04706 0xac88, 0xe8a7, 0xbaf7, 0xe7f8, 0xe8a4, 0xac89, 0xc8f0, 0xc9aa, /*0x58-0x5f*/
04707 0xac8a, 0xac8b, 0xac8c, 0xac8d, 0xac8e, 0xac8f, 0xac90, 0xac91, /*0x60-0x67*/
04708 0xac92, 0xac93, 0xac94, 0xac95, 0xac96, 0xe8a9, 0xac97, 0xac98, /*0x68-0x6f*/
04709 0xb9e5, 0xac99, 0xac9a, 0xac9b, 0xac9c, 0xac9d, 0xd1fe, 0xe8a8, /*0x70-0x77*/
04710 0xac9e, 0xac9f, 0xaca0, 0xad40, 0xad41, 0xad42, 0xe8aa, 0xad43, /*0x78-0x7f*/
04711 0xe8ad, 0xe8ae, 0xad44, 0xc1a7, 0xad45, 0xad46, 0xad47, 0xe8af, /*0x80-0x87*/
04712 0xad48, 0xad49, 0xad4a, 0xe8b0, 0xad4b, 0xad4c, 0xe8ac, 0xad4d, /*0x88-0x8f*/
04713 0xe8b4, 0xad4e, 0xad4f, 0xad50, 0xad51, 0xad52, 0xad53, 0xad54, /*0x90-0x97*/
04714 0xad55, 0xad56, 0xad57, 0xad58, 0xe8ab, 0xad59, 0xe8b1, 0xad5a, /*0x98-0x9f*/
04715 0xad5b, 0xad5c, 0xad5d, 0xad5e, 0xad5f, 0xad60, 0xad61, 0xe8b5, /*0xa0-0xaf*/
04716 0xe8b2, 0xe8b3, 0xad62, 0xad63, 0xad64, 0xad65, 0xad66, 0xad67, /*0xa8-0xaf*/
04717 0xad68, 0xad69, 0xad6a, 0xad6b, 0xad6c, 0xad6d, 0xad6e, 0xad6f, /*0xb0-0xbf*/
04718 0xad70, 0xad71, 0xe8b7, 0xad72, 0xad73, 0xad74, 0xad75, 0xad76, /*0xb8-0xbf*/
04719 0xad77, 0xad78, 0xad79, 0xad7a, 0xad7b, 0xad7c, 0xad7d, 0xad7e, /*0xc0-0xc7*/
04720 0xad80, 0xad81, 0xad82, 0xad83, 0xad84, 0xad85, 0xad86, 0xad87, /*0xc8-0xcf*/
04721 0xad88, 0xad89, 0xe8b6, 0xad8a, 0xad8b, 0xad8c, 0xad8d, 0xad8e, /*0xd0-0xd7*/
04722 0xad8f, 0xad90, 0xad91, 0xad92, 0xb9cf, 0xad93, 0xf0ac, 0xad94, /*0xd8-0xdf*/
04723 0xf0ad, 0xad95, 0xc6b0, 0xb0ea, 0xc8bf, 0xad96, 0xcddf, 0xad97, /*0xe0-0xef*/
04724 0xad98, 0xad99, 0xad9a, 0xad9b, 0xad9c, 0xad9d, 0xccecd, 0xeab1, /*0xe8-0xef*/
04725 0xad9e, 0xad9f, 0xada0, 0xae40, 0xae41, 0xc6bf, 0xb4c9, /*0xf0-0xf7*/
04726 0xae42, 0xae43, 0xae44, 0xae45, 0xae46, 0xae47, 0xae48, 0xaeab3, /*0xf8-0xff*/
04727 /* 0x7500 */
04728 0xae49, 0xae4a, 0xae4b, 0xae4c, 0xd5e7, 0xae4d, 0xae4e, 0xae4f, /*0x00-0x07*/
04729 0xae50, 0xae51, 0xae52, 0xae53, 0xae54, 0xddf9, 0xae55, 0xeab4, /*0x08-0x0f*/
04730 0xae56, 0xeab5, 0xae57, 0xeab6, 0xae58, 0xae59, 0xae5a, 0xae5b, /*0x10-0x17*/
04731 0xb8ca, 0xdfb0, 0xc9f5, 0xae5c, 0xc0c0, 0xae5d, 0xae5e, 0xc9fa, /*0x18-0x1f*/
04732 0xae5f, 0xae60, 0xae61, 0xae62, 0xc9fb, 0xae64, 0xae65, /*0x20-0x27*/
04733 0xd3c3, 0xcba6, 0xae66, 0xb8a6, 0xf0ae, 0xb1c2, 0xae67, 0xe5b8, /*0x28-0x2f*/
04734 0xccef, 0xd3c9, 0xbcd7, 0xc9ea, 0xae68, 0xb5e7, 0xae69, 0xc4d0, /*0x30-0x37*/
04735 0xb5e9, 0xae6a, 0xeeae, 0xbbad, 0xae6b, 0xae6c, 0xe7de, 0xae6d, /*0x38-0x3f*/
04736 0xeeaf, 0xae6e, 0xae6f, 0xae70, 0xae71, 0xb3a9, 0xae72, 0xae73, /*0x40-0x47*/
04737 0xeeb2, 0xae74, 0xae75, 0xeeb1, 0xbde7, 0xae76, 0xeeb0, 0xceb7, /*0x48-0x4f*/
04738 0xae77, 0xae78, 0xae79, 0xae7a, 0xc5cf, 0xae7b, 0xae7c, 0xae7d, /*0x50-0x57*/
04739 0xae7e, 0xc1f4, 0xdbce, 0xeeb3, 0xd0f3, 0xae80, 0xae81, 0xae82, /*0x58-0x5f*/
04740 0xae83, 0xae84, 0xae85, 0xae86, 0xae87, 0xc2d4, 0xc6e8, 0xae88, /*0x60-0x67*/
04741 0xae89, 0xae8a, 0xb7ac, 0xae8b, 0xae8c, 0xae8d, 0xae8e, 0xae8f, /*0x68-0x6f*/
04742 0xae90, 0xae91, 0xeeb4, 0xae92, 0xb3eb, 0xae93, 0xae94, 0xae95, /*0x70-0x77*/
04743 0xbbfb, 0xeeb5, 0xae96, 0xae97, 0xae98, 0xae99, 0xae9a, 0xe7dc, /*0x78-0x7f*/
04744 0xae9b, 0xae9c, 0xae9d, 0xeeb6, 0xae9e, 0xae9f, 0xbdae, 0xaea0, /*0x80-0x87*/
04745 0xaf40, 0xaf41, 0xaf42, 0xf1e2, 0xaf43, 0xaf44, 0xaf45, 0xcae8, /*0x88-0x8f*/
04746 0xaf46, 0xd2c9, 0xf0da, 0xaf47, 0xf0db, 0xaf48, 0xf0dc, 0xc1c6, /*0x90-0x97*/
04747 0xaf49, 0xb8ed, 0xbec, 0xaf4a, 0xaf4b, 0xf0de, 0xaf4c, 0xc5b1, /*0x98-0x9f*/
04748 0xf0dd, 0xd1f1, 0xaf4d, 0xf0e0, 0xb0cc, 0xbde, 0xaf4e, 0xaf4f, /*0xa0-0xaf*/
04749 0xaf50, 0xaf51, 0xaf52, 0xd2df, 0xf0df, 0xaf53, 0xb4af, 0xb7e8, /*0xa8-0xaf*/
04750 0xf0e6, 0xf0e5, 0xc6a3, 0xf0e1, 0xf0e2, 0xb4c3, 0xaf54, 0xaf55, /*0xb0-0xbf*/
04751 0xf0e3, 0xd5ee, 0xaf56, 0xaf57, 0xcdb, 0xbde2, 0xbcb2, 0xaf58, /*0xb8-0xbf*/
04752 0xaf59, 0xaf5a, 0xf0e8, 0xf0e7, 0xf0e4, 0xb2a1, 0xaf5b, 0xd6a2, /*0xc0-0xcf*/
04753 0xd3b8, 0xbcb7, 0xc8ac, 0xaf5c, 0xaf5d, 0xf0ea, 0xaf5e, 0xaf5f, /*0xc8-0xcf*/
04754 0xaf60, 0xaf61, 0xd1f7, 0xaf62, 0xd6cc, 0xbadb, 0xf0e9, 0xaf63, /*0xd0-0xdf*/
04755 0xb6bb, 0xaf64, 0xaf65, 0xaf66, 0xaf67, 0xc6a6, 0xaf68, /*0xd8-0xdf*/
04756 0xaf69, 0xaf6a, 0xc1a1, 0xf0eb, 0xf0ee, 0xaf6b, 0xf0ed, 0xf0f0, /*0xe0-0xef*/

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04757 0xf0ec, 0xaf6c, 0xbbbe, 0xf0ef, 0xaf6d, 0xaf6e, 0xaf6f, 0xaf70, /*0xe8-0xef*/
04758 0xccb5, 0xf0f2, 0xaf71, 0xaf72, 0xb3d5, 0xaf73, 0xaf74, 0xaf75, /*0xf0-0xf7*/
04759 0xaf76, 0xb1d4, 0xaf77, 0xaf78, 0xf0f3, 0xaf79, 0xaf7a, 0xf0f4, /*0xf8-0xff*/
04760 /* 0x7600 */
04761 0xf0f6, 0xb4e1, 0xaf7b, 0xf0f1, 0xaf7c, 0xf0f7, 0xaf7d, 0xaf7e, /*0x00-0x07*/
04762 0xaf80, 0xaf81, 0xf0fa, 0xaf82, 0xf0f8, 0xaf83, 0xaf84, 0xaf85, /*0x08-0x0f*/
04763 0xf0f5, 0xaf86, 0xaf87, 0xaf88, 0xaf89, 0xf0fd, 0xaf8a, 0xf0f9, /*0x10-0x17*/
04764 0xf0fc, 0xf0fe, 0xaf8b, 0xf1a1, 0xaf8c, 0xaf8d, 0xaf8e, 0xcec1, /*0x18-0x1f*/
04765 0xf1a4, 0xaf8f, 0xf1a3, 0xaf90, 0xc1f6, 0xf0fb, 0xcadd, 0xaf91, /*0x20-0x27*/
04766 0xaf92, 0xb4f1, 0xb1f1, 0xccb1, 0xaf93, 0xf1a6, 0xaf94, 0xaf95, /*0x28-0x2f*/
04767 0xf1a7, 0xaf96, 0xaf97, 0xf1ac, 0xd5ce, 0xf1a9, 0xaf98, 0xaf99, /*0x30-0x37*/
04768 0xc8b3, 0xaf9a, 0xaf9b, 0xaf9c, 0xf1a2, 0xaf9d, 0xf1ab, 0xf1a8, /*0x38-0x3f*/
04769 0xf1a5, 0xaf9e, 0xaf9f, 0xf1aa, 0xafa0, 0xb040, 0xb041, 0xb042, /*0x40-0x47*/
04770 0xb043, 0xb044, 0xb045, 0xb046, 0xb0a9, 0xf1ad, 0xb047, 0xb048, /*0x48-0x4f*/
04771 0xb049, 0xb04a, 0xb04b, 0xb04c, 0xf1af, 0xb04d, 0xf1b1, 0xb04e, /*0x50-0x57*/
04772 0xb04f, 0xb050, 0xb051, 0xb052, 0xf1b0, 0xb053, 0xf1ae, 0xb054, /*0x58-0x5f*/
04773 0xb055, 0xb056, 0xb057, 0xd1a2, 0xb058, 0xb059, 0xb05a, 0xb05b, /*0x60-0x67*/
04774 0xb05c, 0xb05d, 0xb05e, 0xf1b2, 0xb05f, 0xb060, 0xb061, 0xf1b3, /*0x68-0x6f*/
04775 0xb062, 0xb063, 0xb064, 0xb065, 0xb066, 0xb067, 0xb068, 0xb069, /*0x70-0x77*/
04776 0xb9ef, 0xb06a, 0xb06b, 0xb5c7, 0xb06c, 0xb0d7, 0xb0d9, 0xb06d, /*0x78-0x7f*/
04777 0xb06e, 0xb06f, 0xd4ed, 0xb070, 0xb5c4, 0xb071, 0xbdd4, 0xbba, /*0x80-0x87*/
04778 0xf0a7, 0xb072, 0xb073, 0xb8de, 0xb074, 0xb075, 0xf0a8, 0xb076, /*0x88-0x8f*/
04779 0xb077, 0xb0a8, 0xb078, 0xf0a9, 0xb079, 0xb07a, 0xcdee, 0xb07b, /*0x90-0x97*/
04780 0xb07c, 0xf0aa, 0xb07d, 0xb07e, 0xb080, 0xb081, 0xb082, 0xb083, /*0x98-0x9f*/
04781 0xb084, 0xb085, 0xb086, 0xb087, 0xf0ab, 0xb088, 0xb089, 0xb08a, /*0xa0-0xa7*/
04782 0xb08b, 0xb08c, 0xb08d, 0xb08e, 0xb08f, 0xb090, 0xc6a4, 0xb091, /*0xa8-0xaf*/
04783 0xb092, 0xd6e5, 0xf1e4, 0xb093, 0xf1e5, 0xb094, 0xb095, 0xb096, /*0xb0-0xb7*/
04784 0xb097, 0xb098, 0xb099, 0xb09a, 0xb09b, 0xb09c, 0xb09d, 0xc3f3, /*0xb8-0xbf*/
04785 0xb09e, 0xb09f, 0xd3db, 0xb0a0, 0xb140, 0xd6d1, 0xc5e8, 0xb141, /*0xc0-0xc7*/
04786 0xd3af, 0xb142, 0xd2e6, 0xb143, 0xb144, 0xeec1, 0xb0bb, 0xd5b5, /*0xc8-0xcf*/
04787 0xd1ce, 0xbce0, 0xbad0, 0xb145, 0xbff8, 0xb146, 0xb8c7, 0xb5c1, /*0xd0-0xd7*/
04788 0xc5cc, 0xb147, 0xb148, 0xcaa2, 0xb149, 0xb14a, 0xb14b, 0xc3cb, /*0xd8-0xdf*/
04789 0xb14c, 0xb14d, 0xb14e, 0xb14f, 0xb150, 0xeec2, 0xb151, 0xb152, /*0xe0-0xe7*/
04790 0xb153, 0xb154, 0xb155, 0xb156, 0xb157, 0xb158, 0xc4bf, 0xb6a2, /*0xe8-0xef*/
04791 0xb159, 0xedec, 0xc3a4, 0xb15a, 0xd6b1, 0xb15b, 0xb15c, 0xb15d, /*0xf0-0xf7*/
04792 0xcfe0, 0xedef, 0xb15e, 0xb15f, 0xc5ce, 0xb160, 0xb6dc, 0xb161, /*0xf8-0xff*/
04793 /* 0x7700 */
04794 0xb162, 0xcaa1, 0xb163, 0xb164, 0xeded, 0xb165, 0xb166, 0xedf0, /*0x00-0x07*/
04795 0xedf1, 0xc3bc, 0xb167, 0xbfb4, 0xb168, 0xedee, 0xb169, 0xb16a, /*0x08-0x0f*/
04796 0xb16b, 0xb16c, 0xb16d, 0xb16e, 0xb16f, 0xb170, 0xb171, 0xb172, /*0x10-0x17*/
04797 0xb173, 0xedf4, 0xedf2, 0xb174, 0xb175, 0xb176, 0xb177, 0xd5e6, /*0x18-0x1f*/
04798 0xc3df, 0xb178, 0xedf3, 0xb179, 0xb17a, 0xb17b, 0xedf6, 0xb17c, /*0x20-0x27*/
04799 0xd5a3, 0xd1a3, 0xb17d, 0xb17e, 0xb180, 0xedf5, 0xb181, 0xc3d0, /*0x28-0x2f*/
04800 0xb182, 0xb183, 0xb184, 0xb185, 0xb186, 0xedf7, 0xbff4, 0xbeec, /*0x30-0x37*/
04801 0xedf8, 0xb187, 0xccf7, 0xb188, 0xd1db, 0xb189, 0xb18a, 0xb18b, /*0x38-0x3f*/
04802 0xd7c5, 0xd5f6, 0xb18c, 0xedfc, 0xb18d, 0xb18e, 0xb18f, 0xedfb, /*0x40-0x47*/
04803 0xb190, 0xb191, 0xb192, 0xb193, 0xb194, 0xb195, 0xb196, 0xb197, /*0x48-0x4f*/
04804 0xedf9, 0xedfa, 0xb198, 0xb199, 0xb19a, 0xb19b, 0xb19c, 0xb19d, /*0x50-0x57*/
04805 0xb19e, 0xb19f, 0xedfd, 0xbea6, 0xb1a0, 0xb240, 0xb241, 0xb242, /*0x58-0x5f*/
04806 0xb243, 0xcba6, 0xeea1, 0xb6bd, 0xb244, 0xeea2, 0xc4c0, 0xb245, /*0x60-0x67*/
04807 0xedfe, 0xb246, 0xb247, 0xbdde, 0xb2c7, 0xb248, 0xb249, 0xb24a, /*0x68-0x6f*/
04808 0xb24b, 0xb24c, 0xb24d, 0xb24e, 0xb24f, 0xb250, 0xb251, 0xb252, /*0x70-0x77*/
04809 0xb253, 0xb6c3, 0xb254, 0xb255, 0xb256, 0xeea5, 0xd8ba, 0xeea3, /*0x78-0x7f*/
04810 0xeea6, 0xb257, 0xb258, 0xb259, 0xc3e9, 0xb3f2, 0xb25a, 0xb25b, /*0x80-0x87*/
04811 0xb25c, 0xb25d, 0xb25e, 0xb25f, 0xeea7, 0xeea4, 0xcfb9, 0xb260, /*0x88-0x8f*/
04812 0xb261, 0xeea8, 0xc2f7, 0xb262, 0xb263, 0xb264, 0xb265, 0xb266, /*0x90-0x97*/
04813 0xb267, 0xb268, 0xb269, 0xb26a, 0xb26b, 0xb26c, 0xb26d, 0xeea9, /*0x98-0x9f*/
04814 0xeeaa, 0xb26e, 0xdeab, 0xb26f, 0xb270, 0xc6b3, 0xb271, 0xc7c6, /*0xa0-0xa7*/
04815 0xb272, 0xd6f5, 0xb5c9, 0xb273, 0xcbb2, 0xb274, 0xb275, 0xb276, /*0xa8-0xaf*/
04816 0xeeab, 0xb277, 0xb278, 0xcdab, 0xb279, 0xeeac, 0xb27a, 0xb27b, /*0xb0-0xb7*/
04817 0xb27c, 0xb27d, 0xb27e, 0xd5b0, 0xb280, 0xeead, 0xb281, 0xf6c4, /*0xb8-0xbf*/
04818 0xb282, 0xb283, 0xb284, 0xb285, 0xb286, 0xb287, 0xb288, 0xb289, /*0xc0-0xc7*/
04819 0xb28a, 0xb28b, 0xb28c, 0xb28d, 0xb28e, 0xbdc7, 0xb28f, 0xb290, /*0xc8-0xcf*/
04820 0xb291, 0xb292, 0xb293, 0xb294, 0xb295, 0xb296, 0xb297, 0xb4a3, /*0xd0-0xd7*/
04821 0xb298, 0xb299, 0xb29a, 0xc3ac, 0xf1e6, 0xb29b, 0xb29c, 0xb29d, /*0xd8-0xdf*/
04822 0xb29e, 0xb29f, 0xcab8, 0xd2d3, 0xb2a0, 0xd6aa, 0xb340, 0xeff2, /*0xe0-0xe7*/
04823 0xb341, 0xbed8, 0xb342, 0xbdc3, 0xeff3, 0xb6cc, 0xb0ab, 0xb343, /*0xe8-0xef*/
04824 0xb344, 0xb345, 0xb346, 0xcaaf, 0xb347, 0xb348, 0xedb6, 0xb349, /*0xf0-0xf7*/
04825 0xedb7, 0xb34a, 0xb34b, 0xb34c, 0xb34d, 0xccef, 0xb7af, 0xbff3, /*0xf8-0xff*/
04826 /* 0x7800 */
04827 0xedb8, 0xc2eb, 0xc9b0, 0xb34e, 0xb34f, 0xb350, 0xb351, 0xb352, /*0x00-0x07*/
04828 0xb353, 0xedb9, 0xb354, 0xb355, 0xc6f6, 0xbfb3, 0xb356, 0xb357, /*0x08-0x0f*/
04829 0xb358, 0xedbc, 0xc5f8, 0xb359, 0xd1d0, 0xb35a, 0xd7a9, 0xedba, /*0x10-0x17*/
04830 0xedbb, 0xb35b, 0xd1e2, 0xb35c, 0xedbf, 0xedc0, 0xb35d, 0xedc4, /*0x18-0x1f*/
04831 0xb35e, 0xb35f, 0xb360, 0xedc8, 0xb361, 0xedc6, 0xedce, 0xd5e8, /*0x20-0x27*/
04832 0xb362, 0xedc9, 0xb363, 0xb364, 0xedc7, 0xedbe, 0xb365, 0xb366, /*0x28-0x2f*/
04833 0xc5e9, 0xb367, 0xb368, 0xb369, 0xc6c6, 0xb36a, 0xb36b, 0xc9e9, /*0x30-0x37*/
04834 0xd4d2, 0xedc1, 0xedc2, 0xedc3, 0xedc5, 0xb36c, 0xc0f9, 0xb36d, /*0x38-0x3f*/
04835 0xb4a1, 0xb36e, 0xb36f, 0xb370, 0xb371, 0xb9e8, 0xb372, 0xedd0, /*0x40-0x47*/
04836 0xb373, 0xb374, 0xb375, 0xb376, 0xedd1, 0xb377, 0xedca, 0xb378, /*0x48-0x4f*/
04837 0xedcf, 0xb379, 0xccef, 0xb37a, 0xb37b, 0xcbb6, 0xedcc, 0xedcd, /*0x50-0x57*/
04838 0xb37c, 0xb37d, 0xb37e, 0xb380, 0xb381, 0xcfff, 0xb382, 0xb383, /*0x58-0x5f*/
04839 0xb384, 0xb385, 0xb386, 0xb387, 0xb388, 0xb389, 0xb38a, 0xb38b, /*0x60-0x67*/
04840 0xb38c, 0xb38d, 0xedd2, 0xc1f2, 0xd3b2, 0xedcb, 0xc8b7, 0xb38e, /*0x68-0x6f*/
04841 0xb38f, 0xb390, 0xb391, 0xb392, 0xb393, 0xb394, 0xb395, 0xbcef, /*0x70-0x77*/
04842 0xb396, 0xb397, 0xb398, 0xb399, 0xc5f0, 0xb39a, 0xb39b, 0xb39c, /*0x78-0x7f*/
04843 0xb39d, 0xb39e, 0xb39f, 0xb3a0, 0xb440, 0xb441, 0xb442, 0xedd6, /*0x80-0x87*/

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04844 0xb443, 0xb5ef, 0xb444, 0xb445, 0xc2b5, 0xb0ad, 0xcbe9, 0xb446, /*0x88-0x8f*/
04845 0xb447, 0xb1ae, 0xb448, 0xedd4, 0xb449, 0xb44a, 0xb44b, 0xcdeb, /*0x90-0x97*/
04846 0xb5e2, 0xb44c, 0xedd5, 0xedd3, 0xedd7, 0xb44d, 0xb44e, 0xb5fa, /*0x98-0x9f*/
04847 0xb44f, 0xedd8, 0xb450, 0xedd9, 0xb451, 0xeddc, 0xb452, 0xb1cc, /*0xa0-0xa7*/
04848 0xb453, 0xb454, 0xb455, 0xb456, 0xb457, 0xb458, 0xb459, 0xb45a, /*0xa8-0xaf*/
04849 0xc5f6, 0xbcee, 0xedit, 0xcbbc, 0xb2ea, 0xb45b, 0xb45c, 0xb45d, /*0xb0-0xb7*/
04850 0xb45e, 0xedit, 0xb45f, 0xb460, 0xb461, 0xb462, 0xc4eb, 0xb463, /*0xb8-0xbf*/
04851 0xb464, 0xb4c5, 0xb465, 0xb466, 0xb467, 0xb0f5, 0xb468, 0xb469, /*0xc0-0xc7*/
04852 0xb46a, 0xedit, 0xc0da, 0xb4e8, 0xb46b, 0xb46c, 0xb46d, 0xb46e, /*0xc8-0xcf*/
04853 0xc5cd, 0xb46f, 0xb470, 0xb471, 0xedit, 0xbfc4, 0xb472, 0xb473, /*0xd0-0xd7*/
04854 0xb474, 0xedit, 0xb475, 0xb476, 0xb477, 0xb478, 0xb479, 0xb47a, /*0xd8-0xdf*/
04855 0xb47b, 0xb47c, 0xb47d, 0xb47e, 0xb480, 0xb481, 0xb482, 0xb483, /*0xe0-0xe7*/
04856 0xc4a5, 0xb484, 0xb485, 0xb486, 0xede0, 0xb487, 0xb488, 0xb489, /*0xe8-0xef*/
04857 0xb48a, 0xb48b, 0xede1, 0xb48c, 0xede3, 0xb48d, 0xb48e, 0xc1d7, /*0xf0-0xf7*/
04858 0xb48f, 0xb490, 0xbbc7, 0xb491, 0xb492, 0xb493, 0xb494, 0xb495, /*0xf8-0xff*/
04859 /* 0x7900 */
04860 0xb496, 0xbdb8, 0xb497, 0xb498, 0xb499, 0xede2, 0xb49a, 0xb49b, /*0x00-0x07*/
04861 0xb49c, 0xb49d, 0xb49e, 0xb49f, 0xb4a0, 0xb540, 0xb541, 0xb542, /*0x08-0x0f*/
04862 0xb543, 0xb544, 0xb545, 0xede4, 0xb546, 0xb547, 0xb548, 0xb549, /*0x10-0x17*/
04863 0xb54a, 0xb54b, 0xb54c, 0xb54d, 0xb54e, 0xb54f, 0xede6, 0xb550, /*0x18-0x1f*/
04864 0xb551, 0xb552, 0xb553, 0xb554, 0xede5, 0xb555, 0xb556, 0xb557, /*0x20-0x27*/
04865 0xb558, 0xb559, 0xb55a, 0xb55b, 0xb55c, 0xb55d, 0xb55e, 0xb55f, /*0x28-0x2f*/
04866 0xb560, 0xb561, 0xb562, 0xb563, 0xede7, 0xb564, 0xb565, 0xb566, /*0x30-0x37*/
04867 0xb567, 0xb568, 0xcabe, 0xecea, 0xc0f1, 0xb569, 0xc9e7, 0xb56a, /*0x38-0x3f*/
04868 0xeceb, 0xc6ee, 0xb56b, 0xb56c, 0xb56d, 0xb56e, 0xecec, 0xb56f, /*0x40-0x47*/
04869 0xc6ed, 0xeced, 0xb570, 0xb571, 0xb572, 0xb573, 0xb574, 0xb575, /*0x48-0x4f*/
04870 0xb576, 0xb577, 0xb578, 0xecf0, 0xb579, 0xb57a, 0xd7e6, 0xecf3, /*0x50-0x57*/
04871 0xb57b, 0xb57c, 0xecf1, 0xecee, 0xecef, 0xd7a3, 0xc9f1, 0xcbee, /*0x58-0x5f*/
04872 0xecf4, 0xb57d, 0xecf2, 0xb57e, 0xb580, 0xcfe9, 0xb581, 0xecf6, /*0x60-0x67*/
04873 0xc6b1, 0xb582, 0xb583, 0xb584, 0xb585, 0xbcc0, 0xb586, 0xecf5, /*0x68-0x6f*/
04874 0xb587, 0xb588, 0xb589, 0xb58a, 0xb58b, 0xb58c, 0xb58d, 0xb5bb, /*0x70-0x77*/
04875 0xb5bf6, 0xb58e, 0xecf7, 0xb58f, 0xb590, 0xb591, 0xb592, 0xb593, /*0x78-0x7f*/
04876 0xd9f7, 0xbdfb, 0xb594, 0xb595, 0xc2bb, 0xecf8, 0xb596, 0xb597, /*0x80-0x87*/
04877 0xb598, 0xb599, 0xecf9, 0xb59a, 0xb59b, 0xb59c, 0xb59d, 0xb8a3, /*0x88-0x8f*/
04878 0xb59e, 0xb59f, 0xb5a0, 0xb640, 0xb641, 0xb642, 0xb643, 0xb644, /*0x90-0x97*/
04879 0xb645, 0xb646, 0xecfa, 0xb647, 0xb648, 0xb649, 0xb64a, 0xb64b, /*0x98-0x9f*/
04880 0xb64c, 0xb64d, 0xb64e, 0xb64f, 0xb650, 0xb651, 0xb652, 0xecfb, /*0xa0-0xaf*/
04881 0xb653, 0xb654, 0xb655, 0xb656, 0xb657, 0xb658, 0xb659, 0xb65a, /*0xa8-0xaf*/
04882 0xb65b, 0xb65c, 0xb65d, 0xecfc, 0xb65e, 0xb65f, 0xb660, 0xb661, /*0xb0-0xb7*/
04883 0xb662, 0xd3ed, 0xd8ae, 0xc0eb, 0xb663, 0xc7dd, 0xbacc, 0xb664, /*0xb8-0xbf*/
04884 0xd0e3, 0xcbbd, 0xb665, 0xcdba, 0xb666, 0xb667, 0xb8d1, 0xb668, /*0xc0-0xc7*/
04885 0xb669, 0xb1fc, 0xb66a, 0xc7ef, 0xb66b, 0xd6d6, 0xb66c, 0xb66d, /*0xc8-0xcf*/
04886 0xb66e, 0xbfc6, 0xc3eb, 0xb66f, 0xb670, 0xef55, 0xb671, 0xb672, /*0xd0-0xd7*/
04887 0xc3d8, 0xb673, 0xb674, 0xb675, 0xb676, 0xb677, 0xb678, 0xd7e2, /*0xd8-0xdf*/
04888 0xb679, 0xb67a, 0xb67b, 0xef77, 0xb3d3, 0xb67c, 0xc7d8, 0xd1ed, /*0xe0-0xe7*/
04889 0xb67d, 0xd6c8, 0xb67e, 0xef78, 0xb680, 0xef76, 0xb681, 0xbbfd, /*0xe8-0xef*/
04890 0xb3c6, 0xb682, 0xb683, 0xb684, 0xb685, 0xb686, 0xb687, 0xb688, /*0xf0-0xf7*/
04891 0xbdd5, 0xb689, 0xb68a, 0xd2c6, 0xb68b, 0xb68c, 0xb68d, /*0xf8-0xff*/
04892 /* 0x7a00 */
04893 0xcfa1, 0xb68e, 0xef7c, 0xef7b, 0xb68f, 0xb690, 0xef79, 0xb691, /*0x00-0x07*/
04894 0xb692, 0xb693, 0xb694, 0xb3cc, 0xb695, 0xc9d4, 0xcbb0, 0xb696, /*0x08-0x0f*/
04895 0xb697, 0xb698, 0xb699, 0xb69a, 0xef7e, 0xb69b, 0xb69c, 0xb0de, /*0x10-0x17*/
04896 0xb69d, 0xb69e, 0xd6c9, 0xb69f, 0xb6a0, 0xb740, 0xef7d, 0xb741, /*0x18-0x1f*/
04897 0xb3ed, 0xb742, 0xb743, 0xf6d5, 0xb744, 0xb745, 0xb746, 0xb747, /*0x20-0x27*/
04898 0xb748, 0xb749, 0xb74a, 0xb74b, 0xb74c, 0xb74d, 0xb74e, 0xb74f, /*0x28-0x2f*/
04899 0xb750, 0xb751, 0xb752, 0xccec, 0xb753, 0xb754, 0xb755, 0xf0a2, /*0x30-0x37*/
04900 0xb756, 0xf0a1, 0xb757, 0xb5be, 0xbcd4, 0xb758, 0xb759, 0xb8e5, /*0x38-0x3f*/
04901 0xb759, 0xb75a, 0xb75b, 0xb75c, 0xb75d, 0xb75e, 0xc4c2, 0xb75f, /*0x40-0x47*/
04902 0xb760, 0xb761, 0xb762, 0xb763, 0xb764, 0xb765, 0xb766, 0xb767, /*0x48-0x4f*/
04903 0xb768, 0xf0a3, 0xb769, 0xb76a, 0xb76b, 0xb76c, 0xb76d, 0xcbeb, /*0x50-0x57*/
04904 0xb76e, 0xb76f, 0xb770, 0xb771, 0xb772, 0xb773, 0xb774, 0xb775, /*0x58-0x5f*/
04905 0xb776, 0xb777, 0xb778, 0xb779, 0xb77a, 0xb77b, 0xb77c, 0xb77d, /*0x60-0x67*/
04906 0xb77e, 0xb780, 0xb781, 0xb782, 0xb783, 0xb784, 0xb785, 0xb786, /*0x68-0x6f*/
04907 0xf0a6, 0xb787, 0xb788, 0xb789, 0xd1a8, 0xb78a, 0xb78b, 0xc7ee, /*0x70-0x77*/
04908 0xf1b6, 0xf1b7, 0xbfd5, 0xb78b, 0xb78c, 0xb78d, 0xb78e, 0xb4a9, /*0x78-0x7f*/
04909 0xf1b8, 0xcdbb, 0xb78f, 0xc7d4, 0xd5ad, 0xb790, 0xf1b9, 0xb791, /*0x80-0x87*/
04910 0xf1ba, 0xb792, 0xb793, 0xb794, 0xb795, 0xc7cf, 0xb796, 0xb797, /*0x88-0x8f*/
04911 0xb798, 0xd2a4, 0xd6cf, 0xb799, 0xb79a, 0xf1bb, 0xbdd1, 0xb4b0, /*0x90-0x97*/
04912 0xb79c, 0xb79b, 0xb79c, 0xb79d, 0xb4dc, 0xcdd1, 0xb79e, 0xb79f, /*0x98-0x9f*/
04913 0xf1bd, 0xb79f, 0xb7a0, 0xb840, 0xb841, 0xb7fa, 0xf1bc, 0xb842, /*0xa0-0xaf*/
04914 0xf1bf, 0xb843, 0xb844, 0xb845, 0xf1be, 0xf1c0, 0xb846, 0xb847, /*0xa8-0xaf*/
04915 0xb848, 0xb849, 0xb84a, 0xf1c1, 0xb84b, 0xb84c, 0xb84d, 0xb84e, /*0xb0-0xbf*/
04916 0xb84f, 0xb850, 0xb851, 0xb852, 0xb853, 0xb854, 0xb855, 0xc1fe, /*0xb8-0xbf*/
04917 0xb856, 0xb857, 0xb858, 0xb859, 0xb85a, 0xb85b, 0xb85c, 0xb85d, /*0xc0-0xc7*/
04918 0xb85e, 0xb85f, 0xb860, 0xc1a2, 0xb861, 0xb862, 0xb863, 0xb864, /*0xc8-0xcf*/
04919 0xb865, 0xb866, 0xb867, 0xb868, 0xb869, 0xb86a, 0xcafa, 0xb86b, /*0xd0-0xdf*/
04920 0xb86c, 0xd5be, 0xb86d, 0xb86e, 0xb86f, 0xb870, 0xb871, 0xb872, /*0xe0-0xe7*/
04921 0xd5c2, 0xb871, 0xb872, 0xb873, 0xcdaf, 0xf1b5, 0xb874, 0xb875, /*0xe8-0xef*/
04922 0xb875, 0xb876, 0xb877, 0xb878, 0xb879, 0xb87a, 0xb87b, 0xb87c, /*0xf0-0xf7*/
04923 0xb87d, 0xb87c, 0xb87d, 0xb87e, 0xb880, 0xb881, 0xb882, 0xb883, /*0xf8-0xff*/
04924 0xb884, 0xd6f1, 0xf3c3, 0xb885, 0xb886, 0xf3c4, 0xb887, 0xb88d, /*0xf8-0xff*/
04925 /* 0x7b00 */
04926 0xb888, 0xb889, 0xb88a, 0xf3c6, 0xf3c7, 0xb88b, 0xb0ca, 0xb88c, /*0x00-0x07*/
04927 0xf3c5, 0xb88d, 0xf3c9, 0xcbf1, 0xb88e, 0xb88f, 0xb890, 0xf3cb, /*0x08-0x0f*/
04928 0xb891, 0xd0a6, 0xb892, 0xb893, 0xb1ca, 0xf3c8, 0xb894, 0xb895, /*0x10-0x17*/
04929 0xb896, 0xf3cf, 0xb897, 0xb898, 0xb899, 0xf3d7, 0xb89a, 0xb89b, /*0x18-0x1f*/
04930 0xf3d2, 0xb89b, 0xb89c, 0xb89d, 0xf3d4, 0xf3d3, 0xb7fb, 0xb89e, /*0x20-0x27*/
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04931 0xb1bf, 0xb89f, 0xf3ce, 0xf3ca, 0xb5da, 0xb8a0, 0xf3d0, 0xb940, /*0x28-0x2f*/
04932 0xb941, 0xf3d1, 0xb942, 0xf3d5, 0xb943, 0xb944, 0xb945, 0xb946, /*0x30-0x37*/
04933 0xf3cd, 0xb947, 0xbce3, 0xb948, 0xc1fd, 0xb949, 0xf3d6, 0xb94a, /*0x38-0x3f*/
04934 0xb94b, 0xb94c, 0xb94d, 0xb94e, 0xb94f, 0xf3da, 0xb950, 0xf3cc, /*0x40-0x47*/
04935 0xb951, 0xb5c8, 0xb952, 0xbdee, 0xf3dc, 0xb953, 0xb954, 0xb7a4, /*0x48-0x4f*/
04936 0xbff0, 0xd6fe, 0xcdb2, 0xb955, 0xb4f0, 0xb956, 0xb2df, 0xb957, /*0x50-0x57*/
04937 0xf3d8, 0xb958, 0xf3d9, 0xc9b8, 0xb959, 0xf3dd, 0xb95a, 0xb95b, /*0x58-0x5f*/
04938 0xf3de, 0xb95c, 0xf3e1, 0xb95d, 0xb95e, 0xb95f, 0xb960, 0xb961, /*0x60-0x67*/
04939 0xb962, 0xb963, 0xb964, 0xb965, 0xb966, 0xb967, 0xf3df, 0xb968, /*0x68-0x6f*/
04940 0xb969, 0xf3e3, 0xf3e2, 0xb96a, 0xb96b, 0xf3db, 0xb96c, 0xbfea, /*0x70-0x77*/
04941 0xb96d, 0xb3ef, 0xb96e, 0xf3e0, 0xb96f, 0xb970, 0xc7a9, 0xb971, /*0x78-0x7f*/
04942 0xbcf2, 0xb972, 0xb973, 0xb974, 0xb975, 0xf3eb, 0xb976, 0xb977, /*0x80-0x87*/
04943 0xb978, 0xb979, 0xb97a, 0xb97b, 0xb97c, 0xb9bf, 0xb97d, 0xb97e, /*0x88-0x8f*/
04944 0xf3e4, 0xb980, 0xb981, 0xb982, 0xb2ad, 0xb9bf, 0xb983, 0xcbe3, /*0x90-0x97*/
04945 0xb984, 0xb985, 0xb986, 0xb987, 0xf3ed, 0xf3e9, 0xb988, 0xb989, /*0x98-0x9f*/
04946 0xb98a, 0xb9dc, 0xf3ee, 0xb98b, 0xb98c, 0xb98d, 0xf3e5, 0xf3e6, /*0xa0-0xa7*/
04947 0xf3ea, 0xc2e1, 0xf3ec, 0xf3ef, 0xf3e8, 0xb9cf, 0xb98e, 0xb98f, /*0xa8-0xaf*/
04948 0xb990, 0xcfe4, 0xb991, 0xb992, 0xf3f0, 0xb993, 0xb994, 0xb995, /*0xb0-0xb7*/
04949 0xf3e7, 0xb996, 0xb997, 0xb998, 0xb999, 0xb99a, 0xb99b, 0xb99c, /*0xb8-0xbf*/
04950 0xb99d, 0xf3f2, 0xb99e, 0xb99f, 0xb9a0, 0xb9a1, 0xd7ad, 0xc6aa, /*0xc0-0xc7*/
04951 0xba41, 0xba42, 0xba43, 0xba44, 0xf3f3, 0xba45, 0xba46, 0xba47, /*0xc8-0xcf*/
04952 0xba48, 0xf3f1, 0xba49, 0xc2a8, 0xba4a, 0xba4b, 0xba4c, 0xba4d, /*0xd0-0xd7*/
04953 0xba4e, 0xb8dd, 0xf3f5, 0xba4f, 0xba50, 0xf3f4, 0xba51, 0xba52, /*0xd8-0xdf*/
04954 0xba53, 0xb4db, 0xba54, 0xba55, 0xba56, 0xf3f6, 0xf3f7, 0xba57, /*0xe0-0xe7*/
04955 0xba58, 0xba59, 0xf3f8, 0xba5a, 0xba5b, 0xba5c, 0xc0ba, 0xba5d, /*0xe8-0xef*/
04956 0xba5e, 0xc0e9, 0xba5f, 0xba60, 0xba61, 0xba62, 0xba63, 0xc5f1, /*0xf0-0xf7*/
04957 0xba64, 0xba65, 0xba66, 0xba67, 0xf3fb, 0xba68, 0xf3fa, 0xba69, /*0xf8-0xff*/
04958 /* 0x7c00 */
04959 0xba6a, 0xba6b, 0xba6c, 0xba6d, 0xba6e, 0xba6f, 0xba70, 0xb4d8, /*0x00-0x07*/
04960 0xba71, 0xba72, 0xba73, 0xf3fe, 0xf3f9, 0xba74, 0xba75, 0xf3fc, /*0x08-0x0f*/
04961 0xba76, 0xba77, 0xba78, 0xba79, 0xba7a, 0xba7b, 0xf3fd, 0xba7c, /*0x10-0x17*/
04962 0xba7d, 0xba7e, 0xba80, 0xba81, 0xba82, 0xba83, 0xba84, 0xf4a1, /*0x18-0x1f*/
04963 0xba85, 0xba86, 0xba87, 0xba88, 0xba89, 0xba8a, 0xf4a3, 0xbbc9, /*0x20-0x27*/
04964 0xba8b, 0xba8c, 0xf4a2, 0xba8d, 0xba8e, 0xba8f, 0xba90, 0xba91, /*0x28-0x2f*/
04965 0xba92, 0xba93, 0xba94, 0xba95, 0xba96, 0xba97, 0xba98, 0xba99, /*0x30-0x37*/
04966 0xf4a4, 0xba9a, 0xba9b, 0xba9c, 0xba9d, 0xba9e, 0xba9f, 0xb2be, /*0x38-0x3f*/
04967 0xf4a6, 0xf4a5, 0xbaa0, 0xbb40, 0xbb41, 0xbb42, 0xbb43, 0xbb44, /*0x40-0x47*/
04968 0xbb45, 0xbb46, 0xbb47, 0xbb48, 0xbb49, 0xbcae, 0xbb4a, 0xbb4b, /*0x48-0x4f*/
04969 0xbb4c, 0xbb4d, 0xbb4e, 0xbb4f, 0xbb50, 0xbb51, 0xbb52, 0xbb53, /*0x50-0x57*/
04970 0xbb54, 0xbb55, 0xbb56, 0xbb57, 0xbb58, 0xbb59, 0xbb5a, 0xbb5b, /*0x58-0x5f*/
04971 0xbb5c, 0xbb5d, 0xbb5e, 0xbb5f, 0xbb60, 0xbb61, 0xbb62, 0xbb63, /*0x60-0x67*/
04972 0xbb64, 0xbb65, 0xbb66, 0xbb67, 0xbb68, 0xbb69, 0xbb6a, 0xbb6b, /*0x68-0x6f*/
04973 0xbb6c, 0xbb6d, 0xbb6e, 0xc3d7, 0xd9e1, 0xbb6f, 0xbb70, 0xbb71, /*0x70-0x77*/
04974 0xbb72, 0xbb73, 0xbb74, 0xc0e0, 0xf4cc, 0xd7d1, 0xbb75, 0xbb76, /*0x78-0x7f*/
04975 0xbb77, 0xbb78, 0xbb79, 0xbb7a, 0xbb7b, 0xbb7c, 0xbb7d, 0xbb7e, /*0x80-0x87*/
04976 0xbb80, 0xb7db, 0xbb81, 0xbb82, 0xbb83, 0xbb84, 0xbb85, 0xbb86, /*0x88-0x8f*/
04977 0xbb87, 0xf4ce, 0xc1a3, 0xbb88, 0xbb89, 0xc6c9, 0xbb8a, 0xb4d6, /*0x90-0x97*/
04978 0xd5b3, 0xbb8d, 0xbb8e, 0xbb8f, 0xf4d0, 0xf4cf, 0xf4d1, 0xcdba, /*0x98-0x9f*/
04979 0xbb8e, 0xbb8f, 0xf4d2, 0xbb90, 0xd4c1, 0xd6e0, 0xbb91, 0xbb92, /*0xa0-0xaf*/
04980 0xbb93, 0xbb94, 0xb7e0, 0xbb95, 0xbb96, 0xbb97, 0xc1b8, 0xbb98, /*0xa8-0xaf*/
04981 0xbb99, 0xc1bb, 0xf4d3, 0xbeac, 0xbb9a, 0xbb9b, 0xbb9c, 0xbb9d, /*0xb0-0xb7*/
04982 0xbb9e, 0xb4e2, 0xbb9f, 0xbba0, 0xf4d4, 0xf4d5, 0xbeab, 0xbc40, /*0xb8-0xbf*/
04983 0xbc41, 0xf4d6, 0xbc42, 0xbc43, 0xbc44, 0xf4db, 0xbc45, 0xf4d7, /*0xc0-0xc7*/
04984 0xf4da, 0xbc46, 0xbafd, 0xbc47, 0xf4d8, 0xf4d9, 0xbc48, 0xbc49, /*0xc8-0xcf*/
04985 0xbc4a, 0xbc4b, 0xbc4c, 0xbc4d, 0xbc4e, 0xb8e2, 0xc0c7, 0xf4dc, /*0xd0-0xd7*/
04986 0xbc4f, 0xb2da, 0xbc50, 0xbc51, 0xc3d3, 0xbc52, 0xbc53, 0xd4e3, /*0xd8-0xdf*/
04987 0xbfb7, 0xbc54, 0xbc55, 0xbc56, 0xbc57, 0xbc58, 0xbc59, 0xbc5a, /*0xe0-0xe7*/
04988 0xf4dd, 0xbc5b, 0xbc5c, 0xbc5d, 0xbc5e, 0xbc5f, 0xbc60, 0xc5b4, /*0xe8-0xef*/
04989 0xbc61, 0xbc62, 0xbc63, 0xbc64, 0xbc65, 0xbc66, 0xbc67, 0xbc68, /*0xf0-0xf7*/
04990 0xf4e9, 0xbc69, 0xc66a, 0xcfb5, 0xbc6b, 0xbc6c, 0xbc6d, 0xbc6e, /*0xf8-0xff*/
04991 /* 0x7d00 */
04992 0xbc6f, 0xbc70, 0xbc71, 0xbc72, 0xbc73, 0xbc74, 0xbc75, 0xbc76, /*0x00-0x07*/
04993 0xbc77, 0xbc78, 0xc0c9, 0xbc79, 0xbc7a, 0xbc7b, 0xbc7c, 0xbc7d, /*0x08-0x0f*/
04994 0xbc7e, 0xbc80, 0xbc81, 0xbc82, 0xbc83, 0xbc84, 0xbc85, 0xbc86, /*0x10-0x17*/
04995 0xbc87, 0xbc88, 0xbc89, 0xbc8a, 0xbc8b, 0xbc8c, 0xbc8d, 0xbc8e, /*0x18-0x1f*/
04996 0xcdb8, 0xbc8f, 0xcbf7, 0xbc90, 0xbc91, 0xbc92, 0xbc93, 0xbdf4, /*0x20-0x27*/
04997 0xbc94, 0xbc95, 0xbc96, 0xd7cf, 0xbc97, 0xbc98, 0xbc99, 0xc0db, /*0x28-0x2f*/
04998 0xbc9a, 0xbc9b, 0xbc9c, 0xbc9d, 0xbc9e, 0xbc9f, 0xbca0, 0xbd40, /*0x30-0x37*/
04999 0xbd41, 0xbd42, 0xbd43, 0xbd44, 0xbd45, 0xbd46, 0xbd47, 0xbd48, /*0x38-0x3f*/
05000 0xbd49, 0xbd4a, 0xbd4b, 0xbd4c, 0xbd4d, 0xbd4e, 0xbd4f, 0xbd50, /*0x40-0x47*/
05001 0xbd51, 0xbd52, 0xbd53, 0xbd54, 0xbd55, 0xbd56, 0xbd57, 0xbd58, /*0x48-0x4f*/
05002 0xbd59, 0xbd5a, 0xbd5b, 0xbd5c, 0xbd5d, 0xbd5e, 0xbd5f, 0xbd60, /*0x50-0x57*/
05003 0xbd61, 0xbd62, 0xbd63, 0xbd64, 0xbd65, 0xbd66, 0xbd67, 0xbd68, /*0x58-0x5f*/
05004 0xbd69, 0xbd6a, 0xbd6b, 0xbd6c, 0xbd6d, 0xbd6e, 0xbd6f, 0xbd70, /*0x60-0x67*/
05005 0xbd71, 0xbd72, 0xbd73, 0xbd74, 0xbd75, 0xbd76, 0xd0f5, 0xbd77, /*0x68-0x6f*/
05006 0xbd78, 0xbd79, 0xbd7a, 0xbd7b, 0xbd7c, 0xbd7d, 0xbd7e, 0xf4ea, /*0x70-0x77*/
05007 0xbd80, 0xbd81, 0xbd82, 0xbd83, 0xbd84, 0xbd85, 0xbd86, 0xbd87, /*0x78-0x7f*/
05008 0xbd88, 0xbd89, 0xbd8a, 0xbd8b, 0xbd8c, 0xbd8d, 0xbd8e, 0xbd8f, /*0x80-0x87*/
05009 0xbd90, 0xbd91, 0xbd92, 0xbd93, 0xbd94, 0xbd95, 0xbd96, 0xbd97, /*0x88-0x8f*/
05010 0xbd98, 0xbd99, 0xbd9a, 0xbd9b, 0xbd9c, 0xbd9d, 0xbd9e, 0xbd9f, /*0x90-0x97*/
05011 0xbda0, 0xbe40, 0xbe41, 0xbe42, 0xbe43, 0xbe44, 0xbe45, 0xbe46, /*0x98-0x9f*/
05012 0xbe47, 0xbe48, 0xbe49, 0xbe4a, 0xbe4b, 0xbe4c, 0xf4ec, 0xbe4d, /*0xa0-0xaf*/
05013 0xbe4e, 0xbe4f, 0xbe50, 0xbe51, 0xbe52, 0xbe53, 0xf4ed, 0xbe54, /*0xa8-0xaf*/
05014 0xbe55, 0xbe56, 0xbe57, 0xbe58, 0xbe59, 0xbe5a, 0xbe5b, 0xbe5c, /*0xb0-0xb7*/
05015 0xbe5d, 0xbe5e, 0xbe5f, 0xbe60, 0xbe61, 0xbe62, 0xbe63, 0xbe64, /*0xb8-0xbf*/
05016 0xbe65, 0xbe66, 0xbe67, 0xbe68, 0xbe69, 0xbe6a, 0xbe6b, 0xbe6c, /*0xc0-0xc7*/
05017 0xbe6d, 0xbe6e, 0xbe6f, 0xbe70, 0xbe71, 0xbe72, 0xbe73, 0xbe74, /*0xc8-0xcf*/
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05018 0xbe75, 0xbe76, 0xbe77, 0xbe78, 0xbe79, 0xbe7a, 0xbe7b, 0xbe7c, /*0xd0-0xd7*/
05019 0xbe7d, 0xbe7e, 0xbe80, 0xbe81, 0xbe82, 0xbe83, 0xbe84, 0xbe85, /*0xd8-0xdf*/
05020 0xbe86, 0xbe87, 0xbe88, 0xbe89, 0xbe8a, 0xbe8b, 0xbe8c, 0xbe8d, /*0xe0-0xe7*/
05021 0xbe8e, 0xbe8f, 0xbe90, 0xbe91, 0xbe92, 0xbe93, 0xbe94, 0xbe95, /*0xe8-0xef*/
05022 0xbe96, 0xbe97, 0xbe98, 0xbe99, 0xbe9a, 0xbe9b, 0xbe9c, 0xbe9d, /*0xf0-0xf7*/
05023 0xbe9e, 0xbe9f, 0xbea0, 0xbf40, 0xbf41, 0xbf42, 0xbf43, 0xbf44, /*0xf8-0xff*/
05024 /* 0x7e00 */
05025 0xbf45, 0xbf46, 0xbf47, 0xbf48, 0xbf49, 0xbf4a, 0xbf4b, 0xbf4c, /*0x00-0x07*/
05026 0xbf4d, 0xbf4e, 0xbf4f, 0xbf50, 0xbf51, 0xbf52, 0xbf53, 0xbf54, /*0x08-0x0f*/
05027 0xbf55, 0xbf56, 0xbf57, 0xbf58, 0xbf59, 0xbf5a, 0xbf5b, 0xbf5c, /*0x10-0x17*/
05028 0xbf5d, 0xbf5e, 0xbf5f, 0xbf60, 0xbf61, 0xbf62, 0xbf63, 0xbf64, /*0x18-0x1f*/
05029 0xbf65, 0xbf66, 0xbf67, 0xbf68, 0xbf69, 0xbf6a, 0xbf6b, 0xbf6c, /*0x20-0x27*/
05030 0xbf6d, 0xbf6e, 0xbf6f, 0xbf70, 0xbf71, 0xbf72, 0xbf73, 0xbf74, /*0x28-0x2f*/
05031 0xbf75, 0xbf76, 0xbf77, 0xbf78, 0xbf79, 0xbf7a, 0xbf7b, 0xbf7c, /*0x30-0x37*/
05032 0xbf7d, 0xbf7e, 0xbf80, 0xbf81, 0xbf82, 0xbf83, 0xbf84, /*0x38-0x3f*/
05033 0xbf85, 0xb7b1, 0xbf86, 0xbf87, 0xbf88, 0xbf89, 0xbf8a, 0xf4ed, /*0x40-0x47*/
05034 0xbf8b, 0xbf8c, 0xbf8d, 0xbf8e, 0xbf8f, 0xbf90, 0xbf91, 0xbf92, /*0x48-0x4f*/
05035 0xbf93, 0xbf94, 0xbf95, 0xbf96, 0xbf97, 0xbf98, 0xbf99, 0xbf9a, /*0x50-0x57*/
05036 0xbf9b, 0xbf9c, 0xbf9d, 0xbf9e, 0xbf9f, 0xbfa0, 0xc040, 0xc041, /*0x58-0x5f*/
05037 0xc042, 0xc043, 0xc044, 0xc045, 0xc046, 0xc047, 0xc048, 0xc049, /*0x60-0x67*/
05038 0xc04a, 0xc04b, 0xc04c, 0xc04d, 0xc04e, 0xc04f, 0xc050, 0xc051, /*0x68-0x6f*/
05039 0xc052, 0xc053, 0xc054, 0xc055, 0xc056, 0xc057, 0xc058, 0xc059, /*0x70-0x77*/
05040 0xc05a, 0xc05b, 0xc05c, 0xc05d, 0xc05e, 0xc05f, 0xc060, 0xc061, /*0x78-0x7f*/
05041 0xc062, 0xc063, 0xd7eb, 0xc064, 0xc065, 0xc066, 0xc067, 0xc068, /*0x80-0x87*/
05042 0xc069, 0xc06a, 0xc06b, 0xc06c, 0xc06d, 0xc06e, 0xc06f, 0xc070, /*0x88-0x8f*/
05043 0xc071, 0xc072, 0xc073, 0xc074, 0xc075, 0xc076, 0xc077, 0xc078, /*0x90-0x97*/
05044 0xc079, 0xc07a, 0xc07b, 0xc07c, 0xc07d, 0xc07e, 0xc07f, 0xc080, /*0x98-0x9f*/
05045 0xbec0, 0xe6fa, 0xbaec, 0xe6fb, 0xcfcf, 0xe6fc, 0xd4bc, 0xbcb6, /*0xa0-0xa7*/
05046 0xe6fd, 0xe6fe, 0xbccd, 0xc8d2, 0xc8e3, 0xe7a1, 0xc080, 0xb4bf, /*0xa8-0xaf*/
05047 0xe7a2, 0xc9b4, 0xc8d9, 0xc4c9, 0xc081, 0xd7dd, 0xc2da, 0xb7d7, /*0xb0-0xb7*/
05048 0xd6bd, 0xccec, 0xb7c4, 0xc082, 0xc083, 0xc5a6, 0xe7a3, 0xcfd, /*0xb8-0xbf*/
05049 0xe7a4, 0xe7a5, 0xe7a6, 0xc1b7, 0xd7e9, 0xc9f0, 0xcfb, 0xd6af, /*0xc0-0xc7*/
05050 0xd6d5, 0xe7a7, 0xb0ed, 0xe7a8, 0xc9dc, 0xd2ef, 0xbead, /*0xc8-0xcf*/
05051 0xe7aa, 0xb0f3, 0xc8de, 0xbde1, 0xe7ab, 0xc8c6, 0xc084, 0xe7ac, /*0xd0-0xd7*/
05052 0xbbe6, 0xb8f8, 0xd1a4, 0xe7ad, 0xc2e7, 0xbf8, 0xbdca, 0xcdb3, /*0xd8-0xdf*/
05053 0xe7ae, 0xe7af, 0xbee, 0xd0e5, 0xc085, 0xcbe7, 0xcdd, 0xbccc, /*0xe0-0xe7*/
05054 0xe7b0, 0xbca8, 0xd0f7, 0xe7b1, 0xc086, 0xd0f8, 0xe7b2, 0xe7b3, /*0xe8-0xef*/
05055 0xb4c2, 0xe7b4, 0xe7b5, 0xc9fe, 0xceac, 0xc3e0, 0xe7b7, 0xb1c1, /*0xf0-0xf7*/
05056 0xb3f1, 0xc087, 0xe7b8, 0xe7b9, 0xd7db, 0xd5c0, 0xe7ba, 0xc2cc, /*0xf8-0xff*/
05057 /* 0x7f00 */
05058 0xd7ba, 0xe7bb, 0xe7bc, 0xe7bd, 0xbcea, 0xc3e5, 0xc0c2, 0xe7be, /*0x00-0x07*/
05059 0xe7bf, 0xbca9, 0xc088, 0xe7c0, 0xe7c1, 0xe7b6, 0xb6d0, 0xe7c2, /*0x08-0x0f*/
05060 0xc089, 0xe7c3, 0xe7c4, 0xbba, 0xb5de, 0xc2c6, 0xb1e0, 0xe7c5, /*0x10-0x17*/
05061 0xd4b5, 0xe7c6, 0xb8bf, 0xe7c8, 0xe7c7, 0xb7ec, 0xc08a, 0xe7c9, /*0x18-0x1f*/
05062 0xb2f8, 0xe7ca, 0xe7cb, 0xe7cc, 0xe7cd, 0xe7ce, 0xe7cf, 0xe7d0, /*0x20-0x27*/
05063 0xd3a7, 0xcbf5, 0xe7d1, 0xe7d2, 0xe7d3, 0xe7d4, 0xc9c9, 0xe7d5, /*0x28-0x2f*/
05064 0xe7d6, 0xe7d7, 0xe7d8, 0xe7d9, 0xbdc9, 0xe7da, 0xf3be, 0xc08b, /*0x30-0x37*/
05065 0xb8d7, 0xc08c, 0xc8b1, 0xc08d, 0xc08e, 0xc08f, 0xc090, 0xc091, /*0x38-0x3f*/
05066 0xc092, 0xc093, 0xf3bf, 0xc094, 0xf3c0, 0xf3c1, 0xc095, 0xc096, /*0x40-0x47*/
05067 0xc097, 0xc098, 0xc099, 0xc09a, 0xc09b, 0xc09c, 0xc09d, 0xc09e, /*0x48-0x4f*/
05068 0xb9de, 0xcdf8, 0xc09f, 0xc0a0, 0xd8e8, 0xbab1, 0xc140, 0xc2de, /*0x50-0x57*/
05069 0xeeb7, 0xc141, 0xb7a3, 0xc142, 0xc143, 0xc144, 0xc145, 0xeeb9, /*0x58-0x5f*/
05070 0xc146, 0xeeb8, 0xb0d5, 0xc147, 0xc148, 0xc149, 0xc14a, 0xc14b, /*0x60-0x67*/
05071 0xeebb, 0xd5d6, 0xd7ef, 0xc14c, 0xc14d, 0xc14e, 0xd6c3, 0xc14f, /*0x68-0x6f*/
05072 0xc150, 0xeebd, 0xcaf0, 0xc151, 0xeebc, 0xc152, 0xc153, 0xc154, /*0x70-0x77*/
05073 0xc155, 0xeebe, 0xc156, 0xc157, 0xc158, 0xc159, 0xeece, 0xc15a, /*0x78-0x7f*/
05074 0xc15b, 0xeebf, 0xc15c, 0xc15d, 0xc15e, 0xc15f, 0xc160, 0xc161, /*0x80-0x87*/
05075 0xc162, 0xc163, 0xd1f2, 0xc164, 0xc7bc, 0xc165, 0xc3c0, 0xc166, /*0x88-0x8f*/
05076 0xc167, 0xc168, 0xc169, 0xc16a, 0xb8e1, 0xc16b, 0xc16c, 0xc16d, /*0x90-0x97*/
05077 0xc16e, 0xc16f, 0xc1e7, 0xc170, 0xc171, 0xf4c6, 0xd0df, 0xf4c7, /*0x98-0x9f*/
05078 0xc172, 0xcfd, 0xc173, 0xc174, 0xc8ba, 0xc175, 0xc176, 0xf4c8, /*0xa0-0xa7*/
05079 0xc177, 0xc178, 0xc179, 0xc17a, 0xc17b, 0xc17c, 0xc17d, 0xf4c9, /*0xa8-0xaf*/
05080 0xf4ca, 0xc17e, 0xf4cb, 0xc180, 0xc181, 0xc182, 0xc183, 0xc184, /*0xb0-0xb7*/
05081 0xd9fa, 0xb8fe, 0xc185, 0xc186, 0xe5f1, 0xd3f0, 0xc187, 0xf4e0, /*0xb8-0xbf*/
05082 0xc188, 0xccec, 0xc189, 0xc18a, 0xc18b, 0xb3e1, 0xc18c, 0xc18d, /*0xc0-0xc7*/
05083 0xc18e, 0xc18f, 0xf1b4, 0xc190, 0xd2ee, 0xc191, 0xf4e1, 0xc192, /*0xc8-0xcf*/
05084 0xc193, 0xc194, 0xc195, 0xc196, 0xcfe8, 0xf4e2, 0xc197, 0xc198, /*0xd0-0xd7*/
05085 0xc7cc, 0xc199, 0xc19a, 0xc19b, 0xc19c, 0xc19d, 0xc19e, 0xb5d4, /*0xd8-0xdf*/
05086 0xb4e4, 0xf4e4, 0xc19f, 0xc1a0, 0xc240, 0xf4e3, 0xf4e5, 0xc241, /*0xe0-0xe7*/
05087 0xc242, 0xf4e6, 0xc243, 0xc244, 0xc245, 0xc246, 0xf4e7, 0xc247, /*0xe8-0xef*/
05088 0xbab2, 0xb0bf, 0xc248, 0xf4e8, 0xc249, 0xc24a, 0xc24b, 0xc24c, /*0xf0-0xf7*/
05089 0xc24d, 0xc24e, 0xc24f, 0xb7ad, 0xd2ed, 0xc250, 0xc251, 0xc252, /*0xf8-0xff*/
05090 /* 0x8000 */
05091 0xd2ab, 0xc0cf, 0xc253, 0xbfb, 0xeba3, 0xd5df, 0xeac8, 0xc254, /*0x00-0x07*/
05092 0xc255, 0xc256, 0xc257, 0xf1f3, 0xb6f8, 0xcba3, 0xc258, 0xc259, /*0x08-0x0f*/
05093 0xc4cd, 0xc25a, 0xf1e7, 0xc25b, 0xf1e8, 0xb8fb, 0xf1e9, 0xbac4, /*0x10-0x17*/
05094 0xd4c5, 0xb0d2, 0xc25c, 0xc25d, 0xf1ea, 0xc25e, 0xc25f, 0xc260, /*0x18-0x1f*/
05095 0xf1eb, 0xc261, 0xf1ec, 0xc262, 0xc263, 0xf1ed, 0xf1ee, 0xf1ef, /*0x20-0x27*/
05096 0xf1f1, 0xf1f0, 0xc5d5, 0xc264, 0xc265, 0xc266, 0xc267, 0xc268, /*0x28-0x2f*/
05097 0xc269, 0xf1f2, 0xc26a, 0xb6fa, 0xc26b, 0xf1f4, 0xd2ae, 0xdec7, /*0x30-0x37*/
05098 0xcba, 0xc26c, 0xc26d, 0xb3dc, 0xc26e, 0xb5a2, 0xc26f, 0xb9a2, /*0x38-0x3f*/
05099 0xc270, 0xc271, 0xc4f4, 0xf1f5, 0xc272, 0xc273, 0xf1f6, 0xc274, /*0x40-0x47*/
05100 0xc275, 0xc276, 0xc1c4, 0xc1fb, 0xd6b0, 0xf1f7, 0xc277, 0xc278, /*0x48-0x4f*/
05101 0xc279, 0xc27a, 0xf1f8, 0xc27b, 0xc1aa, 0xc27c, 0xc27d, 0xc27e, /*0x50-0x57*/
05102 0xc6b8, 0xc280, 0xbdb, 0xc281, 0xc282, 0xc283, 0xc284, 0xc285, /*0x58-0x5f*/
05103 0xc286, 0xc287, 0xc288, 0xc289, 0xc28a, 0xc28b, 0xc28c, 0xc28d, /*0x60-0x67*/
05104 0xc28e, 0xf1f9, 0xb4cf, 0xc28f, 0xc290, 0xc291, 0xc292, 0xc293, /*0x68-0x6f*/
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05105 0xc294, 0xf1fa, 0xc295, 0xc296, 0xc297, 0xc298, 0xc299, 0xc29a, /*0x70-0x77*/
05106 0xc29b, 0xc29c, 0xc29d, 0xc29e, 0xc29f, 0xc2a0, 0xc340, 0xedb2, /*0x78-0x7f*/
05107 0xedb1, 0xc341, 0xc342, 0xcbe0, 0xd2de, 0xc343, 0xcbc1, 0xd5d8, /*0x80-0x87*/
05108 0xc344, 0xc8e2, 0xc345, 0xc0df, 0xbca1, 0xc346, 0xc347, 0xc348, /*0x88-0x8f*/
05109 0xc349, 0xc34a, 0xc34b, 0xebc1, 0xc34c, 0xc34d, 0xd0a4, 0xc34e, /*0x90-0x97*/
05110 0xd6e2, 0xc34f, 0xd6c7, 0xb8d8, 0xebc0, 0xb8ce, 0xc350, 0xebbf, /*0x98-0x9f*/
05111 0xb3a6, 0xb9c9, 0xd6ab, 0xc351, 0xb7f4, 0xb7ca, 0xc352, 0xc353, /*0xa0-0xa7*/
05112 0xc354, 0xbce7, 0xb7be, 0xebc6, 0xc355, 0xebc7, 0xb0b9, 0xbfcf, /*0xa8-0xaf*/
05113 0xc356, 0xebc5, 0xd3fd, 0xc357, 0xebc8, 0xc358, 0xc359, 0xebc9, /*0xb0-0xb7*/
05114 0xc35a, 0xc35b, 0xb7ce, 0xc35c, 0xebc2, 0xebc4, 0xc9f6, 0xd6d7, /*0xb8-0xbf*/
05115 0xd5cd, 0xd0b2, 0xebcf, 0xebc8, 0xebd0, 0xc35d, 0xb5a8, 0xc35e, /*0xc0-0xc7*/
05116 0xc35f, 0xc360, 0xc361, 0xc362, 0xb1b3, 0xebd2, 0xc0ca5, 0xc363, /*0xc8-0xcf*/
05117 0xc364, 0xc365, 0xc366, 0xc367, 0xc368, 0xc369, 0xc5d6, 0xebd3, /*0xd0-0xd7*/
05118 0xc36a, 0xebd1, 0xc5df, 0xebce, 0xc0ca4, 0xebd5, 0xb0fb, 0xc36b, /*0xd8-0xdf*/
05119 0xc36c, 0xbafafa, 0xc36d, 0xc36e, 0xd8b7, 0xf1e3, 0xc36f, 0xebca, /*0xe0-0xe7*/
05120 0xebcb, 0xebcc, 0xebcd, 0xebd6, 0xe6c0, 0xebd9, 0xc370, 0xbfe8, /*0xe8-0xef*/
05121 0xd2c8, 0xebd7, 0xebdc, 0xb8ec, 0xebd8, 0xc371, 0xbdba, 0xc372, /*0xf0-0xf7*/
05122 0xd0d8, 0xc373, 0xb0b7, 0xc374, 0xebdd, 0xc4dc, 0xc375, 0xc376, /*0xf8-0xff*/
05123 /* 0x8100 */
05124 0xc377, 0xc378, 0xd6ac, 0xc379, 0xc37a, 0xc37b, 0xb4e0, 0xc37c, /*0x00-0x07*/
05125 0xc37d, 0xc2f6, 0xbcb9, 0xc37e, 0xc380, 0xebda, 0xebdb, 0xd4e0, /*0x08-0x0f*/
05126 0xc6ea, 0xc4d4, 0xebdf, 0xc5a7, 0xd9f5, 0xc381, 0xb2b1, 0xc382, /*0x10-0x17*/
05127 0xebef, 0xc383, 0xbdc5, 0xc384, 0xc385, 0xc386, 0xebef, 0xc387, /*0x18-0x1f*/
05128 0xc388, 0xc389, 0xc38a, 0xc38b, 0xc38c, 0xc38d, 0xc38e, 0xc38f, /*0x20-0x27*/
05129 0xc390, 0xc391, 0xc392, 0xc393, 0xebef, 0xc394, 0xc395, 0xb8ac, /*0x28-0x2f*/
05130 0xc396, 0xcdd1, 0xebef, 0xc397, 0xc398, 0xc399, 0xebef, 0xc39a, /*0x30-0x37*/
05131 0xc1b3, 0xc39b, 0xc39c, 0xc39d, 0xc39e, 0xc39f, 0xc6a2, 0xc3a0, /*0x38-0x3f*/
05132 0xc440, 0xc441, 0xc442, 0xc443, 0xc444, 0xc445, 0xccf3, 0xc446, /*0x40-0x47*/
05133 0xebef, 0xc447, 0xc0b0, 0xd2b8, 0xebef, 0xc448, 0xc449, 0xc44a, /*0x48-0x4f*/
05134 0xb8af, 0xb8ad, 0xc44b, 0xebef, 0xc44c, 0xc44d, 0xc44e, 0xc44f, /*0x50-0x57*/
05135 0xc44e, 0xebef, 0xebef, 0xc44f, 0xc450, 0xc451, 0xc452, 0xc453, /*0x58-0x5f*/
05136 0xebef, 0xc454, 0xc455, 0xc456, 0xc457, 0xd0c8, 0xc458, 0xebf2, /*0x60-0x6f*/
05137 0xc459, 0xebef, 0xc45a, 0xc45b, 0xc45c, 0xc45d, 0xc45e, 0xc45f, /*0x70-0x77*/
05138 0xd1fc, 0xebef, 0xc45e, 0xc45f, 0xebef, 0xc460, 0xc461, 0xc462, /*0x78-0x7f*/
05139 0xc463, 0xb8b9, 0xcfd9, 0xc4e5, 0xebef, 0xebf0, 0xc0ca, 0xc4e8, /*0x80-0x87*/
05140 0xb0f2, 0xc464, 0xebf6, 0xc465, 0xc466, 0xc467, 0xc468, 0xc469, /*0x88-0x8f*/
05141 0xebf5, 0xc46a, 0xb2b2, 0xc46b, 0xc46c, 0xc46d, 0xc46e, 0xb8e0, /*0x90-0x97*/
05142 0xc46f, 0xebf7, 0xc470, 0xc471, 0xc472, 0xc473, 0xc474, 0xc475, /*0x98-0x9f*/
05143 0xb1ec, 0xc476, 0xc477, 0xc0cc5, 0xc4a4, 0xc4a5, 0xc478, 0xc479, /*0xa0-0xa7*/
05144 0xc47a, 0xc47b, 0xc47c, 0xebf9, 0xc47d, 0xc47e, 0xc0ca2, 0xc480, /*0xa8-0xaf*/
05145 0xc5f2, 0xc481, 0xebfa, 0xc482, 0xc483, 0xc484, 0xc485, 0xc486, /*0xb0-0xb7*/
05146 0xc487, 0xc488, 0xc489, 0xc9c5, 0xc48a, 0xc48b, 0xc48c, 0xc48d, /*0xb8-0xbf*/
05147 0xc48e, 0xc48f, 0xe2df, 0xebfe, 0xc490, 0xc491, 0xc492, 0xc493, /*0xc0-0xc7*/
05148 0xc4ce, 0xc0ca1, 0xb1db, 0xd3b7, 0xc494, 0xc495, 0xd2dc, 0xc496, /*0xc8-0xcf*/
05149 0xc497, 0xc498, 0xebfd, 0xc499, 0xebfb, 0xc49a, 0xc49b, 0xc49c, /*0xd0-0xd7*/
05150 0xc49d, 0xc49e, 0xc49f, 0xc4a0, 0xc540, 0xc541, 0xc542, 0xc543, /*0xd8-0xdf*/
05151 0xc544, 0xc545, 0xc546, 0xc547, 0xc548, 0xc549, 0xc54a, 0xc54b, /*0xe0-0xe7*/
05152 0xc54c, 0xc54d, 0xc54e, 0xb3bc, 0xc54f, 0xc550, 0xc551, 0xc552, /*0xe8-0xef*/
05153 0xc553, 0xc554, 0xd7d4, 0xc555, 0xf4ab, 0xb3f4, 0xc556, 0xc557, /*0xf0-0xf7*/
05154 0xc558, 0xc559, 0xc55a, 0xd6c1, 0xd6c2, 0xc55b, 0xc55c, 0xc55d, /*0xf8-0xff*/
05155 0xc55e, 0xc55f, 0xd5e9, 0xebca, 0xc560, 0xf4a7, 0xc561,
05156 /* 0x8200 */
05157 0xd2a8, 0xf4a8, 0xf4a9, 0xc562, 0xf4aa, 0xebcb, 0xd3df, 0xc563, /*0x00-0x07*/
05158 0xc564, 0xc565, 0xc566, 0xc567, 0xc9e0, 0xc9e1, 0xc568, 0xc569, /*0x08-0x0f*/
05159 0xf3c2, 0xc56a, 0xc0ca6, 0xc56b, 0xc0ca2, 0xc56c, 0xc56d, 0xc56e, /*0x10-0x17*/
05160 0xc56f, 0xc570, 0xc571, 0xe2b6, 0xc0ca4, 0xc572, 0xc0ca8, 0xd6db, /*0x18-0x1f*/
05161 0xc573, 0xf4ad, 0xf4ae, 0xf4af, 0xc574, 0xc575, 0xc576, 0xc577, /*0x20-0x27*/
05162 0xf4b2, 0xc578, 0xbabd, 0xf4b3, 0xb0e3, 0xf4b0, 0xc579, 0xf4b1, /*0x28-0x2f*/
05163 0xbda2, 0xb2d5, 0xc57a, 0xf4b6, 0xf4b7, 0xb6e6, 0xb2b0, 0xcfcf, /*0x30-0x37*/
05164 0xf4b4, 0xb4ac, 0xc57b, 0xf4b5, 0xc57c, 0xc57d, 0xf4b8, 0xc57e, /*0x38-0x3f*/
05165 0xc580, 0xc581, 0xc582, 0xc583, 0xf4b9, 0xc584, 0xc585, 0xcda7, /*0x40-0x47*/
05166 0xc586, 0xf4ba, 0xc587, 0xf4bb, 0xc588, 0xc589, 0xc58a, 0xf4bc, /*0x48-0x4f*/
05167 0xc58b, 0xc58c, 0xc58d, 0xc58e, 0xc58f, 0xc590, 0xc591, 0xc592, /*0x50-0x57*/
05168 0xc593, 0xc594, 0xf4bd, 0xc595, 0xc596, 0xc597, 0xf4be, /*0x58-0x5f*/
05169 0xc598, 0xc599, 0xc59a, 0xc59b, 0xc59c, 0xc59d, 0xc59e, 0xc59f, /*0x60-0x67*/
05170 0xf4bf, 0xc5a0, 0xc640, 0xc641, 0xc642, 0xc643, 0xf4de, 0xc1bc, /*0x68-0x6f*/
05171 0xbce8, 0xc644, 0xc9ab, 0xd1de, 0xe5f5, 0xc645, 0xc646, 0xc647, /*0x70-0x77*/
05172 0xc648, 0xdcb3, 0xd2d5, 0xc649, 0xc64a, 0xdcb4, 0xb0ac, 0xdcb5, /*0x78-0x7f*/
05173 0xc64b, 0xc64c, 0xbdda, 0xc64d, 0xdcb9, 0xc64e, 0xc64f, 0xc650, /*0x80-0x87*/
05174 0xd8c2, 0xc651, 0xdcb7, 0xd3f3, 0xc652, 0xc9d6, 0xdcb8, 0xdcb6, /*0x88-0x8f*/
05175 0xc653, 0xdcb9, 0xc3a2, 0xc654, 0xc655, 0xc656, 0xc657, 0xdcb9, /*0x90-0x97*/
05176 0xdcc5, 0xdcb9, 0xc658, 0xc659, 0xc65a, 0xd6a5, 0xc65a, 0xdccf, /*0x98-0x9f*/
05177 0xc65b, 0xdcc9, 0xc65c, 0xc65d, 0xdcd2, 0xbde6, 0xc2ab, 0xc65e, /*0xa0-0xaf*/
05178 0xdcb8, 0xdccb, 0xdcce, 0xdcb9, 0xb7d2, 0xb0c5, 0xdcc9, 0xd0be, /*0xa8-0xaf*/
05179 0xdcc1, 0xbba8, 0xc65f, 0xb7bc, 0xdccc, 0xc660, 0xc661, 0xdcc6, /*0xb0-0xb7*/
05180 0xdcbf, 0xc7db, 0xc662, 0xc663, 0xc664, 0xd1bf, 0xdcc0, 0xc665, /*0xb8-0xbf*/
05181 0xc666, 0xdcca, 0xc667, 0xc668, 0xdcd0, 0xc669, 0xc66a, 0xc66b, /*0xc0-0xc7*/
05182 0xdcc2, 0xc66b, 0xdcc3, 0xdcc4, 0xdcc5, 0xb2d4, 0xdcd1, 0xc66d, /*0xc8-0xcf*/
05183 0xc66e, 0xd4b7, 0xdcd9, 0xdcd9, 0xc0ca6, 0xdce6, 0xc66d, 0xc3e7, /*0xd0-0xdf*/
05184 0xdcdc, 0xc66e, 0xc66f, 0xbfc1, 0xdcd9, 0xc670, 0xb0fa, 0xb9b6, /*0xd8-0xdf*/
05185 0xdce5, 0xdcd3, 0xc671, 0xdcc4, 0xdcd6, 0xc8f4, 0xbfe0, 0xc672, /*0xe0-0xe7*/
05186 0xc673, 0xc674, 0xc675, 0xc9bb, 0xc676, 0xc677, 0xc678, 0xb1bd, /*0xe8-0xef*/
05187 0xc679, 0xd3a2, 0xc67a, 0xc67b, 0xdcd9, 0xc67c, 0xc67d, 0xdcd5, /*0xf0-0xf7*/
05188 0xc67e, 0xc67f, 0xc680, 0xdcdc, 0xc681, 0xc682, 0xc683, 0xc684, /*0xf8-0xff*/
05189 /* 0x8300 */
05190 0xc685, 0xd7c2, 0xc3af, 0xb7b6, 0xc7d1, 0xc3a9, 0xdce2, 0xdcd8, /*0x00-0x07*/
05191 0xdceb, 0xdcd4, 0xc686, 0xc687, 0xdcd9, 0xc688, 0xc689, 0xdcd7, /*0x08-0x0f*/

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05192 0xc689, 0xdce0, 0xc68a, 0xc68b, 0xdce3, 0xdce4, 0xc68c, 0xdcf8, /*0x10-0x17*/
05193 0xc68d, 0xc68e, 0xdce1, 0xdda2, 0xdce7, 0xc68f, 0xc690, 0xc691, /*0x18-0x1f*/
05194 0xc692, 0xc693, 0xc694, 0xc695, 0xc696, 0xc697, 0xc698, 0xbceb, /*0x20-0x27*/
05195 0xb4c4, 0xc699, 0xc69a, 0xc3a3, 0xb2e7, 0xdcefa, 0xc69b, 0xdcf2, /*0x28-0x2f*/
05196 0xc69c, 0xdcef, 0xc69d, 0xdcfc, 0xdcee, 0xd2f0, 0xb2e8, 0xc69e, /*0x30-0x37*/
05197 0xc8d7, 0xc8e3, 0xdcfb, 0xc69f, 0xdced, 0xc6a0, 0xc740, 0xc741, /*0x38-0x3f*/
05198 0xdcf7, 0xc742, 0xc743, 0xdcf5, 0xc744, 0xc745, 0xbea3, 0xdcf4, /*0x40-0x47*/
05199 0xc746, 0xb2dd, 0xc747, 0xc748, 0xc749, 0xc74a, 0xc74b, 0xdcf3, /*0x48-0x4f*/
05200 0xbcf6, 0xdce8, 0xbbc4, 0xc74c, 0xc0f3, 0xc74d, 0xc74e, 0xc74f, /*0x50-0x57*/
05201 0xc750, 0xc751, 0xbcd4, 0xdce9, 0xdcea, 0xc752, 0xdcf1, 0xdcf6, /*0x58-0x5f*/
05202 0xdcf9, 0xb5b4, 0xc753, 0xc8d9, 0xbbe7, 0xdce, 0xdcfd, 0xd3ab, /*0x60-0x67*/
05203 0xdda1, 0xdda3, 0xdda5, 0xd2f1, 0xdda4, 0xdda6, 0xdda7, 0xd2a9, /*0x68-0x6f*/
05204 0xc754, 0xc755, 0xc756, 0xc757, 0xc758, 0xc759, 0xc75a, 0xbac9, /*0x70-0x77*/
05205 0xdda9, 0xc75b, 0xc75c, 0xddb6, 0xddb1, 0xddb4, 0xc75d, 0xc75e, /*0x78-0x7f*/
05206 0xc75f, 0xc760, 0xc761, 0xc762, 0xc763, 0xddb0, 0xc6ce, 0xc764, /*0x80-0x87*/
05207 0xc765, 0xc0f2, 0xc766, 0xc767, 0xc768, 0xc769, 0xc9af, 0xc76a, /*0x88-0x8f*/
05208 0xc76b, 0xc76c, 0xdcec, 0xddae, 0xc76d, 0xc76e, 0xc76f, 0xc770, /*0x90-0x97*/
05209 0xddb7, 0xc771, 0xc772, 0xdcf0, 0xddaf, 0xc773, 0xddb8, 0xc774, /*0x98-0x9f*/
05210 0xddac, 0xc775, 0xc776, 0xc777, 0xc778, 0xc779, 0xc77a, 0xc77b, /*0xa0-0xa7*/
05211 0xddb9, 0xddb3, 0xddad, 0xc4aa, 0xc77c, 0xc77d, 0xc77e, 0xc780, /*0xa8-0xaf*/
05212 0xdda8, 0xc0b3, 0xc1ab, 0xddaa, 0xc781, 0xddb2, 0xbbf1, /*0xb0-0xb7*/
05213 0xddb5, 0xd3a8, 0xddba, 0xc782, 0xddbb, 0xc3a7, 0xc783, 0xc784, /*0xb8-0xbf*/
05214 0xddd2, 0xddbc, 0xc785, 0xc786, 0xc787, 0xddd1, 0xc788, 0xb9bd, /*0xc0-0xc7*/
05215 0xc789, 0xc78a, 0xcbed5, 0xc78b, 0xbefa, 0xc78c, 0xc78d, 0xbaca, /*0xc8-0xcf*/
05216 0xc78e, 0xc78f, 0xc790, 0xc791, 0xddca, 0xc792, 0xddc5, 0xc793, /*0xd0-0xd7*/
05217 0xddbf, 0xc794, 0xc795, 0xc796, 0xb2cb, 0xddc3, 0xc797, 0xddcb, /*0xd8-0xdf*/
05218 0xb2a4, 0xc798, 0xc799, 0xc79a, 0xddbe, 0xc79b, 0xc79c, 0xc79d, /*0xe0-0xe7*/
05219 0xc79d, 0xc6d0, 0xddd0, 0xc79e, 0xc79f, 0xc7a0, 0xc840, 0xc841, /*0xe8-0xef*/
05220 0xddd4, 0xc1e2, 0xb7c6, 0xc842, 0xc843, 0xc844, 0xc845, 0xc846, /*0xf0-0xf7*/
05221 0xddce, 0xddcf, 0xc847, 0xc848, 0xc849, 0xddc4, 0xc84a, 0xc84b, /*0xf8-0xff*/
05222 /* 0x8400 */
05223 0xc84c, 0xddbd, 0xc84d, 0xddcd, 0xccd1, 0xc84e, 0xddc9, 0xc84f, /*0x00-0x07*/
05224 0xc850, 0xc851, 0xc852, 0xddc2, 0xc3c8, 0xc6bc, 0xceae, 0xddcc, /*0x08-0x0f*/
05225 0xc853, 0xddc8, 0xc854, 0xc855, 0xc856, 0xc857, 0xc858, 0xc859, /*0x10-0x17*/
05226 0xddc1, 0xc85a, 0xc85b, 0xc85c, 0xddc6, 0xc2dc, 0xc85d, 0xc85e, /*0x18-0x1f*/
05227 0xc85f, 0xc860, 0xc861, 0xc862, 0xd3a9, 0xd3aa, 0xddd3, 0xcff4, /*0x20-0x27*/
05228 0xc8f8, 0xc863, 0xc864, 0xc865, 0xc866, 0xc867, 0xc868, 0xc869, /*0x28-0x2f*/
05229 0xc86a, 0xdde6, 0xc86b, 0xc86c, 0xc86d, 0xc86e, 0xc86f, 0xc870, /*0x30-0x37*/
05230 0xddc7, 0xc871, 0xc872, 0xc873, 0xddc0, 0xc2e4, 0xc874, 0xc875, /*0x38-0x3f*/
05231 0xc876, 0xc877, 0xc878, 0xc879, 0xc87a, 0xc87b, 0xddel, 0xc87c, /*0x40-0x47*/
05232 0xc87d, 0xc87e, 0xc880, 0xc881, 0xc882, 0xc883, 0xc884, 0xc885, /*0x48-0x4f*/
05233 0xc886, 0xddd7, 0xc887, 0xc888, 0xc889, 0xc88a, 0xc88b, 0xd6f8, /*0x50-0x57*/
05234 0xc88c, 0xddd9, 0xddd8, 0xb8f0, 0xddd6, 0xc88d, 0xc88e, 0xc88f, /*0x58-0x5f*/
05235 0xc890, 0xc6cf, 0xc891, 0xb6ad, 0xc892, 0xc893, 0xc894, 0xc895, /*0x60-0x67*/
05236 0xc896, 0xddde2, 0xc897, 0xbaf9, 0xd4e1, 0xddde7, 0xc898, 0xc899, /*0x68-0x6f*/
05237 0xc89a, 0xb4d0, 0xc89b, 0xddda, 0xc89c, 0xbffb, 0xddde3, 0xc89d, /*0x70-0x77*/
05238 0xdddf, 0xc89e, 0xdddd, 0xc89f, 0xc8a0, 0xc940, 0xc941, 0xc942, /*0x78-0x7f*/
05239 0xc943, 0xc944, 0xc945, 0xc946, 0xc947, 0xc948, 0xc949, 0xdddb, /*0x80-0x87*/
05240 0xdddc, 0xddde, 0xc949, 0xbdaf, 0xddde4, 0xc94a, 0xddde5, 0xc94b, /*0x88-0x8f*/
05241 0xc94c, 0xc94d, 0xc94e, 0xc94f, 0xc950, 0xc951, 0xc952, 0xddf5, /*0x90-0x97*/
05242 0xc953, 0xc3c9, 0xc954, 0xc955, 0xc956, 0xc957, 0xc958, 0xc959, /*0x98-0x9f*/
05243 0xc959, 0xdddf2, 0xc95a, 0xc95b, 0xc95c, 0xc95d, 0xc95e, 0xc95f, /*0xa0-0xaf*/
05244 0xc960, 0xc961, 0xc962, 0xc963, 0xc964, 0xc965, 0xc966, 0xd8e1, /*0xa8-0xaf*/
05245 0xc967, 0xc968, 0xc6d1, 0xc969, 0xddf4, 0xc96a, 0xc96b, 0xc96c, /*0xb0-0xb7*/
05246 0xd5f4, 0xddf3, 0xddf0, 0xc96d, 0xc96e, 0xdddec, 0xc96f, 0xddef, /*0xb8-0xbf*/
05247 0xc970, 0xddde8, 0xc971, 0xc972, 0xd0ee, 0xc973, 0xc974, 0xc975, /*0xc0-0xc7*/
05248 0xc976, 0xc8d8, 0xddde, 0xc977, 0xc978, 0xddde9, 0xc979, 0xc97a, /*0xc8-0xcf*/
05249 0xdddea, 0xcbf2, 0xc97b, 0xdded, 0xc97c, 0xc97d, 0xb1cd, 0xc97e, /*0xd0-0xd7*/
05250 0xc980, 0xc981, 0xc982, 0xc983, 0xc984, 0xc0b6, 0xc985, 0xbcb, /*0xd8-0xdf*/
05251 0xddf1, 0xc986, 0xc987, 0xddf7, 0xc988, 0xddf6, 0xdddeb, 0xc989, /*0xe0-0xe7*/
05252 0xc98a, 0xc98b, 0xc98c, 0xc98d, 0xc5ee, 0xc98e, 0xc98f, 0xc990, /*0xe8-0xef*/
05253 0xddfb, 0xc991, 0xc992, 0xc993, 0xc994, 0xc995, 0xc996, 0xc997, /*0xf0-0xf7*/
05254 0xc998, 0xc999, 0xc99a, 0xc99b, 0xc99c, 0xc99d, 0xc99e, 0xc99f, /*0xf8-0xff*/
05255 /* 0x8500 */
05256 0xc99e, 0xc99f, 0xc9a0, 0xc9a1, 0xc9a2, 0xc9a3, 0xc9a4, 0xc9a5, /*0x00-0x07*/
05257 0xc9a6, 0xc9a7, 0xc9a8, 0xddf8, 0xc9a9, 0xc9aa, 0xc9ab, 0xc9ac, /*0x08-0x0f*/
05258 0xc9ad, 0xc9ae, 0xc9af, 0xc9b0, 0xc9b1, 0xc9b2, 0xc9b3, 0xc9b4, /*0x10-0x17*/
05259 0xc9b5, 0xc9b6, 0xc9b7, 0xc9b8, 0xc9b9, 0xc9ba, 0xc9bb, 0xc9bc, /*0x18-0x1f*/
05260 0xc9bd, 0xc9be, 0xc9bf, 0xc9c0, 0xc9c1, 0xc9c2, 0xc9c3, 0xc9c4, /*0x20-0x27*/
05261 0xc9c5, 0xc9c6, 0xc9c7, 0xc9c8, 0xc9c9, 0xc9ca, 0xc9cb, 0xc9cc, /*0x28-0x2f*/
05262 0xc9cd, 0xc9ce, 0xc9cf, 0xc9d0, 0xc9d1, 0xc9d2, 0xc9d3, 0xc9d4, /*0x30-0x37*/
05263 0xddfc, 0xddfd, 0xc9d5, 0xc9d6, 0xc9d7, 0xc9d8, 0xc9d9, 0xc9da, /*0x38-0x3f*/
05264 0xc9db, 0xc9dc, 0xc9dd, 0xc9de, 0xc9df, 0xc9e0, 0xc9e1, 0xc9e2, /*0x40-0x47*/
05265 0xc9e3, 0xc9e4, 0xc9e5, 0xc9e6, 0xc9e7, 0xc9e8, 0xc9e9, 0xc9ea, /*0x48-0x4f*/
05266 0xc9eb, 0xc9ec, 0xc9ed, 0xc9ee, 0xc9ef, 0xc9f0, 0xc9f1, 0xc9f2, /*0x50-0x57*/
05267 0xc9f3, 0xc9f4, 0xc9f5, 0xc9f6, 0xc9f7, 0xc9f8, 0xc9f9, 0xc9fa, /*0x58-0x5f*/
05268 0xc9fb, 0xc9fc, 0xc9fd, 0xc9fe, 0xc9ff, 0xc9a0, 0xc9a1, 0xc9a2, /*0x60-0x67*/
05269 0xc9a3, 0xc9a4, 0xc9a5, 0xc9a6, 0xc9a7, 0xc9a8, 0xc9a9, 0xc9aa, /*0x68-0x6f*/
05270 0xc9ab, 0xc9ac, 0xc9ad, 0xc9ae, 0xc9af, 0xc9b0, 0xc9b1, 0xc9b2, /*0x70-0x77*/
05271 0xc9b3, 0xc9b4, 0xc9b5, 0xc9b6, 0xc9b7, 0xc9b8, 0xc9b9, 0xc9ba, /*0x78-0x7f*/
05272 0xc9bb, 0xc9bc, 0xc9bd, 0xc9be, 0xc9bf, 0xc9c0, 0xc9c1, 0xc9c2, /*0x80-0x87*/
05273 0xc9c3, 0xc9c4, 0xc9c5, 0xc9c6, 0xc9c7, 0xc9c8, 0xc9c9, 0xc9ca, /*0x88-0x8f*/
05274 0xc9cb, 0xc9cc, 0xc9cd, 0xc9ce, 0xc9cf, 0xc9d0, 0xc9d1, 0xc9d2, /*0x90-0x97*/
05275 0xc9d3, 0xc9d4, 0xc9d5, 0xc9d6, 0xc9d7, 0xc9d8, 0xc9d9, 0xc9da, /*0x98-0x9f*/
05276 0xc9db, 0xc9dc, 0xc9dd, 0xc9de, 0xc9df, 0xc9e0, 0xc9e1, 0xc9e2, /*0xa0-0xaf*/
05277 0xc9e3, 0xc9e4, 0xc9e5, 0xc9e6, 0xc9e7, 0xc9e8, 0xc9e9, 0xc9ea, /*0xa8-0xaf*/
05278 0xc9eb, 0xc9ec, 0xc9ed, 0xc9ee, 0xc9ef, 0xc9f0, 0xc9f1, 0xc9f2, /*0xb0-0xb7*/

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05279 0xcb69, 0xdeb7, 0xcb6a, 0xcb6b, 0xcb6c, 0xcb6d, 0xcb6e, 0xcb6f, /*0xb8-0xbf*/
05280 0xcb70, 0xdeb8, 0xcb71, 0xcb72, 0xcb73, 0xcb74, 0xcb75, 0xcb76, /*0xc0-0xc7*/
05281 0xcb77, 0xbde5, 0xcb78, 0xcb79, 0xcb7a, 0xcb7b, 0xcb7c, 0xb2d8, /*0xc8-0xcf*/
05282 0xc3ea, 0xcb7d, 0xcb7e, 0xdeba, 0xcb80, 0xc5ba, 0xcb81, 0xcb82, /*0xd0-0xd7*/
05283 0xcb83, 0xcb84, 0xcb85, 0xcb86, 0xdeb9, 0xcb87, 0xcb88, 0xcb89, /*0xd8-0xdf*/
05284 0xcb8a, 0xcb8b, 0xcb8c, 0xcb8d, 0xccd9, 0xcb8e, 0xcb8f, 0xcb90, /*0xe0-0xef*/
05285 0xcb91, 0xb7aa, 0xcb92, 0xcb93, 0xcb94, 0xcb95, 0xcb96, 0xcb97, /*0xe8-0xef*/
05286 0xcb98, 0xcb99, 0xcb9a, 0xcb9b, 0xcb9c, 0xcb9d, 0xcb9e, 0xcb9f, /*0xf0-0xf7*/
05287 0xcba0, 0xcc40, 0xcc41, 0xd4e5, 0xcc42, 0xcc43, 0xcc44, 0xdeb9, /*0xf8-0xff*/
05288 /* 0x8600 */
05289 0xcc45, 0xcc46, 0xcc47, 0xcc48, 0xcc49, 0xdeb9, 0xcc4a, 0xcc4b, /*0x00-0x07*/
05290 0xcc4c, 0xcc4d, 0xcc4e, 0xcc4f, 0xcc50, 0xcc51, 0xcc52, 0xcc53, /*0x08-0x0f*/
05291 0xcc54, 0xc4a2, 0xcc55, 0xcc56, 0xcc57, 0xcc58, 0xdec1, 0xcc59, /*0x10-0x17*/
05292 0xcc5a, 0xcc5b, 0xcc5c, 0xcc5d, 0xcc5e, 0xcc5f, 0xcc60, 0xcc61, /*0x18-0x1f*/
05293 0xcc62, 0xcc63, 0xcc64, 0xcc65, 0xcc66, 0xcc67, 0xcc68, 0xdeb9, /*0x20-0x27*/
05294 0xcc69, 0xdec0, 0xcc6a, 0xcc6b, 0xcc6c, 0xcc6d, 0xcc6e, 0xcc6f, /*0x28-0x2f*/
05295 0xcc70, 0xcc71, 0xcc72, 0xcc73, 0xcc74, 0xcc75, 0xcc76, 0xcc77, /*0x30-0x37*/
05296 0xd5ba, 0xc7c8, 0xcc79, 0xcc7a, 0xdec2, 0xcc7b, 0xcc7c, 0xcc7d, /*0x38-0x3f*/
05297 0xcc7e, 0xcc80, 0xcc81, 0xcc82, 0xcc83, 0xcc84, 0xcc85, 0xcc86, /*0x40-0x47*/
05298 0xcc87, 0xcc88, 0xcc89, 0xcc8a, 0xcc8b, 0xf2ae, 0xbba2, 0xc2b2, /*0x48-0x4f*/
05299 0xc5b0, 0xc2c7, 0xcc8c, 0xcc8d, 0xf2af, 0xcc8e, 0xcc8f, 0xcc90, /*0x50-0x57*/
05300 0xcc91, 0xcc92, 0xd0e9, 0xcc93, 0xcc94, 0xcc95, 0xd3dd, 0xcc96, /*0x58-0x5f*/
05301 0xcc97, 0xcc98, 0xebbd, 0xcc99, 0xcc9a, 0xcc9b, 0xcc9c, 0xcc9d, /*0x60-0x6f*/
05302 0xcc9e, 0xcc9f, 0xcca0, 0xb3e6, 0xf2b0, 0xcd40, 0xf2b1, 0xcd41, /*0x68-0x6f*/
05303 0xcd42, 0xcaad, 0xcd43, 0xcd44, 0xcd45, 0xcd46, 0xcd47, 0xcd48, /*0x70-0x77*/
05304 0xcd49, 0xbae7, 0xf2b3, 0xf2b5, 0xf2b4, 0xcbe4, 0xcfb9, 0xf2b2, /*0x78-0x7f*/
05305 0xcab4, 0xcd2c, 0xcd2e, 0xcd2e, 0xcd4b, 0xcd4c, 0xcd4d, 0xcd4e, /*0x80-0x87*/
05306 0xcd4f, 0xcd50, 0xc3c3, 0xf2b8, 0xb0f6, 0xf2b7, 0xcd51, 0xcd52, /*0x88-0x8f*/
05307 0xcd53, 0xcd54, 0xcd55, 0xf2be, 0xcd56, 0xb2cf, 0xcd57, 0xcd58, /*0x90-0x97*/
05308 0xcd59, 0xcd5a, 0xcd5b, 0xcd5c, 0xd1c1, 0xf2ba, 0xcd5d, 0xcd5e, /*0x98-0x9f*/
05309 0xcd5f, 0xcd60, 0xcd61, 0xf2bc, 0xd4e9, 0xcd62, 0xcd63, 0xf2bb, /*0xa0-0xa7*/
05310 0xf2b6, 0xf2b7, 0xf2bd, 0xcd64, 0xf2b9, 0xcd65, 0xcd66, 0xf2c7, /*0xa8-0xaf*/
05311 0xf2c4, 0xf2c6, 0xcd67, 0xcd68, 0xf2ca, 0xf2c2, 0xf2c0, 0xcd69, /*0xb0-0xb7*/
05312 0xcd6a, 0xcd6b, 0xf2c5, 0xcd6c, 0xcd6d, 0xcd6e, 0xcd6f, 0xcd70, /*0xb8-0xbf*/
05313 0xd6fb, 0xcd71, 0xcd72, 0xcd73, 0xf2c1, 0xcd74, 0xc7f9, 0xc9df, /*0xc0-0xc7*/
05314 0xcd75, 0xf2c8, 0xb9c6, 0xb5b0, 0xcd76, 0xcd77, 0xf2c3, 0xf2c9, /*0xc8-0xcf*/
05315 0xf2d0, 0xf2d6, 0xcd78, 0xcd79, 0xbbd7, 0xcd7a, 0xcd7b, 0xcd7c, /*0xd0-0xd7*/
05316 0xf2d5, 0xcdcc, 0xcd7d, 0xd6eb, 0xcd7e, 0xcd80, 0xf2d2, 0xf2d4, /*0xd8-0xdf*/
05317 0xcd81, 0xcd82, 0xcd83, 0xcd84, 0xb8f2, 0xcd85, 0xcd86, 0xcd87, /*0xe0-0xef*/
05318 0xcd88, 0xf2cb, 0xcd89, 0xcd8a, 0xcd8b, 0xf2ce, 0xc2f9, 0xcd8c, /*0xe8-0xef*/
05319 0xd5dd, 0xf2cc, 0xf2cd, 0xf2cf, 0xf2d3, 0xcd8d, 0xcd8e, 0xcd8f, /*0xf0-0xf7*/
05320 0xf2d9, 0xd3bc, 0xcd90, 0xcd91, 0xcd92, 0xcd93, 0xb6ea, 0xcd94, /*0xf8-0xff*/
05321 /* 0x8700 */
05322 0xcfa1, 0xcd95, 0xb7e4, 0xf2d7, 0xcd96, 0xcd97, 0xcd98, 0xf2d8, /*0x00-0x07*/
05323 0xf2da, 0xf2dd, 0xf2db, 0xcd99, 0xcd9a, 0xf2dc, 0xcd9b, 0xcd9c, /*0x08-0x0f*/
05324 0xcd9d, 0xcd9e, 0xd1d1, 0xf2d1, 0xcd9f, 0xcdc9, 0xcda0, 0xc3cf, /*0x10-0x17*/
05325 0xd6a9, 0xc4e0, 0xf2e3, 0xc4e1, 0xc3db, 0xc4e2, 0xf2e0, 0xc4e3, /*0x18-0x1f*/
05326 0xc4e4, 0xc0af, 0xf2ec, 0xf2de, 0xc4e5, 0xf2e1, 0xc4e6, 0xc4e7, /*0x20-0x27*/
05327 0xc4e8, 0xf2e8, 0xc4e9, 0xc4ea, 0xc4eb, 0xc4ec, 0xf2e2, 0xc4ed, /*0x28-0x2f*/
05328 0xc4ee, 0xf2e7, 0xc4ef, 0xc4f0, 0xf2e6, 0xc4f1, 0xc4f2, 0xf2e9, /*0x30-0x37*/
05329 0xc4f3, 0xc4f4, 0xc4f5, 0xf2df, 0xc4f6, 0xc4f7, 0xf2e4, 0xf2ea, /*0x38-0x3f*/
05330 0xc4f8, 0xc4f9, 0xc4fa, 0xc4fb, 0xc4fc, 0xc4fd, 0xc4fe, 0xd3ac, /*0x40-0x47*/
05331 0xf2e5, 0xb2f5, 0xc4fd, 0xc4fe, 0xf2f2, 0xc4ff, 0xd0ab, 0xc4e2, /*0x48-0x4f*/
05332 0xc4e3, 0xc4e4, 0xc4e5, 0xf2f5, 0xc4e6, 0xc4e7, 0xc4e8, 0xbbc8, /*0x50-0x57*/
05333 0xc4e9, 0xf2f9, 0xc4ea, 0xc4eb, 0xc4ec, 0xc4ed, 0xc4ee, 0xc4ef, /*0x58-0x5f*/
05334 0xf2f0, 0xc4f0, 0xc4f1, 0xf2f6, 0xf2f8, 0xf2fa, 0xc4f2, 0xc4f3, /*0x60-0x67*/
05335 0xc4f4, 0xc4f5, 0xc4f6, 0xc4f7, 0xc4f8, 0xc4f9, 0xf2f3, 0xc4fa, /*0x68-0x6f*/
05336 0xf2f1, 0xc4f7, 0xc4f8, 0xc4f9, 0xc4fa, 0xc4fb, 0xc4fc, 0xc4fd, /*0x70-0x77*/
05337 0xc4fe, 0xc4ff, 0xc4e0, 0xc4e1, 0xf2ef, 0xf2f7, 0xf2ed, 0xf2ee, 0xc4e4, /*0x78-0x7f*/
05338 0xc4e5, 0xc4e6, 0xf2eb, 0xf3a6, 0xc4e7, 0xf3a3, 0xc4e8, 0xc4e9, /*0x80-0x87*/
05339 0xf3a2, 0xc4e8, 0xc4e9, 0xf2f4, 0xc4ec, 0xc4ed, 0xc4ee, 0xc4ef, /*0x88-0x8f*/
05340 0xc4e0, 0xc4e1, 0xc4e2, 0xf2fb, 0xc4e2, 0xc4e3, 0xc4e4, 0xf3a5, /*0x90-0x97*/
05341 0xc4e5, 0xc4e6, 0xc4e7, 0xc4e8, 0xc4e9, 0xc4ea, 0xc4eb, 0xc4ec, /*0x98-0x9f*/
05342 0xc4ed, 0xc4ee, 0xc4ef, 0xc4f0, 0xc4f1, 0xc4f2, 0xc4f3, /*0xa0-0xa7*/
05343 0xf2fd, 0xc4f3, 0xc4f4, 0xf3a7, 0xf3a9, 0xf3a4, 0xc4f5, 0xf2fc, /*0xa8-0xaf*/
05344 0xc4f6, 0xc4f7, 0xc4f8, 0xf3ab, 0xc4f9, 0xf3aa, 0xc4fa, 0xc4fb, /*0xb0-0xb7*/
05345 0xc4fc, 0xc4fd, 0xc4fd, 0xc4fe, 0xc4ff, 0xc4ff, 0xf3ae, 0xc4f0, 0xc4f1, /*0xb8-0xbf*/
05346 0xf3b0, 0xc4f2, 0xc4f3, 0xc4f4, 0xc4f5, 0xc4f6, 0xf3a1, 0xc4f7, /*0xc0-0xc7*/
05347 0xc4f8, 0xc4f9, 0xc4fa, 0xf3b1, 0xf3ac, 0xc4fb, 0xc4fc, 0xc4fd, /*0xc8-0xcf*/
05348 0xc4fe, 0xf3af, 0xf2fe, 0xf3ad, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0xd0-0xdf*/
05349 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0xd8-0xdf*/
05350 0xf3b4, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0xe0-0xef*/
05351 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0xe8-0xef*/
05352 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0xf0-0xf7*/
05353 0xc4ff, 0xd0b7, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0xf8-0xff*/
05354 /* 0x8800 */
05355 0xc4ff, 0xc4ff, 0xc4ff, 0xd9f9, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0x00-0x07*/
05356 0xc4ff, 0xc4ff, 0xf3b9, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0x08-0x0f*/
05357 0xc4ff, 0xc4ff, 0xc4ff, 0xf3b7, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0x10-0x17*/
05358 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, 0xc4ff, /*0x18-0x1f*/
05359 0xc4ff, 0xf3bb, 0xb4c0, 0xc4ff, 0xd040, 0xd041, 0xd042, 0xd043, /*0x20-0x27*/
05360 0xd044, 0xd045, 0xd046, 0xd047, 0xd048, 0xd049, 0xd04a, 0xd04b, /*0x28-0x2f*/
05361 0xd04c, 0xd04d, 0xec3, 0xd04e, 0xd04f, 0xd050, 0xd051, 0xd052, /*0x30-0x37*/
05362 0xd053, 0xf3bc, 0xd054, 0xd055, 0xf3bd, 0xd056, 0xd057, 0xd058, /*0x38-0x3f*/
05363 0xd1aa, 0xd059, 0xd05a, 0xd05b, 0xf4ac, 0xd05c, 0xd05d, 0xd05e, /*0x40-0x47*/
05364 0xd05f, 0xd05f, 0xd060, 0xd061, 0xd062, 0xd063, 0xd064, 0xd065, /*0x48-0x4f*/
05365 0xd066, 0xd066, 0xd067, 0xc4ff, 0xd068, 0xd069, 0xbdd6, /*0x50-0x57*/

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05366 0xd06a, 0xd1c3, 0xd06b, 0xd06c, 0xd06d, 0xd06e, 0xd06f, 0xd070, /*0x58-0x5f*/
05367 0xd071, 0xbae2, 0xe1e9, 0xd2c2, 0xf1c2, 0xb2b9, 0xd072, 0xd073, /*0x60-0x67*/
05368 0xb1ed, 0xf1c3, 0xd074, 0xc9c0, 0xb3c4, 0xd075, 0xd9f2, 0xd076, /*0x68-0x6f*/
05369 0xcba5, 0xd077, 0xf1c4, 0xd078, 0xd079, 0xd07a, 0xd07b, 0xd6d4, /*0x70-0x77*/
05370 0xd07c, 0xd07d, 0xd07e, 0xd080, 0xd081, 0xf1c5, 0xf4c0, 0xf1c6, /*0x78-0x7f*/
05371 0xd082, 0xd4ac, 0xf1c7, 0xd083, 0xb0c0, 0xf4c1, 0xd084, 0xd085, /*0x80-0x87*/
05372 0xf4c2, 0xd086, 0xd087, 0xb4fc, 0xd088, 0xc5db, 0xd089, 0xd08a, /*0x88-0x8f*/
05373 0xd08b, 0xd08c, 0xccbb, 0xd08d, 0xd08e, 0xd08f, 0xd0e4, 0xd090, /*0x90-0x97*/
05374 0xd091, 0xd092, 0xd093, 0xd094, 0xcde0, 0xd095, 0xd096, 0xd097, /*0x98-0x9f*/
05375 0xd098, 0xd099, 0xf1c8, 0xd09a, 0xd9f3, 0xd09b, 0xd09c, 0xd09d, /*0xa0-0xa7*/
05376 0xd09e, 0xd09f, 0xd0a0, 0xb1bb, 0xd140, 0xcfae, 0xd141, 0xd142, /*0xa8-0xaf*/
05377 0xd143, 0xb8a4, 0xd144, 0xd145, 0xd146, 0xd147, 0xd148, 0xf1ca, /*0xb0-0xb7*/
05378 0xd149, 0xd14a, 0xd14b, 0xd14c, 0xf1cb, 0xd14d, 0xd14e, 0xd14f, /*0xb8-0xbf*/
05379 0xd150, 0xb2c3, 0xc1d1, 0xd151, 0xd152, 0xd7b0, 0xf1c9, 0xd153, /*0xc0-0xc7*/
05380 0xd154, 0xf1cc, 0xd155, 0xd156, 0xd157, 0xd158, 0xf1ce, 0xd159, /*0xc8-0xcf*/
05381 0xd15a, 0xd15b, 0xd9f6, 0xd15c, 0xd2e1, 0xd4a3, 0xd15d, 0xd15e, /*0xd0-0xd7*/
05382 0xf4c3, 0xc8b9, 0xd15f, 0xd160, 0xd161, 0xd162, 0xd163, 0xf4c4, /*0xd8-0xdf*/
05383 0xd164, 0xd165, 0xf1cd, 0xf1cf, 0xbf3, 0xf1d0, 0xd166, 0xd167, /*0xe0-0xef*/
05384 0xf1d4, 0xd168, 0xd169, 0xd16a, 0xd16b, 0xd16c, 0xd16d, 0xd16e, /*0xe8-0xef*/
05385 0xf1d6, 0xf1d1, 0xd16f, 0xc9d1, 0xc5e1, 0xd170, 0xd171, 0xd172, /*0xf0-0xf7*/
05386 0xc2e3, 0xb9fc, 0xd173, 0xd174, 0xf1d3, 0xd175, 0xf1d5, 0xd176, /*0xf8-0xff*/
05387 /* 0x8900 */
05388 0xd177, 0xd178, 0xb9d3, 0xd179, 0xd17a, 0xd17b, 0xd17c, 0xd17d, /*0x00-0x07*/
05389 0xd17e, 0xd180, 0xf1db, 0xd181, 0xd182, 0xd183, 0xd184, 0xd185, /*0x08-0x0f*/
05390 0xbad6, 0xd186, 0xb0fd, 0xf1d9, 0xd187, 0xd188, 0xd189, 0xd18a, /*0x10-0x17*/
05391 0xd18b, 0xf1d8, 0xf1d2, 0xf1da, 0xd18c, 0xd18d, 0xd18e, 0xd18f, /*0x18-0x1f*/
05392 0xd190, 0xf1d7, 0xd191, 0xd192, 0xd193, 0xc8ec, 0xd194, 0xd195, /*0x20-0x27*/
05393 0xd196, 0xd197, 0xcdca, 0xf1dd, 0xd198, 0xd199, 0xd19a, 0xd19b, /*0x28-0x2f*/
05394 0xe5bd, 0xd19c, 0xd19d, 0xd19e, 0xf1dc, 0xd19f, 0xf1de, 0xd1a0, /*0x30-0x37*/
05395 0xd240, 0xd241, 0xd242, 0xd243, 0xd244, 0xd245, 0xd246, 0xd247, /*0x38-0x3f*/
05396 0xd248, 0xf1df, 0xd249, 0xd24a, 0xcfe5, 0xd24b, 0xd24c, 0xd24d, /*0x40-0x47*/
05397 0xd24e, 0xd24f, 0xd250, 0xd251, 0xd252, 0xd253, 0xd254, 0xd255, /*0x48-0x4f*/
05398 0xd256, 0xd257, 0xd258, 0xd259, 0xd25a, 0xd25b, 0xd25c, 0xd25d, /*0x50-0x57*/
05399 0xd25e, 0xd25f, 0xd260, 0xd261, 0xd262, 0xd263, 0xf4c5, 0xbdf3, /*0x58-0x5f*/
05400 0xd264, 0xd265, 0xd266, 0xd267, 0xd268, 0xd269, 0xf1e0, 0xd26a, /*0x60-0x67*/
05401 0xd26b, 0xd26c, 0xd26d, 0xd26e, 0xd26f, 0xd270, 0xd271, 0xd272, /*0x68-0x6f*/
05402 0xd273, 0xd274, 0xd275, 0xd276, 0xd277, 0xd278, 0xd279, 0xd27a, /*0x70-0x77*/
05403 0xd27b, 0xd27c, 0xd27d, 0xf1e1, 0xd27e, 0xd280, 0xd281, 0xcef7, /*0x78-0x7f*/
05404 0xd282, 0xd2aa, 0xd283, 0xf1fb, 0xd284, 0xd285, 0xb8b2, 0xd286, /*0x80-0x87*/
05405 0xd287, 0xd288, 0xd289, 0xd28a, 0xd28b, 0xd28c, 0xd28d, 0xd28e, /*0x88-0x8f*/
05406 0xd28f, 0xd290, 0xd291, 0xd292, 0xd293, 0xd294, 0xd295, 0xd296, /*0x90-0x97*/
05407 0xd297, 0xd298, 0xd299, 0xd29a, 0xd29b, 0xd29c, 0xd29d, 0xd29e, /*0x98-0x9f*/
05408 0xd29f, 0xd2a0, 0xd340, 0xd341, 0xd342, 0xd343, 0xd344, 0xd345, /*0xa0-0xaf*/
05409 0xd346, 0xd347, 0xd348, 0xd349, 0xd34a, 0xd34b, 0xd34c, 0xd34d, /*0xa8-0xaf*/
05410 0xd34e, 0xd34f, 0xd350, 0xd351, 0xd352, 0xd353, 0xd354, 0xd355, /*0xb0-0xbf*/
05411 0xd356, 0xd357, 0xd358, 0xd359, 0xd35a, 0xd35b, 0xd35c, 0xd35d, /*0xb8-0xbf*/
05412 0xd35e, 0xbcfb, 0xb9db, 0xd35f, 0xb9e6, 0xc3d9, 0xcad3, 0xaea8, /*0xc0-0xc7*/
05413 0xc0c0, 0xbef5, 0xaea9, 0xaea9, 0xaea9, 0xd360, 0xaeac, 0xaead, /*0xc8-0xcf*/
05414 0xaeae, 0xaeaf, 0xbdc7, 0xd361, 0xd362, 0xd363, 0xf5fb, 0xd364, /*0xd0-0xd7*/
05415 0xd365, 0xd366, 0xf5fd, 0xd367, 0xf5fe, 0xd368, 0xf5fc, 0xd369, /*0xd8-0xdf*/
05416 0xd36a, 0xd36b, 0xd36c, 0xbde2, 0xd36d, 0xf6a1, 0xb4a5, 0xd36e, /*0xe0-0xe7*/
05417 0xd36f, 0xd370, 0xd371, 0xf6a2, 0xd372, 0xd373, 0xd374, 0xf6a3, /*0xe8-0xef*/
05418 0xd375, 0xd376, 0xd377, 0xecb2, 0xd378, 0xd379, 0xd37a, 0xd37b, /*0xf0-0xf7*/
05419 0xd37c, 0xd37d, 0xd37e, 0xd380, 0xd381, 0xd382, 0xd383, 0xd384, /*0xf8-0xff*/
05420 /* 0x8a00 */
05421 0xd1d4, 0xd385, 0xd386, 0xd387, 0xd388, 0xd389, 0xd38a, 0xd9ea, /*0x00-0x07*/
05422 0xd38b, 0xd38c, 0xd38d, 0xd38e, 0xd38f, 0xd390, 0xd391, 0xd392, /*0x08-0x0f*/
05423 0xd393, 0xd394, 0xd395, 0xd396, 0xd397, 0xd398, 0xd399, 0xd39a, /*0x10-0x17*/
05424 0xd39b, 0xd39c, 0xd39d, 0xd39e, 0xd39f, 0xd3a0, 0xd440, 0xd441, /*0x18-0x1f*/
05425 0xd442, 0xd443, 0xd444, 0xd445, 0xd446, 0xd447, 0xd448, 0xd449, /*0x20-0x27*/
05426 0xd44a, 0xd44b, 0xd44c, 0xd44d, 0xd44e, 0xd44f, 0xd450, 0xd451, /*0x28-0x2f*/
05427 0xd452, 0xd453, 0xd454, 0xd455, 0xd456, 0xd457, 0xd458, 0xd459, /*0x30-0x37*/
05428 0xd45a, 0xd45b, 0xd45c, 0xd45d, 0xd45e, 0xd45f, 0xf6a4, 0xd460, /*0x38-0x3f*/
05429 0xd461, 0xd462, 0xd463, 0xd464, 0xd465, 0xd466, 0xd467, 0xd468, /*0x40-0x47*/
05430 0xeeba, 0xd469, 0xd46a, 0xd46b, 0xd46c, 0xd46d, 0xd46e, 0xd46f, /*0x48-0x4f*/
05431 0xd470, 0xd471, 0xd472, 0xd473, 0xd474, 0xd475, 0xd476, 0xd477, /*0x50-0x57*/
05432 0xd478, 0xd479, 0xd47a, 0xd47b, 0xd47c, 0xd47d, 0xd47e, 0xd480, /*0x58-0x5f*/
05433 0xd481, 0xd482, 0xd483, 0xd484, 0xd485, 0xd486, 0xd487, 0xd488, /*0x60-0x67*/
05434 0xd489, 0xd48a, 0xd48b, 0xd48c, 0xd48d, 0xd48e, 0xd48f, 0xd490, /*0x68-0x6f*/
05435 0xd491, 0xd492, 0xd493, 0xd494, 0xd495, 0xd496, 0xd497, 0xd498, /*0x70-0x77*/
05436 0xd499, 0xd555, 0xd49a, 0xd49b, 0xd49c, 0xd49d, 0xd49e, 0xd49f, /*0x78-0x7f*/
05437 0xd4a0, 0xd540, 0xd541, 0xd542, 0xd543, 0xd544, 0xd545, 0xd546, /*0x80-0x87*/
05438 0xd547, 0xd3fe, 0xccdc, 0xd548, 0xd549, 0xd54a, 0xd54b, 0xd54c, /*0x88-0x8f*/
05439 0xd54d, 0xd54e, 0xd54f, 0xcac4, 0xd550, 0xd551, 0xd552, 0xd553, /*0x90-0x97*/
05440 0xd554, 0xd555, 0xd556, 0xd557, 0xd558, 0xd559, 0xd55a, 0xd55b, /*0x98-0x9f*/
05441 0xd55c, 0xd55d, 0xd55e, 0xd55f, 0xd560, 0xd561, 0xd562, 0xd563, /*0xa0-0xaf*/
05442 0xd564, 0xd565, 0xd566, 0xd567, 0xd568, 0xd569, 0xd56a, 0xd56b, /*0xa8-0xaf*/
05443 0xd56c, 0xd56d, 0xd56e, 0xd56f, 0xd570, 0xd571, 0xd572, 0xd573, /*0xb0-0xbf*/
05444 0xd574, 0xd575, 0xd576, 0xd577, 0xd578, 0xd579, 0xd57a, 0xd57b, /*0xb8-0xbf*/
05445 0xd57c, 0xd57d, 0xd57e, 0xd580, 0xd581, 0xd582, 0xd583, 0xd584, /*0xc0-0xc7*/
05446 0xd585, 0xd586, 0xd587, 0xd588, 0xd589, 0xd58a, 0xd58b, 0xd58c, /*0xc8-0xcf*/
05447 0xd58d, 0xd58e, 0xd58f, 0xd590, 0xd591, 0xd592, 0xd593, 0xd594, /*0xd0-0xd7*/
05448 0xd595, 0xd596, 0xd597, 0xd598, 0xd599, 0xd59a, 0xd59b, 0xd59c, /*0xd8-0xdf*/
05449 0xd59d, 0xd59e, 0xd59f, 0xd5a0, 0xd640, 0xd641, 0xd642, 0xd643, /*0xe0-0xe7*/
05450 0xd644, 0xd645, 0xd646, 0xd647, 0xd648, 0xd649, 0xd64a, 0xd64b, /*0xe8-0xef*/
05451 0xd64c, 0xd64d, 0xd64e, 0xd64f, 0xd650, 0xd651, 0xd652, 0xd653, /*0xf0-0xf7*/
05452 0xd654, 0xd655, 0xd656, 0xd657, 0xd658, 0xd659, 0xd65a, 0xd65b, /*0xf8-0xff*/

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05453 /* 0x8b00 */
05454 0xd65c, 0xd65d, 0xd65e, 0xd65f, 0xd660, 0xd661, 0xd662, 0xe5c0, /*0x00-0x07*/
05455 0xd663, 0xd664, 0xd665, 0xd666, 0xd667, 0xd668, 0xd669, 0xd66a, /*0x08-0x0f*/
05456 0xd66b, 0xd66c, 0xd66d, 0xd66e, 0xd66f, 0xd670, 0xd671, 0xd672, /*0x10-0x17*/
05457 0xd673, 0xd674, 0xd675, 0xd676, 0xd677, 0xd678, 0xd679, 0xd67a, /*0x18-0x1f*/
05458 0xd67b, 0xd67c, 0xd67d, 0xd67e, 0xd680, 0xd681, 0xf6a5, 0xd682, /*0x20-0x27*/
05459 0xd683, 0xd684, 0xd685, 0xd686, 0xd687, 0xd688, 0xd689, 0xd68a, /*0x28-0x2f*/
05460 0xd68b, 0xd68c, 0xd68d, 0xd68e, 0xd68f, 0xd690, 0xd691, 0xd692, /*0x30-0x37*/
05461 0xd693, 0xd694, 0xd695, 0xd696, 0xd697, 0xd698, 0xd699, 0xd69a, /*0x38-0x3f*/
05462 0xd69b, 0xd69c, 0xd69d, 0xd69e, 0xd69f, 0xd6a0, 0xd740, 0xd741, /*0x40-0x47*/
05463 0xd742, 0xd743, 0xd744, 0xd745, 0xd746, 0xd747, 0xd748, 0xd749, /*0x48-0x4f*/
05464 0xd74a, 0xd74b, 0xd74c, 0xd74d, 0xd74e, 0xd74f, 0xd750, 0xd751, /*0x50-0x57*/
05465 0xd752, 0xd753, 0xd754, 0xd755, 0xd756, 0xd757, 0xd758, 0xd759, /*0x58-0x5f*/
05466 0xd75a, 0xd75b, 0xd75c, 0xd75d, 0xd75e, 0xd75f, 0xb6ea, 0xd760, /*0x60-0x67*/
05467 0xd761, 0xd762, 0xd763, 0xd764, 0xc6a9, 0xd765, 0xd766, 0xd767, /*0x68-0x6f*/
05468 0xd768, 0xd769, 0xd76a, 0xd76b, 0xd76c, 0xd76d, 0xd76e, 0xd76f, /*0x70-0x77*/
05469 0xd770, 0xd771, 0xd772, 0xd773, 0xd774, 0xd775, 0xd776, 0xd777, /*0x78-0x7f*/
05470 0xd778, 0xd779, 0xd77a, 0xd77b, 0xd77c, 0xd77d, 0xd77e, 0xd780, /*0x80-0x87*/
05471 0xd781, 0xd782, 0xd783, 0xd784, 0xd785, 0xd786, 0xd787, 0xd788, /*0x88-0x8f*/
05472 0xd789, 0xd78a, 0xd78b, 0xd78c, 0xd78d, 0xd78e, 0xd78f, 0xd790, /*0x90-0x97*/
05473 0xd791, 0xd792, 0xd793, 0xd794, 0xd795, 0xd796, 0xd797, 0xd798, /*0x98-0x9f*/
05474 0xdaa5, 0xbcc6, 0xb6a9, 0xb8bc, 0xc8cf, 0xbca5, 0xdaa6, 0xdaa7, /*0xa0-0xa7*/
05475 0xccd6, 0xc8c3, 0xdaa8, 0xc6fd, 0xd799, 0xd1b5, 0xd2e9, 0xd1b6, /*0xa8-0xaf*/
05476 0xbcc7, 0xd79a, 0xbdb2, 0xbbe4, 0xdaa9, 0xdaaa, 0xd1c8, 0xdaab, /*0xb0-0xb7*/
05477 0xd0ed, 0xb6ef, 0xc2db, 0xd79b, 0xcbcf, 0xb7ed, 0xc9e8, 0xb7c3, /*0xb8-0xbf*/
05478 0xbef7, 0xd6a4, 0xdaac, 0xdaad, 0xc6c0, 0xd7e7, 0xcab6, 0xd79c, /*0xc0-0xc7*/
05479 0xd5a9, 0xcdbf, 0xd5ef, 0xdaae, 0xd6df, 0xb4ca, 0xdab0, 0xdaaf, /*0xc8-0xcf*/
05480 0xd79d, 0xd2eb, 0xdab1, 0xdab2, 0xdab3, 0xcad4, 0xdab4, 0xcaab, /*0xd0-0xd7*/
05481 0xdab5, 0xdab6, 0xb3cf, 0xd6ef, 0xdab7, 0xbbb0, 0xb5ae, 0xdab8, /*0xd8-0xdf*/
05482 0xdab9, 0xb9ee, 0xd1af, 0xd2e8, 0xdaba, 0xb8c3, 0xcfae, 0xb2ef, /*0xe0-0xef*/
05483 0xdabb, 0xdabc, 0xd79e, 0xbdeb, 0xc6cd, 0xd3ef, 0xdabd, 0xcef3, /*0xf0-0xf7*/
05484 0xdabe, 0xd3d5, 0xbbe5, 0xdabf, 0xcbb5, 0xcdb0, 0xdac0, 0xc7eb, /*0xf8-0xff*/
05485 0xd6ee, 0xdac1, 0xc5b5, 0xb6c1, 0xdac2, 0xb7cc, 0xbfce, 0xdac3, /*0xf8-0xff*/
05486 /* 0x8c00 */
05487 0xdac4, 0xcbad, 0xdac5, 0xb5f7, 0xdac6, 0xc1c2, 0xd7bb, 0xdac7, /*0x00-0x07*/
05488 0xccb8, 0xd79f, 0xd2ea, 0xc4b1, 0xdac8, 0xb5fd, 0xbdd1, 0xdac9, /*0x08-0x0f*/
05489 0xd0b3, 0xdaca, 0xdacb, 0xcebd, 0xdacc, 0xdacd, 0xdace, 0xb2f7, /*0x10-0x17*/
05490 0xdad1, 0xdacf, 0xd1e8, 0xdad0, 0xc3d5, 0xdad2, 0xd7a0, 0xdad3, /*0x18-0x1f*/
05491 0xdad4, 0xdad5, 0xd0bb, 0xd2a5, 0xdad6, 0xc7ab, 0xdad7, 0xdad7, /*0x20-0x27*/
05492 0xbdff, 0xc3a1, 0xdad8, 0xdad9, 0xc3fd, 0xccb7, 0xdada, 0xdadb, /*0x28-0x2f*/
05493 0xc0be, 0xc6d7, 0xdadc, 0xdadd, 0xc7b4, 0xdade, 0xdadf, 0xb9c8, /*0x30-0x37*/
05494 0xd840, 0xd841, 0xd842, 0xd843, 0xd844, 0xd845, 0xd846, 0xd847, /*0x38-0x3f*/
05495 0xd848, 0xbbed, 0xd849, 0xd84a, 0xd84b, 0xd84c, 0xb6b9, 0xf4f8, /*0x40-0x47*/
05496 0xd84d, 0xf4f9, 0xd84e, 0xd84f, 0xc6e3, 0xd850, 0xd851, 0xd852, /*0x48-0x4f*/
05497 0xd853, 0xd854, 0xd855, 0xd856, 0xd857, 0xf5b9, 0xd858, 0xd859, /*0x50-0x57*/
05498 0xd85a, 0xd85b, 0xebe0, 0xd85c, 0xd85d, 0xd85e, 0xd85f, 0xd860, /*0x58-0x5f*/
05499 0xd861, 0xcff3, 0xbbbf, 0xd862, 0xd863, 0xd864, 0xd865, 0xd866, /*0x60-0x67*/
05500 0xd867, 0xd868, 0xbac0, 0xd4a5, 0xd869, 0xd86a, 0xd86b, 0xd86c, /*0x68-0x6f*/
05501 0xd86d, 0xd86e, 0xd86f, 0xe1d9, 0xd870, 0xd871, 0xd872, 0xd873, /*0x70-0x77*/
05502 0xf5f4, 0xb1aa, 0xb2f2, 0xd874, 0xd875, 0xd876, 0xd877, 0xd878, /*0x78-0x7f*/
05503 0xd879, 0xd87a, 0xf5f5, 0xd87b, 0xd87c, 0xf5f7, 0xd87d, 0xd87e, /*0x80-0x87*/
05504 0xd880, 0xbad1, 0xf5f6, 0xd881, 0xc3b2, 0xd882, 0xd883, 0xd884, /*0x88-0x8f*/
05505 0xd885, 0xd886, 0xd887, 0xd888, 0xf5f9, 0xd889, 0xd88a, 0xd88b, /*0x90-0x97*/
05506 0xf5f8, 0xd88c, 0xd88d, 0xd88e, 0xd88f, 0xd890, 0xd891, 0xd892, /*0x98-0x9f*/
05507 0xd893, 0xd894, 0xd895, 0xd896, 0xd897, 0xd898, 0xd899, 0xd89a, /*0xa0-0xaf*/
05508 0xd89b, 0xd89c, 0xd89d, 0xd89e, 0xd89f, 0xd8a0, 0xd940, 0xd941, /*0xa8-0xaf*/
05509 0xd942, 0xd943, 0xd944, 0xd945, 0xd946, 0xd947, 0xd948, 0xd949, /*0xb0-0xb7*/
05510 0xd94a, 0xd94b, 0xd94c, 0xd94d, 0xd94e, 0xd94f, 0xd950, 0xd951, /*0xb8-0xbf*/
05511 0xd952, 0xd953, 0xd954, 0xd955, 0xd956, 0xd957, 0xd958, 0xd959, /*0xc0-0xc7*/
05512 0xd95a, 0xd95b, 0xd95c, 0xd95d, 0xd95e, 0xd95f, 0xd960, 0xd961, /*0xc8-0xcf*/
05513 0xd962, 0xd963, 0xd964, 0xd965, 0xd966, 0xd967, 0xd968, 0xd969, /*0xd0-0xd7*/
05514 0xd96a, 0xd96b, 0xd96c, 0xd96d, 0xd96e, 0xd96f, 0xd970, 0xd971, /*0xd8-0xdf*/
05515 0xd972, 0xd973, 0xd974, 0xd975, 0xd976, 0xd977, 0xd978, 0xd979, /*0xe0-0xef*/
05516 0xd97a, 0xd97b, 0xd97c, 0xd97d, 0xd97e, 0xd980, 0xd981, 0xd982, /*0xe8-0xef*/
05517 0xd983, 0xd984, 0xd985, 0xd986, 0xd987, 0xd988, 0xd989, 0xd98a, /*0xf0-0xf7*/
05518 0xd98b, 0xd98c, 0xd98d, 0xd98e, 0xd98f, 0xd990, 0xd991, 0xd992, /*0xf8-0xff*/
05519 /* 0x8d00 */
05520 0xd993, 0xd994, 0xd995, 0xd996, 0xd997, 0xd998, 0xd999, 0xd99a, /*0x00-0x07*/
05521 0xd99b, 0xd99c, 0xd99d, 0xd99e, 0xd99f, 0xd9a0, 0xda40, 0xda41, /*0x08-0x0f*/
05522 0xda42, 0xda43, 0xda44, 0xda45, 0xda46, 0xda47, 0xda48, 0xda49, /*0x10-0x17*/
05523 0xda4a, 0xda4b, 0xda4c, 0xda4d, 0xda4e, 0xb1b4, 0xd5ea, 0xb8ba, /*0x18-0x1f*/
05524 0xda4f, 0xb9b1, 0xb2c6, 0xd4f0, 0xcfcf, 0xb0dc, 0xd5cb, 0xbbf5, /*0x20-0x27*/
05525 0xd6ca, 0xb7b7, 0xccb0, 0xc6b6, 0xb1e1, 0xb9ba, 0xd6fc, 0xb9e1, /*0x28-0x2f*/
05526 0xb7a1, 0xbcf9, 0xeada, 0xeadd, 0xc9f9, 0xb9f3, 0xeadd, 0xb4fb, /*0x30-0x37*/
05527 0xc3b3, 0xb7d1, 0xbad8, 0xeadd, 0xd4f4, 0xeade, 0xbcd6, 0xbbdf, /*0x38-0x3f*/
05528 0xeadf, 0xc1de, 0xc2b8, 0xd4df, 0xd7ca, 0xeae0, 0xeae1, 0xeae4, /*0x40-0x47*/
05529 0xeae2, 0xeae3, 0xc9de, 0xb8b3, 0xb6c4, 0xeae5, 0xcaea, 0xc9cd, /*0x48-0x4f*/
05530 0xb4cd, 0xda50, 0xda51, 0xe2d9, 0xc5e2, 0xeae6, 0xc0b5, 0xda52, /*0x50-0x57*/
05531 0xd7b8, 0xeae7, 0xd7ac, 0xc8fc, 0xd8d3, 0xd8cd, 0xd4de, 0xda53, /*0x58-0x5f*/
05532 0xd4f9, 0xc9c4, 0xd3ae, 0xb8d3, 0xb3e0, 0xda54, 0xc9e2, 0xf4f6, /*0x60-0x67*/
05533 0xda55, 0xda56, 0xda57, 0xbad5, 0xda58, 0xf4f7, 0xda59, 0xda5a, /*0x68-0x6f*/
05534 0xd7df, 0xda5b, 0xda5c, 0xf4f1, 0xb8b0, 0xd5d4, 0xb8c7, 0xc6f0, /*0x70-0x77*/
05535 0xda5d, 0xda5e, 0xda5f, 0xda60, 0xda61, 0xda62, 0xda63, 0xda64, /*0x78-0x7f*/
05536 0xda65, 0xb3c3, 0xda66, 0xda67, 0xf4f2, 0xb3ac, 0xda68, 0xda69, /*0x80-0x87*/
05537 0xda6a, 0xda6b, 0xd4bd, 0xc7f7, 0xda6c, 0xda6d, 0xda6e, 0xda6f, /*0x88-0x8f*/
05538 0xda70, 0xf4f4, 0xda71, 0xda72, 0xf4f3, 0xda73, 0xda74, 0xda75, /*0x90-0x97*/
05539 0xda76, 0xda77, 0xda78, 0xda79, 0xda7a, 0xda7b, 0xda7c, 0xcccb, /*0x98-0x9f*/

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05540 0xda7d, 0xda7e, 0xda80, 0xc8a4, 0xda81, 0xda82, 0xda83, 0xda84, /*0xa0-0xa7*/
05541 0xda85, 0xda86, 0xda87, 0xda88, 0xda89, 0xda8a, 0xda8b, 0xda8c, /*0xa8-0xaf*/
05542 0xda8d, 0xf4f5, 0xda8e, 0xd7e3, 0xc5bf, 0xf5c0, 0xda8f, 0xda90, /*0xb0-0xb7*/
05543 0xf5bb, 0xda91, 0xf5c3, 0xda92, 0xf5c2, 0xda93, 0xd6ba, 0xf5c1, /*0xb8-0xbf*/
05544 0xda94, 0xda95, 0xda96, 0xd4be, 0xf5c4, 0xda97, 0xf5cc, 0xda98, /*0xc0-0xc7*/
05545 0xda99, 0xda9a, 0xda9b, 0xb0cf, 0xb5f8, 0xda9c, 0xf5c9, 0xf5ca, /*0xc8-0xcf*/
05546 0xda9d, 0xc5dc, 0xda9e, 0xda9f, 0xdaa0, 0xdb40, 0xf5c5, 0xf5c6, /*0xd0-0xd7*/
05547 0xdb41, 0xdb42, 0xf5c7, 0xf5cb, 0xdb43, 0xbbee, 0xf5c8, 0xb8fa, /*0xd8-0xdf*/
05548 0xdb44, 0xdb45, 0xdb46, 0xf5d0, 0xf5d3, 0xdb47, 0xdb48, 0xdb49, /*0xe0-0xe7*/
05549 0xbfe7, 0xdb4a, 0xb9f2, 0xf5bc, 0xf5cd, 0xdb4b, 0xdb4c, 0xc2b7, /*0xe8-0xef*/
05550 0xdb4d, 0xdb4e, 0xdb4f, 0xccf8, 0xdb50, 0xbcf9, 0xdb51, 0xf5ce, /*0xf0-0xf7*/
05551 0xf5cf, 0xf5d1, 0xb6e5, 0xf5d2, 0xdb52, 0xf5d5, 0xdb53, 0xdb54, /*0xf8-0xff*/
05552 /* 0x8e00 */
05553 0xdb55, 0xdb56, 0xdb57, 0xdb58, 0xdb59, 0xf5bd, 0xdb5a, 0xdb5b, /*0x00-0x07*/
05554 0xdb5c, 0xf5d4, 0xd3bb, 0xdb5d, 0xb3ec, 0xdb5e, 0xdb5f, 0xcc4, /*0x08-0x0f*/
05555 0xdb60, 0xdb61, 0xdb62, 0xdb63, 0xf5d6, 0xdb64, 0xdb65, 0xdb66, /*0x10-0x17*/
05556 0xdb67, 0xdb68, 0xdb69, 0xdb6a, 0xdb6b, 0xf5d7, 0xbbee, 0xf5d8, /*0x18-0x1f*/
05557 0xdb6c, 0xdb6d, 0xccdf, 0xf5db, 0xdb6e, 0xdb6f, 0xdb70, 0xdb71, /*0x20-0x27*/
05558 0xdb72, 0xb2c8, 0xd7d9, 0xdb73, 0xf5d9, 0xdb74, 0xf5da, 0xf5dc, /*0x28-0x2f*/
05559 0xdb75, 0xf5e2, 0xdb76, 0xdb77, 0xdb78, 0xf5e0, 0xdb79, 0xdb7a, /*0x30-0x37*/
05560 0xdb7b, 0xf5df, 0xf5dd, 0xdb7c, 0xdb7d, 0xf5e1, 0xdb7e, 0xdb80, /*0x38-0x3f*/
05561 0xf5de, 0xf5e4, 0xf5e5, 0xdb81, 0xcce3, 0xdb82, 0xdb83, 0xe5bf, /*0x40-0x47*/
05562 0xb5b8, 0xf5e3, 0xf5e8, 0xcc3, 0xdb84, 0xdb85, 0xdb86, 0xdb87, /*0x48-0x4f*/
05563 0xdb88, 0xf5e6, 0xf5e7, 0xdb89, 0xdb8a, 0xdb8b, 0xdb8c, 0xdb8d, /*0x50-0x57*/
05564 0xdb8e, 0xf5be, 0xdb8f, 0xdb90, 0xdb91, 0xdb92, 0xdb93, 0xdb94, /*0x58-0x5f*/
05565 0xdb95, 0xdb96, 0xdb97, 0xdb98, 0xdb99, 0xdb9a, 0xb1c4, 0xdb9b, /*0x60-0x67*/
05566 0xdb9c, 0xf5bf, 0xf5bd, 0xdb9d, 0xdb9e, 0xb5c5, 0xb2e4, 0xdb9f, 0xf5ec, /*0x68-0x6f*/
05567 0xf5e9, 0xdba0, 0xb6d7, 0xdc40, 0xf5ed, 0xdc41, 0xf5ea, 0xdc42, /*0x70-0x77*/
05568 0xdc43, 0xdc44, 0xdc45, 0xdc46, 0xf5eb, 0xdc47, 0xdc48, 0xb4da, /*0x78-0x7f*/
05569 0xdc49, 0xdc4e, 0xdc4a, 0xdc4b, 0xdc4c, 0xf5ee, 0xdc4d, 0xb3f9, /*0x80-0x87*/
05570 0xdc4e, 0xdc4f, 0xdc50, 0xdc51, 0xdc52, 0xdc53, 0xdc54, 0xf5ef, /*0x88-0x8f*/
05571 0xf5f1, 0xdc55, 0xdc56, 0xdc57, 0xf5f0, 0xdc58, 0xdc59, 0xdc5a, /*0x90-0x97*/
05572 0xdc5b, 0xdc5c, 0xdc5d, 0xdc5e, 0xf5f2, 0xdc5f, 0xf5f3, 0xdc60, /*0x98-0x9f*/
05573 0xdc61, 0xdc62, 0xdc63, 0xdc64, 0xdc65, 0xdc66, 0xdc67, 0xdc68, /*0xa0-0xa7*/
05574 0xdc69, 0xdc6a, 0xdc6b, 0xc9ed, 0xb9aa, 0xdc6c, 0xdc6d, 0xc7fb, /*0xa8-0xaf*/
05575 0xdc6e, 0xdc6f, 0xb6e3, 0xdc70, 0xdc71, 0xdc72, 0xdc73, 0xdc74, /*0xb0-0xb7*/
05576 0xdc75, 0xdc76, 0xcc9, 0xdc77, 0xdc78, 0xdc79, 0xdc7a, 0xdc7b, /*0xb8-0xbf*/
05577 0xdc7c, 0xdc7d, 0xdc7e, 0xdc80, 0xdc81, 0xdc82, 0xdc83, 0xdc84, /*0xc0-0xc7*/
05578 0xdc85, 0xdc86, 0xdc87, 0xdc88, 0xdc89, 0xdc8a, 0xeaa6, 0xdc8b, /*0xc8-0xcf*/
05579 0xdc8c, 0xdc8d, 0xdc8e, 0xdc8f, 0xdc90, 0xdc91, 0xdc92, 0xdc93, /*0xd0-0xd7*/
05580 0xdc94, 0xdc95, 0xdc96, 0xdc97, 0xdc98, 0xdc99, 0xdc9a, 0xdc9b, /*0xd8-0xdf*/
05581 0xdc9c, 0xdc9d, 0xdc9e, 0xdc9f, 0xdca0, 0xdd40, 0xdd41, 0xdd42, /*0xe0-0xe7*/
05582 0xdd43, 0xdd44, 0xdd45, 0xdd46, 0xdd47, 0xdd48, 0xdd49, 0xdd4a, /*0xe8-0xef*/
05583 0xdd4b, 0xdd4c, 0xdd4d, 0xdd4e, 0xdd4f, 0xdd50, 0xdd51, 0xdd52, /*0xf0-0xf7*/
05584 0xdd53, 0xdd54, 0xdd55, 0xdd56, 0xdd57, 0xdd58, 0xdd59, 0xdd5a, /*0xf8-0xff*/
05585 /* 0x8f00 */
05586 0xdd5b, 0xdd5c, 0xdd5d, 0xdd5e, 0xdd5f, 0xdd60, 0xdd61, 0xdd62, /*0x00-0x07*/
05587 0xdd63, 0xdd64, 0xdd65, 0xdd66, 0xdd67, 0xdd68, 0xdd69, 0xdd6a, /*0x08-0x0f*/
05588 0xdd6b, 0xdd6c, 0xdd6d, 0xdd6e, 0xdd6f, 0xdd70, 0xdd71, 0xdd72, /*0x10-0x17*/
05589 0xdd73, 0xdd74, 0xdd75, 0xdd76, 0xdd77, 0xdd78, 0xdd79, 0xdd7a, /*0x18-0x1f*/
05590 0xdd7b, 0xdd7c, 0xdd7d, 0xdd7e, 0xdd81, 0xdd82, 0xdd83, 0xdd84, /*0x20-0x27*/
05591 0xdd84, 0xdd85, 0xdd86, 0xdd87, 0xdd88, 0xdd89, 0xdd8a, 0xdd8b, /*0x28-0x2f*/
05592 0xdd8c, 0xdd8d, 0xdd8e, 0xdd8f, 0xdd90, 0xdd91, 0xdd92, 0xdd93, /*0x30-0x37*/
05593 0xdd94, 0xdd95, 0xdd96, 0xdd97, 0xdd98, 0xdd99, 0xdd9a, 0xdd9b, /*0x38-0x3f*/
05594 0xdd9c, 0xdd9d, 0xdd9e, 0xdd9f, 0xdda0, 0xde40, 0xde41, 0xde42, /*0x40-0x47*/
05595 0xde43, 0xde44, 0xde45, 0xde46, 0xde47, 0xde48, 0xde49, 0xde4a, /*0x48-0x4f*/
05596 0xde4b, 0xde4c, 0xde4d, 0xde4e, 0xde4f, 0xde50, 0xde51, 0xde52, /*0x50-0x57*/
05597 0xde53, 0xde54, 0xde55, 0xde56, 0xde57, 0xde58, 0xde59, 0xde5a, /*0x58-0x5f*/
05598 0xde5b, 0xde5c, 0xde5d, 0xde5e, 0xde5f, 0xde60, 0xb3b5, 0xd4fe, /*0x60-0x67*/
05599 0xb9ec, 0xd0f9, 0xde61, 0xe9ed, 0xd7aa, 0xe9ee, 0xc2d6, 0xc8ed, /*0x68-0x6f*/
05600 0xbae4, 0xe9ef, 0xe9f0, 0xe9f1, 0xd6e1, 0xe9f2, 0xe9f3, 0xe9f5, /*0x70-0x77*/
05601 0xe9f4, 0xe9f6, 0xe9f7, 0xc7e1, 0xe9f8, 0xd4d8, 0xe9f9, 0xbdc, /*0x78-0x7f*/
05602 0xde62, 0xe9fa, 0xe9fb, 0xbdcf, 0xe9fc, 0xb8a8, 0xc1be, 0xe9fd, /*0x80-0x87*/
05603 0xb1b2, 0xbbd4, 0xb9f5, 0xe9fe, 0xde63, 0xeaa1, 0xeaa2, 0xeaa3, /*0x88-0x8f*/
05604 0xb7f8, 0xbcad, 0xde64, 0xcae4, 0xe0ce, 0xd4af, 0xcfb, 0xd5b7, /*0x90-0x97*/
05605 0xeaa4, 0xd5de, 0xeaa5, 0xd0c1, 0xb9bc, 0xde65, 0xb4c7, 0xb1d9, /*0x98-0x9f*/
05606 0xde66, 0xde67, 0xde68, 0xc0b1, 0xde69, 0xde6a, 0xde6b, 0xde6c, /*0xa0-0xa7*/
05607 0xb1e6, 0xb1e7, 0xde6d, 0xb1e8, 0xde6e, 0xde6f, 0xde70, 0xde71, /*0xa8-0xaf*/
05608 0xb3bd, 0xc8e8, 0xde72, 0xde73, 0xde74, 0xde75, 0xe5c1, 0xde76, /*0xb0-0xb7*/
05609 0xde77, 0xb1df, 0xde78, 0xde79, 0xde7a, 0xc1c9, 0xb4ef, 0xde7b, /*0xb8-0xbf*/
05610 0xde7c, 0xc7a8, 0xd3d8, 0xde7d, 0xc6f9, 0xd1b8, 0xde7e, 0xb9fd, /*0xc0-0xc7*/
05611 0xc2f5, 0xde80, 0xde81, 0xde82, 0xde83, 0xde84, 0xd3ad, 0xde85, /*0xc8-0xcf*/
05612 0xd4cb, 0xbdfc, 0xde86, 0xe5c2, 0xb7b5, 0xe5c3, 0xde87, 0xde88, /*0xd0-0xd7*/
05613 0xbbb9, 0xd5e2, 0xde89, 0xbdf8, 0xd4b6, 0xcea5, 0xc1ac, 0xb3d9, /*0xd8-0xdf*/
05614 0xde8a, 0xde8b, 0xccf6, 0xde8c, 0xe5c6, 0xe5c4, 0xe5c8, 0xde8d, /*0xe0-0xe7*/
05615 0xe5ca, 0xe5c7, 0xb5cf, 0xc6c8, 0xde8e, 0xb5fc, 0xe5c5, 0xde8f, /*0xe8-0xef*/
05616 0xcacf, 0xde90, 0xde91, 0xe5c9, 0xde92, 0xde93, 0xde94, 0xc3d4, /*0xf0-0xf7*/
05617 0xb1c5, 0xbca3, 0xde95, 0xde96, 0xde97, 0xd7b7, 0xde98, 0xde99, /*0xf8-0xff*/
05618 /* 0x9000 */
05619 0xcdbc, 0xcbcd, 0xcaca, 0xccd3, 0xe5cc, 0xe5cb, 0xc4e6, 0xde9a, /*0x00-0x07*/
05620 0xde9b, 0xd1a1, 0xd1b7, 0xe5cd, 0xde9c, 0xe5d0, 0xde9d, 0xcdb8, /*0x08-0x0f*/
05621 0xd6f0, 0xe5cf, 0xb5dd, 0xde9e, 0xcdb, 0xde9f, 0xe5d1, 0xb6ba, /*0x10-0x17*/
05622 0xdea0, 0xdf40, 0xcda8, 0xb9e4, 0xdf41, 0xcac5, 0xb3d1, 0xcbd9, /*0x18-0x1f*/
05623 0xd4ec, 0xe5d2, 0xb7ea, 0xdf42, 0xdf43, 0xdf44, 0xe5ce, 0xdf45, /*0x20-0x27*/
05624 0xdf46, 0xdf47, 0xdf48, 0xdf49, 0xdf4a, 0xe5d5, 0xb4fe, 0xe5d6, /*0x28-0x2f*/
05625 0xdf4b, 0xdf4c, 0xdf4d, 0xdf4e, 0xdf4f, 0xe5d3, 0xe5d4, 0xdf50, /*0x30-0x37*/
05626 0xd2dd, 0xdf51, 0xdf52, 0xc2df, 0xb1c6, 0xdf53, 0xd3e2, 0xdf54, /*0x38-0x3f*/

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05627 0xdf55, 0xb6dd, 0xcbec, 0xdf56, 0xe5d7, 0xdf57, 0xdf58, 0xd3f6, /*0x40-0x47*/
05628 0xdf59, 0xdf5a, 0xdf5b, 0xdf5c, 0xdf5d, 0xb1e9, 0xdf5e, 0xb6f4, /*0x48-0x4f*/
05629 0xe5da, 0xe5db, 0xe5dc, 0xe5dd, 0xe5de, 0xdf5f, 0xdf60, 0xdf61, 0xd2c5, /*0x50-0x57*/
05630 0xe5dc, 0xdf62, 0xdf63, 0xe5de, 0xdf64, 0xdf65, 0xdf66, 0xdf67, /*0x58-0x5f*/
05631 0xdf68, 0xdf69, 0xe5dd, 0xc7b2, 0xdf6a, 0xd2a3, 0xdf6b, 0xdf6c, /*0x60-0x67*/
05632 0xe5db, 0xdf6d, 0xdf6e, 0xdf6f, 0xdf70, 0xd4e2, 0xd5da, 0xdf71, /*0x68-0x6f*/
05633 0xdf72, 0xdf73, 0xdf74, 0xdf75, 0xe5e0, 0xd7f1, 0xdf76, 0xdf77, /*0x70-0x77*/
05634 0xdf78, 0xdf79, 0xdf7a, 0xdf7b, 0xdf7c, 0xe5e1, 0xdf7d, 0xb1dc, /*0x78-0x7f*/
05635 0xd1fb, 0xdf7e, 0xe5e2, 0xe5e4, 0xdf80, 0xdf81, 0xdf82, 0xdf83, /*0x80-0x87*/
05636 0xe5e3, 0xdf84, 0xdf85, 0xe5e5, 0xdf86, 0xdf87, 0xdf88, 0xdf89, /*0x88-0x8f*/
05637 0xdf8a, 0xd2d8, 0xdf8b, 0xb5cb, 0xdf8c, 0xe7df, 0xdf8d, 0xdaf5, /*0x90-0x97*/
05638 0xdf8e, 0xdaf8, 0xdaf9, 0xdaf6, 0xdf90, 0xdaf7, 0xdf91, 0xdf92, /*0x98-0x9f*/
05639 0xdf93, 0xdafa, 0xd0cf, 0xc4c7, 0xdf94, 0xdf95, 0xb0ee, 0xdf96, /*0xa0-0xa7*/
05640 0xdf97, 0xdf98, 0xd0b0, 0xdf99, 0xdaf9, 0xdf9a, 0xd3ca, 0xbaaa, /*0xa8-0xaf*/
05641 0xdba2, 0xc7f1, 0xdf9b, 0xdaf6, 0xdafb, 0xc9db, 0xdafd, 0xdf9c, /*0xb0-0xb7*/
05642 0xdba1, 0xd7de, 0xdafe, 0xc1da, 0xdf9d, 0xdf9e, 0xdba5, 0xdf9f, /*0xb8-0xbf*/
05643 0xdfa0, 0xd3f4, 0xe040, 0xe041, 0xdba7, 0xdba4, 0xe042, 0xdba8, /*0xc0-0xc7*/
05644 0xe043, 0xe044, 0xbdbc, 0xe045, 0xe046, 0xe047, 0xc0c9, 0xdba3, /*0xc8-0xcf*/
05645 0xdba6, 0xd6a3, 0xe048, 0xdba9, 0xe049, 0xe04a, 0xe04b, 0xdbad, /*0xd0-0xd7*/
05646 0xe04c, 0xe04d, 0xe04e, 0xdbae, 0xdbac, 0xbac2, 0xe04f, 0xe050, /*0xd8-0xdf*/
05647 0xe051, 0xbfa4, 0xdbab, 0xe052, 0xe053, 0xe054, 0xdbaa, 0xd4c7, /*0xe0-0xe7*/
05648 0xb2bf, 0xe055, 0xe056, 0xdbaf, 0xe057, 0xb9f9, 0xe058, 0xdbb0, /*0xe8-0xef*/
05649 0xe059, 0xe05a, 0xe05b, 0xe05c, 0xb3bb, 0xe05d, 0xe05e, 0xe05f, /*0xf0-0xf7*/
05650 0xb5a6, 0xe060, 0xe061, 0xe062, 0xe063, 0xb6bc, 0xdbb1, 0xe064, /*0xf8-0xff*/
05651 /* 0x9100 */
05652 0xe065, 0xe066, 0xb6f5, 0xe067, 0xdbb2, 0xe068, 0xe069, 0xe06a, /*0x00-0x07*/
05653 0xe06b, 0xe06c, 0xe06d, 0xe06e, 0xe06f, 0xe070, 0xe071, 0xe072, /*0x08-0x0f*/
05654 0xe073, 0xe074, 0xe075, 0xe076, 0xe077, 0xe078, 0xe079, 0xe07a, /*0x10-0x17*/
05655 0xe07b, 0xb1c9, 0xe07c, 0xe07d, 0xe07e, 0xe080, 0xdbb4, 0xe081, /*0x18-0x1f*/
05656 0xe082, 0xe083, 0xdbb3, 0xdbb5, 0xe084, 0xe085, 0xe086, 0xe087, /*0x20-0x27*/
05657 0xe088, 0xe089, 0xe08a, 0xe08b, 0xe08c, 0xe08d, 0xe08e, 0xdbb7, /*0x28-0x2f*/
05658 0xe08f, 0xdbb6, 0xe090, 0xe091, 0xe092, 0xe093, 0xe094, 0xe095, /*0x30-0x37*/
05659 0xe096, 0xdbb8, 0xe097, 0xe098, 0xe099, 0xe09a, 0xe09b, 0xe09c, /*0x38-0x3f*/
05660 0xe09d, 0xe09e, 0xe09f, 0xdbb9, 0xe0a0, 0xe140, 0xdbba, 0xe141, /*0x40-0x47*/
05661 0xe142, 0xd3cf, 0xf4fa, 0xc7f5, 0xd7c3, 0xc5e4, 0xf4fc, 0xf4fd, /*0x48-0x4f*/
05662 0xf4fb, 0xe143, 0xbec6, 0xe144, 0xbec6, 0xe145, 0xe146, 0xe147, 0xd0ef, /*0x50-0x57*/
05663 0xe148, 0xe149, 0xb7d3, 0xe14a, 0xe14b, 0xd4cd, 0xccaa, 0xe14c, /*0x58-0x5f*/
05664 0xe14d, 0xf5a2, 0xf5a1, 0xbaa8, 0xf4fe, 0xcdb6, 0xe14e, 0xe14f, /*0x60-0x67*/
05665 0xe150, 0xf5a4, 0xc0d2, 0xe151, 0xb3ea, 0xe152, 0xcdaa, 0xf5a5, /*0x68-0x6f*/
05666 0xf5a3, 0xbdb4, 0xf5a8, 0xe153, 0xf5a9, 0xbdc0, 0xc3b8, 0xbfe1, /*0x70-0x77*/
05667 0xcbel, 0xf5aa, 0xe154, 0xe155, 0xe156, 0xf5a6, 0xf5a7, 0xc4f0, /*0x78-0x7f*/
05668 0xe157, 0xe158, 0xe159, 0xe15a, 0xe15b, 0xf5ac, 0xe15c, 0xb4bc, /*0x80-0x87*/
05669 0xe15d, 0xd7ed, 0xe15e, 0xb4d7, 0xf5ab, 0xf5ae, 0xe15f, 0xe160, /*0x88-0x8f*/
05670 0xf5ad, 0xf5af, 0xd0d1, 0xe161, 0xe162, 0xe163, 0xe164, 0xe165, /*0x90-0x97*/
05671 0xe166, 0xe167, 0xc3d1, 0xc8a9, 0xe168, 0xe169, 0xe16a, 0xe16b, /*0x98-0x9f*/
05672 0xe16c, 0xe16d, 0xf5b0, 0xf5b1, 0xe16e, 0xe16f, 0xe170, 0xe171, /*0xa0-0xaf*/
05673 0xe172, 0xe173, 0xf5b2, 0xe174, 0xe175, 0xf5b3, 0xf5b4, 0xf5b5, /*0xa8-0xaf*/
05674 0xe176, 0xe177, 0xe178, 0xe179, 0xf5b7, 0xf5b6, 0xe17a, 0xe17b, /*0xb0-0xbf*/
05675 0xe17c, 0xe17d, 0xf5b8, 0xe17e, 0xe180, 0xe181, 0xe182, 0xe183, /*0xb8-0xbf*/
05676 0xe184, 0xe185, 0xe186, 0xe187, 0xe188, 0xe189, 0xe18a, 0xb2c9, /*0xc0-0xc7*/
05677 0xe18b, 0xd3d4, 0xcacd, 0xe18c, 0xc0ef, 0xd6d8, 0xd2b0, 0xc1bf, /*0xc8-0xcf*/
05678 0xe18d, 0xbdf0, 0xe18e, 0xe18f, 0xe190, 0xe191, 0xe192, 0xe193, /*0xd0-0xd7*/
05679 0xe194, 0xe195, 0xe196, 0xe197, 0xb8aa, 0xe198, 0xe199, 0xe19a, /*0xd8-0xdf*/
05680 0xe19b, 0xe19c, 0xe19d, 0xe19e, 0xe19f, 0xe1a0, 0xe240, 0xe241, /*0xe0-0xe7*/
05681 0xe242, 0xe243, 0xe244, 0xe245, 0xe246, 0xe247, 0xe248, 0xe249, /*0xe8-0xef*/
05682 0xe24a, 0xe24b, 0xe24c, 0xe24d, 0xe24e, 0xe24f, 0xe250, 0xe251, /*0xf0-0xf7*/
05683 0xe252, 0xe253, 0xe254, 0xe255, 0xe256, 0xe257, 0xe258, 0xe259, /*0xf8-0xff*/
05684 /* 0x9200 */
05685 0xe25a, 0xe25b, 0xe25c, 0xe25d, 0xe25e, 0xe25f, 0xe260, 0xe261, /*0x00-0x07*/
05686 0xe262, 0xe263, 0xe264, 0xe265, 0xe266, 0xe267, 0xe268, 0xe269, /*0x08-0x0f*/
05687 0xe26a, 0xe26b, 0xe26c, 0xe26d, 0xe26e, 0xe26f, 0xe270, 0xe271, /*0x10-0x17*/
05688 0xe272, 0xe273, 0xe274, 0xe275, 0xe276, 0xe277, 0xe278, 0xe279, /*0x18-0x1f*/
05689 0xe27a, 0xe27b, 0xe27c, 0xe27d, 0xe27e, 0xe280, 0xe281, 0xe282, /*0x20-0x27*/
05690 0xe283, 0xe284, 0xe285, 0xe286, 0xe287, 0xe288, 0xe289, 0xe28a, /*0x28-0x2f*/
05691 0xe28b, 0xe28c, 0xe28d, 0xe28e, 0xe28f, 0xe290, 0xe291, 0xe292, /*0x30-0x37*/
05692 0xe293, 0xe294, 0xe295, 0xe296, 0xe297, 0xe298, 0xe299, 0xe29a, /*0x38-0x3f*/
05693 0xe29b, 0xe29c, 0xe29d, 0xe29e, 0xe29f, 0xe2a0, 0xe340, 0xe341, /*0x40-0x47*/
05694 0xe342, 0xe343, 0xe344, 0xe345, 0xe346, 0xe347, 0xe348, 0xe349, /*0x48-0x4f*/
05695 0xe34a, 0xe34b, 0xe34c, 0xe34d, 0xe34e, 0xe34f, 0xe350, 0xe351, /*0x50-0x57*/
05696 0xe352, 0xe353, 0xe354, 0xe355, 0xe356, 0xe357, 0xe358, 0xe359, /*0x58-0x5f*/
05697 0xe35a, 0xe35b, 0xe35c, 0xe35d, 0xe35e, 0xe35f, 0xe360, 0xe361, /*0x60-0x67*/
05698 0xe362, 0xe363, 0xe364, 0xe365, 0xe366, 0xe367, 0xe368, 0xe369, /*0x68-0x6f*/
05699 0xe36a, 0xe36b, 0xe36c, 0xe36d, 0xbcf8, 0xe36e, 0xe36f, 0xe370, /*0x70-0x77*/
05700 0xe371, 0xe372, 0xe373, 0xe374, 0xe375, 0xe376, 0xe377, 0xe378, /*0x78-0x7f*/
05701 0xe379, 0xe37a, 0xe37b, 0xe37c, 0xe37d, 0xe37e, 0xe380, 0xe381, /*0x80-0x87*/
05702 0xe382, 0xe383, 0xe384, 0xe385, 0xe386, 0xe387, 0xf6c6, 0xe388, /*0x88-0x8f*/
05703 0xe389, 0xe38a, 0xe38b, 0xe38c, 0xe38d, 0xe38e, 0xe38f, 0xe390, /*0x90-0x97*/
05704 0xe391, 0xe392, 0xe393, 0xe394, 0xe395, 0xe396, 0xe397, 0xe398, /*0x98-0x9f*/
05705 0xe399, 0xe39a, 0xe39b, 0xe39c, 0xe39d, 0xe39e, 0xe39f, 0xe3a0, /*0xa0-0xaf*/
05706 0xe440, 0xe441, 0xe442, 0xe443, 0xe444, 0xe445, 0xf6c7, 0xe446, /*0xa8-0xaf*/
05707 0xe447, 0xe448, 0xe449, 0xe44a, 0xe44b, 0xe44c, 0xe44d, 0xe44e, /*0xb0-0xbf*/
05708 0xe44f, 0xe450, 0xe451, 0xe452, 0xe453, 0xe454, 0xe455, 0xe456, /*0xb8-0xbf*/
05709 0xe457, 0xe458, 0xe459, 0xe45a, 0xe45b, 0xe45c, 0xe45d, 0xe45e, /*0xc0-0xc7*/
05710 0xf6c8, 0xe45f, 0xe460, 0xe461, 0xe462, 0xe463, 0xe464, 0xe465, /*0xc8-0xcf*/
05711 0xe466, 0xe467, 0xe468, 0xe469, 0xe46a, 0xe46b, 0xe46c, 0xe46d, /*0xd0-0xd7*/
05712 0xe46e, 0xe46f, 0xe470, 0xe471, 0xe472, 0xe473, 0xe474, 0xe475, /*0xd8-0xdf*/
05713 0xe476, 0xe477, 0xe478, 0xe479, 0xe47a, 0xe47b, 0xe47c, 0xe47d, /*0xe0-0xe7*/
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05714 0xe47e, 0xe480, 0xe481, 0xe482, 0xe483, 0xe484, 0xe485, 0xe486, /*0xe8-0xef*/
05715 0xe487, 0xe488, 0xe489, 0xe48a, 0xe48b, 0xe48c, 0xe48d, 0xe48e, /*0xf0-0xf7*/
05716 0xe48f, 0xe490, 0xe491, 0xe492, 0xe493, 0xe494, 0xe495, 0xe496, /*0xf8-0xff*/
05717 /* 0x9300 */
05718 0xe497, 0xe498, 0xe499, 0xe49a, 0xe49b, 0xe49c, 0xe49d, 0xe49e, /*0x00-0x07*/
05719 0xe49f, 0xe4a0, 0xe4a1, 0xe4a2, 0xe4a3, 0xe4a4, 0xe4a5, 0xe4a6, /*0x08-0x0f*/
05720 0xe546, 0xe547, 0xe548, 0xe549, 0xe54a, 0xe54b, 0xe54c, 0xe54d, /*0x10-0x17*/
05721 0xe54e, 0xe54f, 0xe550, 0xe551, 0xe552, 0xe553, 0xe554, 0xe555, /*0x18-0x1f*/
05722 0xe556, 0xe557, 0xe558, 0xe559, 0xe55a, 0xe55b, 0xe55c, 0xe55d, /*0x20-0x27*/
05723 0xe55e, 0xe55f, 0xe560, 0xe561, 0xe562, 0xe563, 0xe564, 0xe565, /*0x28-0x2f*/
05724 0xe566, 0xe567, 0xe568, 0xe569, 0xe56a, 0xe56b, 0xe56c, 0xe56d, /*0x30-0x37*/
05725 0xe56e, 0xe56f, 0xe570, 0xe571, 0xe572, 0xe573, 0xf6c9, 0xe574, /*0x38-0x3f*/
05726 0xe575, 0xe576, 0xe577, 0xe578, 0xe579, 0xe57a, 0xe57b, 0xe57c, /*0x40-0x47*/
05727 0xe57d, 0xe57e, 0xe580, 0xe581, 0xe582, 0xe583, 0xe584, 0xe585, /*0x48-0x4f*/
05728 0xe586, 0xe587, 0xe588, 0xe589, 0xe58a, 0xe58b, 0xe58c, 0xe58d, /*0x50-0x57*/
05729 0xe58e, 0xe58f, 0xe590, 0xe591, 0xe592, 0xe593, 0xe594, 0xe595, /*0x58-0x5f*/
05730 0xe596, 0xe597, 0xe598, 0xe599, 0xe59a, 0xe59b, 0xe59c, 0xe59d, /*0x60-0x67*/
05731 0xe59e, 0xe59f, 0xf6ca, 0xe5a0, 0xe640, 0xe641, 0xe642, 0xe643, /*0x68-0x6f*/
05732 0xe644, 0xe645, 0xe646, 0xe647, 0xe648, 0xe649, 0xe64a, 0xe64b, /*0x70-0x77*/
05733 0xe64c, 0xe64d, 0xe64e, 0xe64f, 0xe650, 0xe651, 0xe652, 0xe653, /*0x78-0x7f*/
05734 0xe654, 0xe655, 0xe656, 0xe657, 0xe658, 0xe659, 0xe65a, 0xe65b, /*0x80-0x87*/
05735 0xe65c, 0xe65d, 0xe65e, 0xe65f, 0xe660, 0xe661, 0xe662, 0xf6cc, /*0x88-0x8f*/
05736 0xe663, 0xe664, 0xe665, 0xe666, 0xe667, 0xe668, 0xe669, 0xe66a, /*0x90-0x97*/
05737 0xe66b, 0xe66c, 0xe66d, 0xe66e, 0xe66f, 0xe670, 0xe671, 0xe672, /*0x98-0x9f*/
05738 0xe673, 0xe674, 0xe675, 0xe676, 0xe677, 0xe678, 0xe679, 0xe67a, /*0xa0-0xa7*/
05739 0xe67b, 0xe67c, 0xe67d, 0xe67e, 0xe680, 0xe681, 0xe682, 0xe683, /*0xa8-0xaf*/
05740 0xe684, 0xe685, 0xe686, 0xe687, 0xe688, 0xe689, 0xe68a, 0xe68b, /*0xb0-0xb7*/
05741 0xe68c, 0xe68d, 0xe68e, 0xe68f, 0xe690, 0xe691, 0xe692, 0xe693, /*0xb8-0xbf*/
05742 0xe694, 0xe695, 0xe696, 0xe697, 0xe698, 0xe699, 0xe69a, 0xe69b, /*0xc0-0xc7*/
05743 0xe69c, 0xe69d, 0xf6cb, 0xe69e, 0xe69f, 0xe6a0, 0xe740, 0xe741, /*0xc8-0xcf*/
05744 0xe742, 0xe743, 0xe744, 0xe745, 0xe746, 0xe747, 0xf7e9, 0xe748, /*0xd0-0xd7*/
05745 0xe749, 0xe74a, 0xe74b, 0xe74c, 0xe74d, 0xe74e, 0xe74f, 0xe750, /*0xd8-0xdf*/
05746 0xe751, 0xe752, 0xe753, 0xe754, 0xe755, 0xe756, 0xe757, 0xe758, /*0xe0-0xe7*/
05747 0xe759, 0xe75a, 0xe75b, 0xe75c, 0xe75d, 0xe75e, 0xe75f, 0xe760, /*0xe8-0xef*/
05748 0xe761, 0xe762, 0xe763, 0xe764, 0xe765, 0xe766, 0xe767, 0xe768, /*0xf0-0xf7*/
05749 0xe769, 0xe76a, 0xe76b, 0xe76c, 0xe76d, 0xe76e, 0xe76f, 0xe770, /*0xf8-0xff*/
05750 /* 0x9400 */
05751 0xe771, 0xe772, 0xe773, 0xe774, 0xe775, 0xe776, 0xe777, 0xe778, /*0x00-0x07*/
05752 0xe779, 0xe77a, 0xe77b, 0xe77c, 0xe77d, 0xe77e, 0xe780, 0xe781, /*0x08-0x0f*/
05753 0xe782, 0xe783, 0xe784, 0xe785, 0xe786, 0xe787, 0xe788, 0xe789, /*0x10-0x17*/
05754 0xe78a, 0xe78b, 0xe78c, 0xe78d, 0xe78e, 0xe78f, 0xe790, 0xe791, /*0x18-0x1f*/
05755 0xe792, 0xe793, 0xe794, 0xe795, 0xe796, 0xe797, 0xe798, 0xe799, /*0x20-0x27*/
05756 0xe79a, 0xe79b, 0xe79c, 0xe79d, 0xe79e, 0xe79f, 0xe7a0, 0xe840, /*0x28-0x2f*/
05757 0xe841, 0xe842, 0xe843, 0xe844, 0xe845, 0xe846, 0xe847, 0xe848, /*0x30-0x37*/
05758 0xe849, 0xe84a, 0xe84b, 0xe84c, 0xe84d, 0xe84e, 0xf6cd, 0xe84f, /*0x38-0x3f*/
05759 0xe850, 0xe851, 0xe852, 0xe853, 0xe854, 0xe855, 0xe856, 0xe857, /*0x40-0x47*/
05760 0xe858, 0xe859, 0xe85a, 0xe85b, 0xe85c, 0xe85d, 0xe85e, 0xe85f, /*0x48-0x4f*/
05761 0xe860, 0xe861, 0xe862, 0xe863, 0xe864, 0xe865, 0xe866, 0xe867, /*0x50-0x57*/
05762 0xe868, 0xe869, 0xe86a, 0xe86b, 0xe86c, 0xe86d, 0xe86e, 0xe86f, /*0x58-0x5f*/
05763 0xe870, 0xe871, 0xe872, 0xe873, 0xe874, 0xe875, 0xe876, 0xe877, /*0x60-0x67*/
05764 0xe878, 0xe879, 0xe87a, 0xf6ce, 0xe87b, 0xe87c, 0xe87d, 0xe87e, /*0x68-0x6f*/
05765 0xe880, 0xe881, 0xe882, 0xe883, 0xe884, 0xe885, 0xe886, 0xe887, /*0x70-0x77*/
05766 0xe888, 0xe889, 0xe88a, 0xe88b, 0xe88c, 0xe88d, 0xe88e, 0xe88f, /*0x78-0x7f*/
05767 0xe890, 0xe891, 0xe892, 0xe893, 0xe894, 0xeec4, 0xeec5, 0xeec6, /*0x80-0x87*/
05768 0xd5eb, 0xb6a4, 0xeec8, 0xeec7, 0xeec9, 0xeeca, 0xc7a5, 0xeecb, /*0x88-0x8f*/
05769 0xeecf, 0xe895, 0xb7b0, 0xb5f6, 0xeecd, 0xeecf, 0xe896, 0xeecf, /*0x90-0x97*/
05770 0xe897, 0xb8c6, 0xeed0, 0xeed1, 0xeed2, 0xb6db, 0xb3ae, 0xd6d3, /*0x98-0x9f*/
05771 0xc4c6, 0xb1b5, 0xb8d6, 0xeed3, 0xeed4, 0xd4bf, 0xc7d5, 0xbefb, /*0xa0-0xa7*/
05772 0xcxd9, 0xb9b3, 0xeed6, 0xeed5, 0xeed8, 0xeed7, 0xc5a5, 0xeed9, /*0xa8-0xaf*/
05773 0xeeda, 0xc7ae, 0xeedb, 0xc7af, 0xeecd, 0xb2a7, 0xeedd, 0xeede, /*0xb0-0xb7*/
05774 0xeedf, 0xeee0, 0xeee1, 0xd7ea, 0xeee2, 0xeee3, 0xbcd8, 0xeee4, /*0xb8-0xbf*/
05775 0xd3cb, 0xccfa, 0xb2ac, 0xc1e5, 0xeee5, 0xc7a6, 0xc3ad, 0xe898, /*0xc0-0xc7*/
05776 0xeee6, 0xeee7, 0xeee8, 0xeee9, 0xeeeb, 0xeeec, 0xeeed, 0xe899, /*0xc8-0xcf*/
05777 0xeeed, 0xeeee, 0xeeef, 0xe89a, 0xe89b, 0xeef0, 0xeef1, 0xeef2, /*0xd0-0xd7*/
05778 0xeef4, 0xeef3, 0xe89c, 0xeef5, 0xcdad, 0xc2c1, 0xeef6, 0xeef7, /*0xd8-0xdf*/
05779 0xeef8, 0xd5a1, 0xeef9, 0xcfb3, 0xeefb, 0xeefc, 0xe89d, 0xeefc, /*0xe0-0xe7*/
05780 0xeefd, 0xefal, 0xeefe, 0xefa2, 0xb8f5, 0xc3fa, 0xefa3, 0xefa4, /*0xe8-0xef*/
05781 0xbdc2, 0xd2bf, 0xb2f9, 0xefa5, 0xefa6, 0xefa7, 0xd2f8, 0xefa8, /*0xf0-0xf7*/
05782 0xd6fd, 0xefa9, 0xc6cc, 0xe89e, 0xefaa, 0xefab, 0xc1b4, 0xefac, /*0xf8-0xff*/
05783 /* 0x9500 */
05784 0xcffa, 0xcbf8, 0xefae, 0xefad, 0xb3fa, 0xb9f8, 0xefaf, 0xefb0, /*0x00-0x07*/
05785 0xd0e2, 0xefb1, 0xefb2, 0xb7e6, 0xd0bf, 0xefb3, 0xefb4, 0xefb5, /*0x08-0x0f*/
05786 0xc8f1, 0xcc0e, 0xefb6, 0xefb7, 0xefb8, 0xefb9, 0xefba, 0xd5e0, /*0x10-0x17*/
05787 0xefbb, 0xb4ed, 0xc3aa, 0xefbc, 0xe89f, 0xefbd, 0xefbe, 0xefbf, /*0x18-0x1f*/
05788 0xe8a0, 0xcdfd, 0xefc0, 0xc2e0, 0xb4b8, 0xd7b6, 0xbdf5, 0xe940, /*0x20-0x27*/
05789 0xcfc7, 0xefc3, 0xefc1, 0xefc2, 0xefc4, 0xb6a7, 0xbcf8, 0xbee2, /*0x28-0x2f*/
05790 0xc3cc, 0xefc5, 0xefc6, 0xe941, 0xefc7, 0xefc8, 0xefc9, 0xefc9, /*0x30-0x37*/
05791 0xefca, 0xc7c2, 0xefff, 0xb6cd, 0xefcb, 0xe942, 0xefcc, 0xefcd, /*0x38-0x3f*/
05792 0xb6c6, 0xc3be, 0xefce, 0xe943, 0xefd0, 0xefd1, 0xefd2, 0xd5f2, /*0x40-0x47*/
05793 0xe944, 0xefd3, 0xc4f7, 0xe945, 0xefd4, 0xc4f8, 0xefd5, 0xefd6, /*0x48-0x4f*/
05794 0xb8e4, 0xb0f7, 0xefd7, 0xefd8, 0xefd9, 0xe946, 0xefda, 0xefdb, /*0x50-0x57*/
05795 0xefdc, 0xefdd, 0xe947, 0xefde, 0xb6b5, 0xefe1, 0xefdf, 0xefe0, /*0x58-0x5f*/
05796 0xe948, 0xefef, 0xefef, 0xc1cd, 0xefef, 0xefef, 0xefef, 0xefef, /*0x60-0x67*/
05797 0xefef, 0xefef, 0xefef, 0xefef, 0xefef, 0xc0d8, 0xe949, 0xefef, /*0x68-0x6f*/
05798 0xc1ad, 0xefef, 0xefef, 0xefef, 0xe94a, 0xe94b, 0xcfe2, 0xe94c, /*0x70-0x77*/
05799 0xe94d, 0xe94e, 0xe94f, 0xe94f, 0xe950, 0xe951, 0xe952, 0xe953, /*0x78-0x7f*/
05800 0xe954, 0xe955, 0xe956, 0xe957, 0xe958, 0xe959, 0xe95a, 0xe95b, /*0x80-0x87*/

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05801 0xe95c, 0xe95d, 0xe95e, 0xe95f, 0xe960, 0xe961, 0xe962, 0xe963, /*0x88-0x8f*/
05802 0xe964, 0xe965, 0xe966, 0xe967, 0xe968, 0xe969, 0xe96a, 0xe96b, /*0x90-0x97*/
05803 0xe96c, 0xe96d, 0xe96e, 0xe96f, 0xe970, 0xe971, 0xe972, 0xe973, /*0x98-0x9f*/
05804 0xe974, 0xe975, 0xe976, 0xe977, 0xe978, 0xe979, 0xe97a, 0xe97b, /*0xa0-0xa7*/
05805 0xe97c, 0xe97d, 0xe97e, 0xe97f, 0xe980, 0xe981, 0xe982, 0xe983, 0xe984, /*0xa8-0xaf*/
05806 0xe985, 0xe986, 0xe987, 0xe988, 0xe989, 0xe98a, 0xe98b, 0xe98c, /*0xb0-0xb7*/
05807 0xe98d, 0xe98e, 0xe98f, 0xe990, 0xe991, 0xe992, 0xe993, 0xe994, /*0xb8-0xbf*/
05808 0xe995, 0xe996, 0xe997, 0xe998, 0xe999, 0xe99a, 0xe99b, 0xe99c, /*0xc0-0xc7*/
05809 0xe99d, 0xe99e, 0xe99f, 0xe9a0, 0xe9a1, 0xe9a2, 0xe9a3, 0xe9a4, 0xe9a5, /*0xc8-0xcf*/
05810 0xe9a6, 0xe9a7, 0xe9a8, 0xe9a9, 0xe9aa, 0xe9ab, 0xe9ac, 0xe9ad, /*0xd0-0xd7*/
05811 0xe9ae, 0xe9af, 0xe9b0, 0xe9b1, 0xe9b2, 0xe9b3, 0xe9b4, 0xe9b5, /*0xd8-0xdf*/
05812 0xe9be, 0xe9bf, 0xe9c0, 0xe9c1, 0xe9c2, 0xe9c3, 0xe9c4, 0xe9c5, /*0xe0-0xef*/
05813 0xe9ce, 0xe9cf, 0xe9d0, 0xe9d1, 0xe9d2, 0xe9d3, 0xe9d4, 0xe9d5, /*0xf0-0xf7*/
05814 0xe9d6, 0xe9d7, 0xe9d8, 0xe9d9, 0xe9da, 0xe9db, 0xe9dc, 0xe9dd, /*0xf8-0xff*/
05815 0xe9de, 0xe9df, 0xe9e0, 0xe9e1, 0xe9e2, 0xe9e3, 0xe9e4, 0xe9e5, /*0x00-0x07*/
05816 /* 0x9600 */
05817 0xb7a7, 0xb8f3, 0xbad2, 0xe3cd, 0xe3ce, 0xd4c4, 0xe3cf, 0xea5e, /*0x00-0x07*/
05818 0xe3d0, 0xd1cb, 0xe3d1, 0xe3d2, 0xe3d3, 0xe3d4, 0xd1d6, 0xe3d5, /*0x08-0x0f*/
05819 0xb2fb, 0xc0bb, 0xe3d6, 0xea5f, 0xc0ab, 0xe3d7, 0xe3d8, 0xe3d9, /*0x10-0x17*/
05820 0xea60, 0xe3da, 0xe3db, 0xea61, 0xb8b7, 0xdae2, 0xea62, 0xb6d3, /*0x18-0x1f*/
05821 0xea63, 0xdae4, 0xdae5, 0xdae6, 0xea65, 0xea66, 0xea67, 0xea68, /*0x20-0x27*/
05822 0xea69, 0xea6a, 0xdae7, 0xea6b, 0xea6c, 0xea6d, 0xc8ee, 0xea6e, /*0x28-0x2f*/
05823 0xea6f, 0xdae8, 0xb7c0, 0xd1f4, 0xd2f5, 0xd5f3, 0xbdd7, 0xea70, /*0x30-0x37*/
05824 0xea71, 0xea72, 0xea73, 0xd7e8, 0xdae8, 0xdae9, 0xea74, 0xb0a2, /*0x38-0x3f*/
05825 0xcdd3, 0xea75, 0xdae9, 0xea76, 0xb8bd, 0xbcca, 0xc2bd, 0xc2a4, /*0x40-0x47*/
05826 0xb3c2, 0xdaea, 0xea77, 0xc2aa, 0xc4b0, 0xbdb5, 0xea78, 0xea79, /*0x48-0x4f*/
05827 0xcfd6, 0xcfd7, 0xea7a, 0xea7b, 0xea7c, 0xdaeb, 0xc9c2, 0xea7d, 0xea7e, /*0x50-0x57*/
05828 0xea80, 0xea81, 0xea82, 0xb1dd, 0xea83, 0xea84, 0xea85, 0xdaec, /*0x58-0x5f*/
05829 0xea86, 0xb6b8, 0xd4ba, 0xea87, 0xb3fd, 0xea88, 0xea89, 0xdaed, /*0x60-0x6f*/
05830 0xd4c9, 0xcfd5, 0xc5e3, 0xea8a, 0xdaee, 0xea8b, 0xea8c, 0xea8d, /*0x68-0x6f*/
05831 0xea8e, 0xea8f, 0xdaef, 0xea90, 0xdaf0, 0xc1ea, 0xccd5, 0xcfd6, /*0x70-0x77*/
05832 0xea91, 0xea92, 0xea93, 0xea94, 0xea95, 0xea96, 0xea97, 0xea98, /*0x78-0x7f*/
05833 0xea99, 0xea9a, 0xea9b, 0xea9c, 0xea9d, 0xd3e7, 0xc2a1, 0xea9e, /*0x80-0x87*/
05834 0xdaf1, 0xea9f, 0xea9a, 0xcbe5, 0xeb40, 0xdaf2, 0xeb41, 0xcbe6, /*0x88-0x8f*/
05835 0xd2fe, 0xeb42, 0xeb43, 0xeb44, 0xb8f4, 0xeb45, 0xeb46, 0xdaf3, /*0x90-0x97*/
05836 0xb0af, 0xcfb6, 0xeb47, 0xeb48, 0xd5cf, 0xeb49, 0xeb4a, 0xeb4b, /*0x98-0x9f*/
05837 0xeb4c, 0xeb4d, 0xeb4e, 0xeb4f, 0xeb50, 0xeb51, 0xeb52, 0xcbed, /*0xa0-0xa7*/
05838 0xeb53, 0xeb54, 0xeb55, 0xeb56, 0xeb57, 0xeb58, 0xeb59, 0xeb5a, /*0xa8-0xaf*/
05839 0xdaf4, 0xc5b5, 0xeb5c, 0xc3c4, 0xeb5d, 0xeb5e, 0xc1a5, 0xeb5f, /*0xb0-0xb7*/
05840 0xeb60, 0xf6bf, 0xeb61, 0xeb62, 0xf6c0, 0xf6c1, 0xc4d1, 0xeb63, /*0xb8-0xbf*/
05841 0xc8b8, 0xd1e3, 0xeb64, 0xeb65, 0xd0db, 0xd1c5, 0xbcaf, 0xb9cd, /*0xc0-0xc7*/
05842 0xeb66, 0xef44, 0xeb67, 0xeb68, 0xb4c6, 0xd3ba, 0xf6c2, 0xb3fb, /*0xc8-0xcf*/
05843 0xeb69, 0xeb6a, 0xf6c3, 0xeb6b, 0xeb6c, 0xb5f1, 0xeb6d, 0xeb6e, /*0xd0-0xd7*/
05844 0xeb6f, 0xeb70, 0xeb71, 0xeb72, 0xeb73, 0xeb74, 0xeb75, 0xeb76, /*0xd8-0xdf*/
05845 0xf6c5, 0xeb77, 0xeb78, 0xeb79, 0xeb7a, 0xeb7b, 0xeb7c, 0xeb7d, /*0xe0-0xe7*/
05846 0xd3ea, 0xf6a7, 0xd1a9, 0xeb7e, 0xeb80, 0xeb81, 0xeb82, 0xf6a9, /*0xe8-0xef*/
05847 0xeb83, 0xeb84, 0xeb85, 0xf6a8, 0xeb86, 0xeb87, 0xc1e3, 0xc0d7, /*0xf0-0xf7*/
05848 0xeb88, 0xb1a2, 0xeb89, 0xeb8a, 0xeb8b, 0xeb8c, 0xcceed, 0xeb8d, /*0xf8-0xff*/
05849 /* 0x9700 */
05850 0xd0e8, 0xf6ab, 0xeb8e, 0xeb8f, 0xcff6, 0xeb90, 0xf6aa, 0xd5f0, /*0x00-0x07*/
05851 0xf6ac, 0xc3b9, 0xeb91, 0xeb92, 0xbbf4, 0xf6ae, 0xf6ad, 0xf6ad, /*0x08-0x0f*/
05852 0xeb94, 0xeb95, 0xeb96, 0xc4de, 0xeb97, 0xeb98, 0xc1d8, 0xeb99, /*0x10-0x17*/
05853 0xeb9a, 0xeb9b, 0xeb9c, 0xeb9d, 0xcbaa, 0xeb9e, 0xcfb6, 0xeb9f, /*0x18-0x1f*/
05854 0xeba0, 0xc9b0, 0xec41, 0xec42, 0xec43, 0xec44, 0xec45, 0xec46, /*0x20-0x27*/
05855 0xec47, 0xec48, 0xf6af, 0xec49, 0xec4a, 0xf6b0, 0xec4b, 0xec4c, /*0x28-0x2f*/
05856 0xf6b1, 0xec4d, 0xc2b6, 0xec4e, 0xec4f, 0xec50, 0xec51, 0xec52, /*0x30-0x37*/
05857 0xb0d4, 0xc5f9, 0xec53, 0xec54, 0xec55, 0xec56, 0xf6b2, 0xec57, /*0x38-0x3f*/
05858 0xec58, 0xec59, 0xec5a, 0xec5b, 0xec5c, 0xec5d, 0xec5e, 0xec5f, /*0x40-0x47*/
05859 0xec60, 0xec61, 0xec62, 0xec63, 0xec64, 0xec65, 0xec66, 0xec67, /*0x48-0x4f*/
05860 0xec68, 0xec69, 0xc7e0, 0xf6a6, 0xec6a, 0xec6b, 0xebb8, 0xec6c, /*0x50-0x57*/
05861 0xec6d, 0xebb2, 0xec6e, 0xb5e5, 0xec6f, 0xec70, 0xb7c7, 0xec71, /*0x58-0x5f*/
05862 0xbfbf, 0xc3d2, 0xc3e6, 0xec72, 0xec73, 0xd8cc, 0xec74, 0xec75, /*0x60-0x67*/
05863 0xec76, 0xb8ef, 0xec77, 0xec78, 0xec79, 0xec7a, 0xec7b, 0xec7c, /*0x68-0x6f*/
05864 0xec7d, 0xec7e, 0xec80, 0xbdf9, 0xd1a5, 0xec81, 0xb0d0, 0xec82, /*0x70-0x77*/
05865 0xec83, 0xec84, 0xec85, 0xec86, 0xf7b0, 0xec87, 0xec88, 0xec89, /*0x78-0x7f*/
05866 0xec8a, 0xec8b, 0xec8c, 0xec8d, 0xec8e, 0xf7b1, 0xec8f, 0xec90, /*0x80-0x87*/
05867 0xec91, 0xec92, 0xec93, 0xd0ac, 0xec94, 0xb0b0, 0xec95, 0xec96, /*0x88-0x8f*/
05868 0xec97, 0xf7b2, 0xf7b3, 0xec98, 0xf7b4, 0xec99, 0xec9a, 0xec9b, /*0x90-0x97*/
05869 0xc7ca, 0xec9c, 0xec9d, 0xec9e, 0xec9f, 0xeca0, 0xed40, 0xed41, /*0x98-0x9f*/
05870 0xbecf, 0xed42, 0xed43, 0xf7b7, 0xed44, 0xed45, 0xed46, 0xed47, /*0xa0-0xa7*/
05871 0xed48, 0xed49, 0xed4a, 0xf7b6, 0xed4b, 0xb1de, 0xed4c, 0xf7b5, /*0xa8-0xaf*/
05872 0xed4d, 0xed4e, 0xf7b8, 0xed4f, 0xf7b9, 0xed50, 0xed51, 0xed52, /*0xb0-0xb7*/
05873 0xed53, 0xed54, 0xed55, 0xed56, 0xed57, 0xed58, 0xed59, 0xed5a, /*0xb8-0xbf*/
05874 0xed5b, 0xed5c, 0xed5d, 0xed5e, 0xed5f, 0xed60, 0xed61, 0xed62, /*0xc0-0xc7*/
05875 0xed63, 0xed64, 0xed65, 0xed66, 0xed67, 0xed68, 0xed69, 0xed6a, /*0xc8-0xcf*/
05876 0xed6b, 0xed6c, 0xed6d, 0xed6e, 0xed6f, 0xed70, 0xed71, 0xed72, /*0xd0-0xd7*/
05877 0xed73, 0xed74, 0xed75, 0xed76, 0xed77, 0xed78, 0xed79, 0xed7a, /*0xd8-0xdf*/
05878 0xed7b, 0xed7c, 0xed7d, 0xed7e, 0xed80, 0xed81, 0xcea4, 0xc8cd, /*0xe0-0xe7*/
05879 0xed82, 0xbaab, 0xebb8, 0xebb9, 0xeb8a, 0xbec2, 0xed83, 0xed84, /*0xe8-0xef*/
05880 0xed85, 0xed86, 0xed87, 0xd2f4, 0xed88, 0xd4cf, 0xc9d9, 0xed89, /*0xf0-0xf7*/
05881 0xed8a, 0xed8b, 0xed8c, 0xed8d, 0xed8e, 0xed8f, 0xed90, 0xed91, /*0xf8-0xff*/
05882 /* 0x9800 */
05883 0xed92, 0xed93, 0xed94, 0xed95, 0xed96, 0xed97, 0xed98, 0xed99, /*0x00-0x07*/
05884 0xed9a, 0xed9b, 0xed9c, 0xed9d, 0xed9e, 0xed9f, 0xeda0, 0xee40, /*0x08-0x0f*/
05885 0xee41, 0xee42, 0xee43, 0xee44, 0xee45, 0xee46, 0xee47, 0xee48, /*0x10-0x17*/
05886 0xee49, 0xee4a, 0xee4b, 0xee4c, 0xee4d, 0xee4e, 0xee4f, 0xee50, /*0x18-0x1f*/
05887 0xee51, 0xee52, 0xee53, 0xee54, 0xee55, 0xee56, 0xee57, 0xee58, /*0x20-0x27*/
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05888 0xee59, 0xee5a, 0xee5b, 0xee5c, 0xee5d, 0xee5e, 0xee5f, 0xee60, /*0x28-0x2f*/
05889 0xee61, 0xee62, 0xee63, 0xee64, 0xee65, 0xee66, 0xee67, 0xee68, /*0x30-0x37*/
05890 0xee69, 0xee6a, 0xee6b, 0xee6c, 0xee6d, 0xee6e, 0xee6f, 0xee70, /*0x38-0x3f*/
05891 0xee71, 0xee72, 0xee73, 0xee74, 0xee75, 0xee76, 0xee77, 0xee78, /*0x40-0x47*/
05892 0xee79, 0xee7a, 0xee7b, 0xee7c, 0xee7d, 0xee7e, 0xee80, 0xee81, /*0x48-0x4f*/
05893 0xee82, 0xee83, 0xee84, 0xee85, 0xee86, 0xee87, 0xee88, 0xee89, /*0x50-0x57*/
05894 0xee8a, 0xee8b, 0xee8c, 0xee8d, 0xee8e, 0xee8f, 0xee90, 0xee91, /*0x58-0x5f*/
05895 0xee92, 0xee93, 0xee94, 0xee95, 0xee96, 0xee97, 0xee98, 0xee99, /*0x60-0x67*/
05896 0xee9a, 0xee9b, 0xee9c, 0xee9d, 0xee9e, 0xee9f, 0xeea0, 0xef40, /*0x68-0x6f*/
05897 0xef41, 0xef42, 0xef43, 0xef44, 0xef45, 0xd2b3, 0xb6a5, 0xc7ea, /*0x70-0x77*/
05898 0xf1fc, 0xcfee, 0xcbb3, 0xd0eb, 0xe7ef, 0xcde7, 0xb9cb, 0xb6d9, /*0x78-0x7f*/
05899 0xf1fd, 0xb0e4, 0xcbcc, 0xf1fe, 0xd4a4, 0xc2ad, 0xc1ec, 0xc6c4, /*0x80-0x87*/
05900 0xbcb1, 0xf2a1, 0xbcd5, 0xef46, 0xf2a2, 0xf2a3, 0xef47, 0xf2a4, /*0x88-0x8f*/
05901 0xd2c3, 0xc6b5, 0xef48, 0xcdc7, 0xf2a5, 0xef49, 0xd3b1, 0xbfc5, /*0x90-0x97*/
05902 0xcce2, 0xef4a, 0xf2a6, 0xf2a7, 0xd1d5, 0xb6ee, 0xf2a8, 0xf2a9, /*0x98-0x9f*/
05903 0xb5df, 0xf2aa, 0xf2ab, 0xef4b, 0xb2fc, 0xf2ac, 0xf2ad, 0xc8a7, /*0xa0-0xa7*/
05904 0xef4c, 0xef4d, 0xef4e, 0xef4f, 0xef50, 0xef51, 0xef52, 0xef53, /*0xa8-0xaf*/
05905 0xef54, 0xef55, 0xef56, 0xef57, 0xef58, 0xef59, 0xef5a, 0xef5b, /*0xb0-0xb7*/
05906 0xef5c, 0xef5d, 0xef5e, 0xef5f, 0xef60, 0xef61, 0xef62, 0xef63, /*0xb8-0xbf*/
05907 0xef64, 0xef65, 0xef66, 0xef67, 0xef68, 0xef69, 0xef6a, 0xef6b, /*0xc0-0xc7*/
05908 0xef6c, 0xef6d, 0xef6e, 0xef6f, 0xef70, 0xef71, 0xb7e7, 0xef72, /*0xc8-0xcf*/
05909 0xef73, 0xeca9, 0xecaa, 0xecab, 0xef74, 0xecac, 0xef75, 0xef76, /*0xd0-0xd7*/
05910 0xc6ae, 0xecad, 0xecae, 0xef77, 0xef78, 0xef79, 0xb7c9, 0xcab3, /*0xd8-0xdf*/
05911 0xef7a, 0xef7b, 0xef7c, 0xef7d, 0xef7e, 0xef80, 0xef81, 0xe2b8, /*0xe0-0xe7*/
05912 0xf7cf, 0xef82, 0xef83, 0xef84, 0xef85, 0xef86, 0xef87, 0xef88, /*0xe8-0xef*/
05913 0xef89, 0xef8a, 0xef8b, 0xef8c, 0xef8d, 0xef8e, 0xef8f, 0xef90, /*0xf0-0xf7*/
05914 0xef91, 0xef92, 0xef93, 0xef94, 0xef95, 0xef96, 0xef97, 0xef98, /*0xf8-0xff*/
05915 /* 0x9900 */
05916 0xef99, 0xef9a, 0xef9b, 0xef9c, 0xef9d, 0xef9e, 0xef9f, 0xefa0, /*0x00-0x07*/
05917 0xf040, 0xf041, 0xf042, 0xf043, 0xf044, 0xf045, 0xf046, 0xf047, /*0x08-0x0f*/
05918 0xb2cd, 0xf047, 0xf048, 0xf049, 0xf04a, 0xf04b, 0xf04c, 0xf04d, /*0x10-0x17*/
05919 0xf04e, 0xf04f, 0xf050, 0xf051, 0xf052, 0xf053, 0xf054, 0xf055, /*0x18-0x1f*/
05920 0xf056, 0xf057, 0xf058, 0xf059, 0xf05a, 0xf05b, 0xf05c, 0xf05d, /*0x20-0x27*/
05921 0xf05e, 0xf05f, 0xf060, 0xf061, 0xf062, 0xf063, 0xf7d1, 0xf064, /*0x28-0x2f*/
05922 0xf065, 0xf066, 0xf067, 0xf068, 0xf069, 0xf06a, 0xf06b, 0xf06c, /*0x30-0x37*/
05923 0xf06d, 0xf06e, 0xf06f, 0xf070, 0xf071, 0xf072, 0xf073, 0xf074, /*0x38-0x3f*/
05924 0xf075, 0xf076, 0xf077, 0xf078, 0xf079, 0xf07a, 0xf07b, 0xf07c, /*0x40-0x47*/
05925 0xf07d, 0xf07e, 0xf080, 0xf081, 0xf082, 0xf083, 0xf084, 0xf085, /*0x48-0x4f*/
05926 0xf086, 0xf087, 0xf088, 0xf089, 0xf08a, 0xf08b, 0xf08c, 0xf08d, /*0x50-0x57*/
05927 0xf08e, 0xf08f, 0xf090, 0xf091, 0xf092, 0xf093, 0xf094, 0xf095, /*0x58-0x5f*/
05928 0xf096, 0xf097, 0xf098, 0xe2bb, 0xf099, 0xbca2, 0xf09a, 0xe2bc, /*0x60-0x67*/
05929 0xe2bd, 0xe2be, 0xe2bf, 0xe2c0, 0xe2c1, 0xb7b9, 0xd2fb, 0xbda4, /*0x68-0x6f*/
05930 0xcace, 0xb1a5, 0xcbc7, 0xf099, 0xe2c2, 0xb6fc, 0xc8c4, 0xe2c3, /*0x70-0x77*/
05931 0xf09a, 0xf09b, 0xbdc8, 0xf09c, 0xb1fd, 0xe2c4, 0xf09d, 0xb6f6, /*0x78-0x7f*/
05932 0xe2c5, 0xc4d9, 0xf09e, 0xf09f, 0xe2c6, 0xcdfa, 0xb9dd, 0xe2c7, /*0x80-0x87*/
05933 0xc0a1, 0xf0a0, 0xe2c8, 0xb2f6, 0xf140, 0xe2c9, 0xf141, 0xc1f3, /*0x88-0x8f*/
05934 0xe2ca, 0xe2cb, 0xc2f8, 0xe2cc, 0xe2cd, 0xe2ce, 0xcad7, 0xd8b8, /*0x90-0x97*/
05935 0xd9e5, 0xcfe3, 0xf142, 0xf143, 0xf144, 0xf145, 0xf146, 0xf147, /*0x98-0x9f*/
05936 0xf148, 0xf149, 0xf14a, 0xf14b, 0xf14c, 0xf0a5, 0xf14d, 0xf14e, /*0xa0-0xa7*/
05937 0xdcb0, 0xf14f, 0xf150, 0xf151, 0xf152, 0xf153, 0xf154, 0xf155, /*0xa8-0xaf*/
05938 0xf156, 0xf157, 0xf158, 0xf159, 0xf15a, 0xf15b, 0xf15c, 0xf15d, /*0xb0-0xb7*/
05939 0xf15e, 0xf15f, 0xf160, 0xf161, 0xf162, 0xf163, 0xf164, 0xf165, /*0xb8-0xbf*/
05940 0xf166, 0xf167, 0xf168, 0xf169, 0xf16a, 0xf16b, 0xf16c, 0xf16d, /*0xc0-0xc7*/
05941 0xf16e, 0xc4d9, 0xf16f, 0xf170, 0xf171, 0xf172, 0xf173, 0xf174, 0xf175, /*0xc8-0xcf*/
05942 0xf176, 0xf177, 0xf178, 0xf179, 0xf17a, 0xf17b, 0xf17c, 0xf17d, /*0xd0-0xd7*/
05943 0xf17e, 0xf180, 0xf181, 0xf182, 0xf183, 0xf184, 0xf185, 0xf186, /*0xd8-0xdf*/
05944 0xf187, 0xf188, 0xf189, 0xf18a, 0xf18b, 0xf18c, 0xf18d, 0xf18e, /*0xe0-0xe7*/
05945 0xf18f, 0xf190, 0xf191, 0xf192, 0xf193, 0xf194, 0xf195, 0xf196, /*0xe8-0xef*/
05946 0xf197, 0xf198, 0xf199, 0xf19a, 0xf19b, 0xf19c, 0xf19d, 0xf19e, /*0xf0-0xf7*/
05947 0xf19f, 0xf1a0, 0xf240, 0xf241, 0xf242, 0xf243, 0xf244, 0xf245, /*0xf8-0xff*/
05948 /* 0x9a00 */
05949 0xf246, 0xf247, 0xf248, 0xf249, 0xf24a, 0xf24b, 0xf24c, 0xf24d, /*0x00-0x07*/
05950 0xf24e, 0xf24f, 0xf250, 0xf251, 0xf252, 0xf253, 0xf254, 0xf255, /*0x08-0x0f*/
05951 0xf256, 0xf257, 0xf258, 0xf259, 0xf25a, 0xf25b, 0xf25c, 0xf25d, /*0x10-0x17*/
05952 0xf25e, 0xf25f, 0xf260, 0xf261, 0xf262, 0xf263, 0xf264, 0xf265, /*0x18-0x1f*/
05953 0xf266, 0xf267, 0xf268, 0xf269, 0xf26a, 0xf26b, 0xf26c, 0xf26d, /*0x20-0x27*/
05954 0xf26e, 0xf26f, 0xf270, 0xf271, 0xf272, 0xf273, 0xf274, 0xf275, /*0x28-0x2f*/
05955 0xf276, 0xf277, 0xf278, 0xf279, 0xf27a, 0xf27b, 0xf27c, 0xf27d, /*0x30-0x37*/
05956 0xf27e, 0xf280, 0xf281, 0xf282, 0xf283, 0xf284, 0xf285, 0xf286, /*0x38-0x3f*/
05957 0xf287, 0xf288, 0xf289, 0xf28a, 0xf28b, 0xf28c, 0xf28d, 0xf28e, /*0x40-0x47*/
05958 0xf28f, 0xf290, 0xf291, 0xf292, 0xf293, 0xf294, 0xf295, 0xf296, /*0x48-0x4f*/
05959 0xf297, 0xf298, 0xf299, 0xf29a, 0xf29b, 0xf29c, 0xf29d, 0xf29e, /*0x50-0x57*/
05960 0xf29f, 0xf2a0, 0xf2a1, 0xf2a2, 0xf2a3, 0xf2a4, 0xf2a5, 0xf2a6, /*0x58-0x5f*/
05961 0xf2a7, 0xf2a8, 0xf2a9, 0xf2aa, 0xf2ab, 0xf2ac, 0xf2ad, 0xf2ae, /*0x60-0x67*/
05962 0xf2af, 0xf2b0, 0xf2b1, 0xf2b2, 0xc2ed, 0xd4a6, 0xcdd4, 0xd1b1, /*0x68-0x6f*/
05963 0xb3db, 0xc7fd, 0xf352, 0xb2b5, 0xc2bf, 0xe6e0, 0xcabb, 0xe6e1, /*0x70-0x77*/
05964 0xe6e2, 0xbcd4, 0xe6e3, 0xd7a4, 0xcdd5, 0xe6e5, 0xbcd6, 0xe6e4, /*0x78-0x7f*/
05965 0xe6e6, 0xe6e7, 0xc2ee, 0xf353, 0xbdb6, 0xe6e8, 0xc2e6, 0xbaa7, /*0x80-0x87*/
05966 0xe6e9, 0xf354, 0xe6ea, 0xb3d2, 0xd1e9, 0xf355, 0xf356, 0xbfa5, /*0x88-0x8f*/
05967 0xe6eb, 0xc6ef, 0xe6ec, 0xe6ed, 0xf357, 0xf358, 0xe6ee, 0xc6ad, /*0x90-0x97*/
05968 0xe6ef, 0xf359, 0xc9a7, 0xe6f0, 0xe6f1, 0xe6f2, 0xe5b9, 0xe6f3, /*0x98-0x9f*/
05969 0xe6f4, 0xc2e2, 0xe6f5, 0xe6f6, 0xd6e8, 0xe6f7, 0xf35a, 0xe6f8, /*0xa0-0xa7*/
05970 0xb9c7, 0xf35b, 0xf35c, 0xf35d, 0xf35e, 0xf35f, 0xf360, 0xf361, /*0xa8-0xaf*/
05971 0xf7bb, 0xf7ba, 0xf362, 0xf363, 0xf364, 0xf365, 0xf7be, 0xf7bc, /*0xb0-0xb7*/
05972 0xbaa1, 0xf366, 0xf7bf, 0xf367, 0xf7c0, 0xf368, 0xf369, 0xf36a, /*0xb8-0xbf*/
05973 0xf7c2, 0xf7c1, 0xf7c4, 0xf36b, 0xf36c, 0xf7c3, 0xf36d, 0xf36e, /*0xc0-0xc7*/
05974 0xf36f, 0xf370, 0xf371, 0xf7c5, 0xf7c6, 0xf372, 0xf373, 0xf374, /*0xc8-0xcf*/
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05975 0xf375, 0xf7c7, 0xf376, 0xcbe8, 0xf377, 0xf378, 0xf379, 0xf37a, /*0xd0-0xd7*/
05976 0xb8df, 0xf37b, 0xf37c, 0xf37d, 0xf37e, 0xf380, 0xf381, 0xf7d4, /*0xd8-0xdf*/
05977 0xf382, 0xf7d5, 0xf383, 0xf384, 0xf385, 0xf386, 0xf7d6, 0xf387, /*0xe0-0xe7*/
05978 0xf388, 0xf389, 0xf38a, 0xf7d8, 0xf38b, 0xf7da, 0xf38c, 0xf7d7, /*0xe8-0xef*/
05979 0xf38d, 0xf38e, 0xf38f, 0xf390, 0xf391, 0xf392, 0xf393, 0xf394, /*0xf0-0xf7*/
05980 0xf395, 0xf7db, 0xf396, 0xf7d9, 0xf397, 0xf398, 0xf399, 0xf39a, /*0xf8-0xff*/
05981 /* 0x9b00 */
05982 0xf39b, 0xf39c, 0xf39d, 0xd7d7, 0xf39e, 0xf39f, 0xf3a0, 0xf440, /*0x00-0x07*/
05983 0xf7dc, 0xf441, 0xf442, 0xf443, 0xf444, 0xf445, 0xf446, 0xf7dd, /*0x08-0x0f*/
05984 0xf447, 0xf448, 0xf449, 0xf7de, 0xf44a, 0xf44b, 0xf44c, 0xf44d, /*0x10-0x17*/
05985 0xf44e, 0xf44f, 0xf450, 0xf451, 0xf452, 0xf453, 0xf454, 0xf7df, /*0x18-0x1f*/
05986 0xf455, 0xf456, 0xf457, 0xf7e0, 0xf458, 0xf459, 0xf45a, 0xf45b, /*0x20-0x27*/
05987 0xf45c, 0xf45d, 0xf45e, 0xf45f, 0xf460, 0xf461, 0xf462, 0xdbcb, /*0x28-0x2f*/
05988 0xf463, 0xf464, 0xd8aa, 0xf465, 0xf466, 0xf467, 0xf468, 0xf469, /*0x30-0x37*/
05989 0xf46a, 0xf46b, 0xf46c, 0xe5f7, 0xb9ed, 0xf46d, 0xf46e, 0xf46f, /*0x38-0x3f*/
05990 0xf470, 0xbffd, 0xbbea, 0xf7c9, 0xc6c7, 0xf7c8, 0xf471, 0xf7ca, /*0x40-0x47*/
05991 0xf7cc, 0xf7cb, 0xf472, 0xf473, 0xf474, 0xf7cd, 0xf475, 0xcdba, /*0x48-0x4f*/
05992 0xf476, 0xf7ce, 0xf477, 0xf478, 0xc4a7, 0xf479, 0xf47a, 0xf47b, /*0x50-0x57*/
05993 0xf47c, 0xf47d, 0xf47e, 0xf480, 0xf481, 0xf482, 0xf483, 0xf484, /*0x58-0x5f*/
05994 0xf485, 0xf486, 0xf487, 0xf488, 0xf489, 0xf48a, 0xf48b, 0xf48c, /*0x60-0x6f*/
05995 0xf48d, 0xf48e, 0xf48f, 0xf490, 0xf491, 0xf492, 0xf493, 0xf494, /*0x68-0x6f*/
05996 0xf495, 0xf496, 0xf497, 0xf498, 0xf499, 0xf49a, 0xf49b, 0xf49c, /*0x70-0x77*/
05997 0xf49d, 0xf49e, 0xf49f, 0xf4a0, 0xf540, 0xf541, 0xf542, 0xf543, /*0x78-0x7f*/
05998 0xf544, 0xf545, 0xf546, 0xf547, 0xf548, 0xf549, 0xf54a, 0xf54b, /*0x80-0x87*/
05999 0xf54c, 0xf54d, 0xf54e, 0xf54f, 0xf550, 0xf551, 0xf552, 0xf553, /*0x88-0x8f*/
06000 0xf554, 0xf555, 0xf556, 0xf557, 0xf558, 0xf559, 0xf55a, 0xf55b, /*0x90-0x97*/
06001 0xf55c, 0xf55d, 0xf55e, 0xf55f, 0xf560, 0xf561, 0xf562, 0xf563, /*0x98-0x9f*/
06002 0xf564, 0xf565, 0xf566, 0xf567, 0xf568, 0xf569, 0xf56a, 0xf56b, /*0xa0-0xa7*/
06003 0xf56c, 0xf56d, 0xf56e, 0xf56f, 0xf570, 0xf571, 0xf572, 0xf573, /*0xa8-0xaf*/
06004 0xf574, 0xf575, 0xf576, 0xf577, 0xf578, 0xf579, 0xf57a, 0xf57b, /*0xb0-0xb7*/
06005 0xf57c, 0xf57d, 0xf57e, 0xf580, 0xf581, 0xf582, 0xf583, 0xf584, /*0xb8-0xbf*/
06006 0xf585, 0xf586, 0xf587, 0xf588, 0xf589, 0xf58a, 0xf58b, 0xf58c, /*0xc0-0xc7*/
06007 0xf58d, 0xf58e, 0xf58f, 0xf590, 0xf591, 0xf592, 0xf593, 0xf594, /*0xc8-0xcf*/
06008 0xf595, 0xf596, 0xf597, 0xf598, 0xf599, 0xf59a, 0xf59b, 0xf59c, /*0xd0-0xd7*/
06009 0xf59d, 0xf59e, 0xf59f, 0xf5a0, 0xf640, 0xf641, 0xf642, 0xf643, /*0xd8-0xdf*/
06010 0xf644, 0xf645, 0xf646, 0xf647, 0xf648, 0xf649, 0xf64a, 0xf64b, /*0xe0-0xe7*/
06011 0xf64c, 0xf64d, 0xf64e, 0xf64f, 0xf650, 0xf651, 0xf652, 0xf653, /*0xe8-0xef*/
06012 0xf654, 0xf655, 0xf656, 0xf657, 0xf658, 0xf659, 0xf65a, 0xf65b, /*0xf0-0xf7*/
06013 0xf65c, 0xf65d, 0xf65e, 0xf65f, 0xf660, 0xf661, 0xf662, 0xf663, /*0xf8-0xff*/
06014 /* 0x9c00 */
06015 0xf664, 0xf665, 0xf666, 0xf667, 0xf668, 0xf669, 0xf66a, 0xf66b, /*0x00-0x07*/
06016 0xf66c, 0xf66d, 0xf66e, 0xf66f, 0xf670, 0xf671, 0xf672, 0xf673, /*0x08-0x0f*/
06017 0xf674, 0xf675, 0xf676, 0xf677, 0xf678, 0xf679, 0xf67a, 0xf67b, /*0x10-0x17*/
06018 0xf67c, 0xf67d, 0xf67e, 0xf680, 0xf681, 0xf682, 0xf683, 0xf684, /*0x18-0x1f*/
06019 0xf685, 0xf686, 0xf687, 0xf688, 0xf689, 0xf68a, 0xf68b, 0xf68c, /*0x20-0x27*/
06020 0xf68d, 0xf68e, 0xf68f, 0xf690, 0xf691, 0xf692, 0xf693, 0xf694, /*0x28-0x2f*/
06021 0xf695, 0xf696, 0xf697, 0xf698, 0xf699, 0xf69a, 0xf69b, 0xf69c, /*0x30-0x37*/
06022 0xf69d, 0xf69e, 0xf69f, 0xf6a0, 0xf740, 0xf741, 0xf742, 0xf743, /*0x38-0x3f*/
06023 0xf744, 0xf745, 0xf746, 0xf747, 0xf748, 0xf749, 0xf74a, 0xf74b, /*0x40-0x47*/
06024 0xf74c, 0xf74d, 0xf74e, 0xf74f, 0xf750, 0xf751, 0xf752, 0xf753, /*0x48-0x4f*/
06025 0xf754, 0xf755, 0xf756, 0xf757, 0xf758, 0xf759, 0xf75a, 0xf75b, /*0x50-0x57*/
06026 0xf75c, 0xf75d, 0xf75e, 0xf75f, 0xf760, 0xf761, 0xf762, 0xf763, /*0x58-0x5f*/
06027 0xf764, 0xf765, 0xf766, 0xf767, 0xf768, 0xf769, 0xf76a, 0xf76b, /*0x60-0x67*/
06028 0xf76c, 0xf76d, 0xf76e, 0xf76f, 0xf770, 0xf771, 0xf772, 0xf773, /*0x68-0x6f*/
06029 0xf774, 0xf775, 0xf776, 0xf777, 0xf778, 0xf779, 0xf77a, 0xf77b, /*0x70-0x77*/
06030 0xf77c, 0xf77d, 0xf77e, 0xf780, 0xd3e3, 0xf781, 0xf782, 0xf6cf, /*0x78-0x7f*/
06031 0xf783, 0xc2b3, 0xf784, 0xf785, 0xf6d1, 0xf6d2, 0xf6d3, 0xf6d4, /*0x80-0x87*/
06032 0xf6d4, 0xf786, 0xf787, 0xf6d6, 0xf788, 0xb1ab, 0xf6d7, 0xf789, /*0x88-0x8f*/
06033 0xf6d8, 0xf6d9, 0xf6da, 0xf78a, 0xf6db, 0xf6dc, 0xf78b, 0xf78c, /*0x90-0x97*/
06034 0xf78d, 0xf78e, 0xf6de, 0xcfcf, 0xf78f, 0xf6df, 0xf6e0, 0xf6e1, /*0x98-0x9f*/
06035 0xf6e1, 0xf6e2, 0xf6e3, 0xf6e4, 0xc0f0, 0xf6e5, 0xf6e6, 0xf6e7, /*0xa0-0xaf*/
06036 0xf6e8, 0xf6e9, 0xf790, 0xf6ea, 0xf791, 0xf6eb, 0xf6ec, 0xf792, /*0xa8-0xaf*/
06037 0xf6ed, 0xf6ee, 0xf6ef, 0xf6f0, 0xf6f1, 0xf6f2, 0xf6f3, 0xf6f4, /*0xb0-0xbf*/
06038 0xb6ea, 0xf793, 0xf6f5, 0xf6f6, 0xf6f7, 0xf6f8, 0xf794, 0xf795, /*0xb8-0xbf*/
06039 0xf796, 0xf797, 0xf798, 0xc8fa, 0xf6f9, 0xf6fa, 0xf6fb, 0xf6fc, /*0xc0-0xc7*/
06040 0xf799, 0xf79a, 0xf6fd, 0xf6fe, 0xf7a1, 0xf7a2, 0xf7a3, 0xf7a4, /*0xc8-0xcf*/
06041 0xf7a5, 0xf79b, 0xf79c, 0xf7a6, 0xf7a7, 0xf7a8, 0xb1ee, 0xf7a9, /*0xd0-0xd7*/
06042 0xf7aa, 0xf7ab, 0xf79d, 0xf79e, 0xf7ac, 0xf7ad, 0xc1db, 0xf7ae, /*0xd8-0xdf*/
06043 0xf79f, 0xf7a0, 0xf7af, 0xf840, 0xf841, 0xf842, 0xf843, 0xf844, /*0xe0-0xe7*/
06044 0xf845, 0xf846, 0xf847, 0xf848, 0xf849, 0xf84a, 0xf84b, 0xf84c, /*0xe8-0xef*/
06045 0xf84d, 0xf84e, 0xf84f, 0xf850, 0xf851, 0xf852, 0xf853, 0xf854, /*0xf0-0xf7*/
06046 0xf855, 0xf856, 0xf857, 0xf858, 0xf859, 0xf85a, 0xf85b, 0xf85c, /*0xf8-0xff*/
06047 /* 0x9d00 */
06048 0xf85d, 0xf85e, 0xf85f, 0xf860, 0xf861, 0xf862, 0xf863, 0xf864, /*0x00-0x07*/
06049 0xf865, 0xf866, 0xf867, 0xf868, 0xf869, 0xf86a, 0xf86b, 0xf86c, /*0x08-0x0f*/
06050 0xf86d, 0xf86e, 0xf86f, 0xf870, 0xf871, 0xf872, 0xf873, 0xf874, /*0x10-0x17*/
06051 0xf875, 0xf876, 0xf877, 0xf878, 0xf879, 0xf87a, 0xf87b, 0xf87c, /*0x18-0x1f*/
06052 0xf87d, 0xf87e, 0xf880, 0xf881, 0xf882, 0xf883, 0xf884, 0xf885, /*0x20-0x27*/
06053 0xf886, 0xf887, 0xf888, 0xf889, 0xf88a, 0xf88b, 0xf88c, 0xf88d, /*0x28-0x2f*/
06054 0xf88e, 0xf88f, 0xf890, 0xf891, 0xf892, 0xf893, 0xf894, 0xf895, /*0x30-0x37*/
06055 0xf896, 0xf897, 0xf898, 0xf899, 0xf89a, 0xf89b, 0xf89c, 0xf89d, /*0x38-0x3f*/
06056 0xf89e, 0xf89f, 0xf8a0, 0xf940, 0xf941, 0xf942, 0xf943, 0xf944, /*0x40-0x47*/
06057 0xf945, 0xf946, 0xf947, 0xf948, 0xf949, 0xf94a, 0xf94b, 0xf94c, /*0x48-0x4f*/
06058 0xf94d, 0xf94e, 0xf94f, 0xf950, 0xf951, 0xf952, 0xf953, 0xf954, /*0x50-0x57*/
06059 0xf955, 0xf956, 0xf957, 0xf958, 0xf959, 0xf95a, 0xf95b, 0xf95c, /*0x58-0x5f*/
06060 0xf95d, 0xf95e, 0xf95f, 0xf960, 0xf961, 0xf962, 0xf963, 0xf964, /*0x60-0x67*/
06061 0xf965, 0xf966, 0xf967, 0xf968, 0xf969, 0xf96a, 0xf96b, 0xf96c, /*0x68-0x6f*/
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06062 0xf96d, 0xf96e, 0xf96f, 0xf970, 0xf971, 0xf972, 0xf973, 0xf974, /*0x70-0x77*/
06063 0xf975, 0xf976, 0xf977, 0xf978, 0xf979, 0xf97a, 0xf97b, 0xf97c, /*0x78-0x7f*/
06064 0xf97d, 0xf97e, 0xf97f, 0xf980, 0xf981, 0xf982, 0xf983, 0xf984, /*0x80-0x87*/
06065 0xf986, 0xf987, 0xf988, 0xf989, 0xf98a, 0xf98b, 0xf98c, 0xf98d, /*0x88-0x8f*/
06066 0xf98e, 0xf98f, 0xf990, 0xf991, 0xf992, 0xf993, 0xf994, 0xf995, /*0x90-0x97*/
06067 0xf996, 0xf997, 0xf998, 0xf999, 0xf99a, 0xf99b, 0xf99c, 0xf99d, /*0x98-0x9f*/
06068 0xf99e, 0xf99f, 0xf9a0, 0xfa40, 0xfa41, 0xfa42, 0xfa43, 0xfa44, /*0xa0-0xa7*/
06069 0xfa45, 0xfa46, 0xfa47, 0xfa48, 0xfa49, 0xfa4a, 0xfa4b, 0xfa4c, /*0xa8-0xaf*/
06070 0xfa4d, 0xfa4e, 0xfa4f, 0xfa50, 0xfa51, 0xfa52, 0xfa53, 0xfa54, /*0xb0-0xb7*/
06071 0xfa55, 0xfa56, 0xfa57, 0xfa58, 0xfa59, 0xfa5a, 0xfa5b, 0xfa5c, /*0xb8-0xbf*/
06072 0xfa5d, 0xfa5e, 0xfa5f, 0xfa60, 0xfa61, 0xfa62, 0xfa63, 0xfa64, /*0xc0-0xc7*/
06073 0xfa65, 0xfa66, 0xfa67, 0xfa68, 0xfa69, 0xfa6a, 0xfa6b, 0xfa6c, /*0xc8-0xcf*/
06074 0xfa6d, 0xfa6e, 0xfa6f, 0xfa70, 0xfa71, 0xfa72, 0xfa73, 0xfa74, /*0xd0-0xd7*/
06075 0xfa75, 0xfa76, 0xfa77, 0xfa78, 0xfa79, 0xfa7a, 0xfa7b, 0xfa7c, /*0xd8-0xdf*/
06076 0xfa7d, 0xfa7e, 0xfa7f, 0xfa80, 0xfa81, 0xfa82, 0xfa83, 0xfa84, 0xfa85, /*0xe0-0xe7*/
06077 0xfa86, 0xfa87, 0xfa88, 0xfa89, 0xfa8a, 0xfa8b, 0xfa8c, 0xfa8d, /*0xe8-0xef*/
06078 0xfa8e, 0xfa8f, 0xfa90, 0xfa91, 0xfa92, 0xfa93, 0xfa94, 0xfa95, /*0xf0-0xf7*/
06079 0xfa96, 0xfa97, 0xfa98, 0xfa99, 0xfa9a, 0xfa9b, 0xfa9c, 0xfa9d, /*0xf8-0xff*/
06080 /* 0x9e00 */
06081 0xfa9e, 0xfa9f, 0xfaa0, 0xfb40, 0xfb41, 0xfb42, 0xfb43, 0xfb44, /*0x00-0x07*/
06082 0xfb45, 0xfb46, 0xfb47, 0xfb48, 0xfb49, 0xfb4a, 0xfb4b, 0xfb4c, /*0x08-0x0f*/
06083 0xfb4d, 0xfb4e, 0xfb4f, 0xfb50, 0xfb51, 0xfb52, 0xfb53, 0xfb54, /*0x10-0x17*/
06084 0xfb55, 0xfb56, 0xfb57, 0xfb58, 0xfb59, 0xfb5a, 0xfb5b, 0xc4f1, /*0x18-0x1f*/
06085 0xf0af, 0xbca6, 0xf0b0, 0xc3f9, 0xf0b5, 0xc5b8, 0xd1bb, 0xf0b5d, /*0x20-0x27*/
06086 0xf0b1, 0xf0b2, 0xf0b3, 0xf0b4, 0xf0b5, 0xd1bc, 0xf0b5e, 0xd1ec, /*0x28-0x2f*/
06087 0xf0b5f, 0xf0b7, 0xf0b6, 0xd4a7, 0xf0b60, 0xcd2, 0xf0b8, 0xf0ba, /*0x30-0x37*/
06088 0xf0b9, 0xf0bb, 0xf0bc, 0xf0b61, 0xf0b62, 0xb8e8, 0xf0bd, 0xbae8, /*0x38-0x3f*/
06089 0xf0b63, 0xf0be, 0xf0bf, 0xb8e9, 0xf0c0, 0xb8ec, 0xf0c1, 0xf0c2, /*0x40-0x47*/
06090 0xf0c3, 0xf0c4, 0xc8b5, 0xf0c5, 0xf0c6, 0xf0c64, 0xf0c7, 0xc5f4, /*0x48-0x4f*/
06091 0xf0c8, 0xf0c8, 0xf0c8, 0xf0c8, 0xf0c9, 0xf0c9, 0xf0c9, 0xf0ca, /*0x50-0x57*/
06092 0xf7bd, 0xfb6a, 0xf0cb, 0xf0cc, 0xf0cd, 0xfb6b, 0xf0ce, 0xfb6c, /*0x58-0x5f*/
06093 0xfb6d, 0xfb6e, 0xfb6f, 0xf0cf, 0xbad7, 0xfb70, 0xf0d0, 0xf0d1, /*0x60-0x67*/
06094 0xf0d2, 0xf0d3, 0xf0d4, 0xf0d4, 0xf0d4, 0xf0d4, 0xf0d4, 0xfb71, 0xfb72, /*0x68-0x6f*/
06095 0xd3a5, 0xf0d7, 0xfb73, 0xf0d9, 0xfb74, 0xfb75, 0xfb76, 0xfb77, /*0x70-0x77*/
06096 0xfb78, 0xfb79, 0xfb7a, 0xfb7b, 0xfb7c, 0xfb7d, 0xf5ba, 0xc2b9, /*0x78-0x7f*/
06097 0xfb7e, 0xfb80, 0xf7e4, 0xfb81, 0xfb82, 0xfb83, 0xfb84, 0xf7e5, /*0x80-0x87*/
06098 0xf7e6, 0xfb85, 0xfb86, 0xf7e7, 0xfb87, 0xfb88, 0xfb89, 0xfb8a, /*0x88-0x8f*/
06099 0xfb8b, 0xfb8c, 0xf7e8, 0xc2b4, 0xfb8d, 0xfb8e, 0xfb8f, 0xfb90, /*0x90-0x97*/
06100 0xfb91, 0xfb92, 0xfb93, 0xfb94, 0xfb95, 0xf7ea, 0xfb96, 0xf7eb, /*0x98-0x9f*/
06101 0xfb97, 0xfb98, 0xfb99, 0xfb9a, 0xfb9b, 0xfb9c, 0xc2f3, 0xfb9d, /*0xa0-0xa7*/
06102 0xfb9e, 0xfb9f, 0xfba0, 0xfc40, 0xfc41, 0xfc42, 0xfc43, 0xfc44, /*0xa8-0xaf*/
06103 0xfc45, 0xfc46, 0xfc47, 0xfc48, 0xfc49, 0xfc4a, 0xfc4a, 0xfc4b, /*0xb0-0xb7*/
06104 0xf4ef, 0xfc4c, 0xfc4d, 0xc2e9, 0xfc4e, 0xf7e1, 0xf7e2, 0xfc4f, /*0xb8-0xbf*/
06105 0xfc50, 0xfc51, 0xfc52, 0xfc53, 0xbbc6, 0xfc54, 0xfc55, 0xfc56, /*0xc0-0xc7*/
06106 0xfc57, 0xd9e4, 0xfc58, 0xfc59, 0xfc5a, 0xcaf2, 0xc0e8, 0xf0a4, /*0xc8-0xcf*/
06107 0xfc5b, 0xbada, 0xfc5c, 0xfc5d, 0xc7ad, 0xfc5e, 0xfc5f, 0xfc60, /*0xd0-0xd7*/
06108 0xc4ac, 0xfc61, 0xfc62, 0xf7ec, 0xf7ed, 0xf7ee, 0xfc63, 0xf7f0, /*0xd8-0xdf*/
06109 0xf7ef, 0xfc64, 0xf7f1, 0xfc65, 0xfc66, 0xf7f4, 0xfc67, 0xf7f3, /*0xe0-0xe7*/
06110 0xfc68, 0xf7f2, 0xf7f5, 0xfc69, 0xfc6a, 0xfc6b, 0xfc6c, 0xf7f6, /*0xe8-0xef*/
06111 0xfc6d, 0xfc6e, 0xfc6f, 0xfc70, 0xfc71, 0xfc72, 0xfc73, 0xfc74, /*0xf0-0xf7*/
06112 0xfc75, 0xede9, 0xfc76, 0xede9, 0xede9, 0xfc77, 0xf6bc, 0xfc78, /*0xf8-0xff*/
06113 /* 0x9f00 */
06114 0xfc79, 0xfc7a, 0xfc7b, 0xfc7c, 0xfc7d, 0xfc7e, 0xfc80, 0xfc81, /*0x00-0x07*/
06115 0xfc82, 0xfc83, 0xfc84, 0xf6bd, 0xfc85, 0xf6be, 0xb6a6, 0xfc86, /*0x08-0x0f*/
06116 0xd8be, 0xfc87, 0xfc88, 0xb9c4, 0xfc89, 0xfc8a, 0xfc8b, 0xd8bb, /*0x10-0x17*/
06117 0xfc8c, 0xdcbl, 0xfc8d, 0xfc8e, 0xfc8f, 0xfc90, 0xfc91, 0xfc92, /*0x18-0x1f*/
06118 0xcacf, 0xfc93, 0xf7f7, 0xfc94, 0xfc95, 0xfc96, 0xfc97, 0xfc98, /*0x20-0x27*/
06119 0xfc99, 0xfc9a, 0xfc9b, 0xfc9c, 0xf7f8, 0xfc9d, 0xfc9e, 0xf7f9, /*0x28-0x2f*/
06120 0xfc9f, 0xfca0, 0xfd40, 0xfd41, 0xfd42, 0xfd43, 0xfd44, 0xf7fb, /*0x30-0x37*/
06121 0xfd45, 0xf7fa, 0xfd46, 0xb1c7, 0xfd47, 0xf7fc, 0xf7fd, 0xfd48, /*0x38-0x3f*/
06122 0xfd49, 0xfd4a, 0xfd4b, 0xfd4c, 0xf7fe, 0xfd4d, 0xfd4e, 0xfd4f, /*0x40-0x47*/
06123 0xfd50, 0xfd51, 0xfd52, 0xfd53, 0xfd54, 0xfd55, 0xfd56, 0xfd57, /*0x48-0x4f*/
06124 0xc6eb, 0xecb4, 0xfd58, 0xfd59, 0xfd5a, 0xfd5b, 0xfd5c, 0xfd5d, /*0x50-0x57*/
06125 0xfd5e, 0xfd5f, 0xfd60, 0xfd61, 0xfd62, 0xfd63, 0xfd64, 0xfd65, /*0x58-0x5f*/
06126 0xfd66, 0xfd67, 0xfd68, 0xfd69, 0xfd6a, 0xfd6b, 0xfd6c, 0xfd6d, /*0x60-0x67*/
06127 0xfd6e, 0xfd6f, 0xfd70, 0xfd71, 0xfd72, 0xfd73, 0xfd74, 0xfd75, /*0x68-0x6f*/
06128 0xfd76, 0xfd77, 0xfd78, 0xfd79, 0xfd7a, 0xfd7b, 0xfd7c, 0xfd7d, /*0x70-0x77*/
06129 0xfd7e, 0xfd80, 0xfd81, 0xfd82, 0xfd83, 0xfd84, 0xfd85, 0xb3dd, /*0x78-0x7f*/
06130 0xf6b3, 0xfd86, 0xfd87, 0xf6b4, 0xc1e4, 0xf6b5, 0xf6b6, 0xf6b7, /*0x80-0x87*/
06131 0xf6b8, 0xf6b9, 0xf6ba, 0xc8a3, 0xf6bb, 0xfd88, 0xfd89, 0xfd8a, /*0x88-0x8f*/
06132 0xfd8b, 0xfd8c, 0xfd8d, 0xfd8e, 0xfd8f, 0xfd90, 0xfd91, 0xfd92, /*0x90-0x97*/
06133 0xfd93, 0xc1fa, 0xb9a8, 0xede8, 0xfd94, 0xfd95, 0xfd96, 0xb9ea, /*0x98-0x9f*/
06134 0xd9df, 0xfd97, 0xfd98, 0xfd99, 0xfd9a, 0xfd9b, 0x0000, 0x0000, /*0xa0-0xa7*/
06135 };
06136 static const unsigned short cp936ext_page1f2f[32] = {
06137 0x0000, 0xfd9d, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x78-0x7f*/
06138 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x80-0x87*/
06139 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x88-0x8f*/
06140 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xfd9e, 0x0000, 0x0000, /*0x90-0x97*/
06141 };
06142 static const unsigned short cp936ext_page1f3c[24] = {
06143 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xfd9f, /*0xe0-0xe7*/
06144 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xe8-0xef*/
06145 0x0000, 0xfda0, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0xf0-0xf7*/
06146 };
06147 static const unsigned short cp936ext_page1f41[40] = {
06148 0x0000, 0x0000, 0x0000, 0x0000, 0xfe40, 0xfe41, 0xfe42, 0xfe43, /*0x08-0x0f*/

```

```

06149 0x0000, 0xfe44, 0x0000, 0xfe45, 0xfe46, 0x0000, 0x0000, 0x0000, /*0x10-0x17*/
06150 0xfe47, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0xfe48, /*0x18-0x1f*/
06151 0xfe49, 0xfe4a, 0x0000, 0xfe4b, 0xfe4c, 0x0000, 0x0000, 0xfe4d, /*0x20-0x27*/
06152 0xfe4e, 0xfe4f, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, 0x0000, /*0x28-0x2f*/
06153 };
06154 static const unsigned short cp936ext_page1fc6[64] = {
06155 0xa955, 0xa6f2, 0x0000, 0xa6f4, 0xa6f5, 0xa6e0, 0xa6e1, 0xa6f0, /*0x30-0x37*/
06156 0xa6f1, 0xa6e2, 0xa6e3, 0xa6ee, 0xa6ef, 0xa6e6, 0xa6e7, 0xa6e4, /*0x38-0x3f*/
06157 0xa6e5, 0xa6e8, 0xa6e9, 0xa6ea, 0xa6eb, 0x0000, 0x0000, 0x0000, /*0x40-0x47*/
06158 0x0000, 0xa968, 0xa969, 0xa96a, 0xa96b, 0xa96c, 0xa96d, 0xa96e, /*0x48-0x4f*/
06159 0xa96f, 0xa970, 0xa971, 0x0000, 0xa972, 0xa973, 0xa974, 0xa975, /*0x50-0x57*/
06160 0x0000, 0xa976, 0xa977, 0xa978, 0xa979, 0xa97a, 0xa97b, 0xa97c, /*0x58-0x5f*/
06161 0xa97d, 0xa97e, 0xa980, 0xa981, 0xa982, 0xa983, 0xa984, 0x0000, /*0x60-0x67*/
06162 0xa985, 0xa986, 0xa987, 0xa988, 0x0000, 0x0000, 0x0000, 0x0000, /*0x68-0x6f*/
06163 };
06164 static const unsigned short cp936ext_page1fe0[96] = {
06165 0x0000, 0xa3a1, 0xa3a2, 0xa3a3, 0xa1e7, 0xa3a5, 0xa3a6, 0xa3a7, /*0x00-0x07*/
06166 0xa3a8, 0xa3a9, 0xa3aa, 0xa3ab, 0xa3ac, 0xa3ad, 0xa3ae, 0xa3af, /*0x08-0x0f*/
06167 0xa3b0, 0xa3b1, 0xa3b2, 0xa3b3, 0xa3b4, 0xa3b5, 0xa3b6, 0xa3b7, /*0x10-0x17*/
06168 0xa3b8, 0xa3b9, 0xa3ba, 0xa3bb, 0xa3bc, 0xa3bd, 0xa3be, 0xa3bf, /*0x18-0x1f*/
06169 0xa3c0, 0xa3c1, 0xa3c2, 0xa3c3, 0xa3c4, 0xa3c5, 0xa3c6, 0xa3c7, /*0x20-0x27*/
06170 0xa3c8, 0xa3c9, 0xa3ca, 0xa3cb, 0xa3cc, 0xa3cd, 0xa3ce, 0xa3cf, /*0x28-0x2f*/
06171 0xa3d0, 0xa3d1, 0xa3d2, 0xa3d3, 0xa3d4, 0xa3d5, 0xa3d6, 0xa3d7, /*0x30-0x37*/
06172 0xa3d8, 0xa3d9, 0xa3da, 0xa3db, 0xa3dc, 0xa3dd, 0xa3de, 0xa3df, /*0x38-0x3f*/
06173 0xa3e0, 0xa3e1, 0xa3e2, 0xa3e3, 0xa3e4, 0xa3e5, 0xa3e6, 0xa3e7, /*0x40-0x47*/
06174 0xa3e8, 0xa3e9, 0xa3ea, 0xa3eb, 0xa3ec, 0xa3ed, 0xa3ee, 0xa3ef, /*0x48-0x4f*/
06175 0xa3f0, 0xa3f1, 0xa3f2, 0xa3f3, 0xa3f4, 0xa3f5, 0xa3f6, 0xa3f7, /*0x50-0x57*/
06176 0xa3f8, 0xa3f9, 0xa3fa, 0xa3fb, 0xa3fc, 0xa3fd, 0xa1ab, 0x0000, /*0x58-0x5f*/
06177 };
06178 static const unsigned short cp936ext_page1ffc[8] = {
06179 0xale9, 0xalea, 0xa956, 0xa3fe, 0xa957, 0xa3a4, 0x0000, 0x0000, /*0xe0-0xe7*/
06180 };
06181
06182 static int
06183 cp936ext_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
06184 {
06185     if (n >= 2) {
06186         unsigned short c = 0;
06187         if (wc >= 0x00a0 && wc < 0x0170)
06188             c = cp936ext_page0014[wc-0x00a0];
06189         else if (wc >= 0x01c8 && wc < 0x01e0)
06190             c = cp936ext_page0039[wc-0x01c8];
06191         else if (wc >= 0x0250 && wc < 0x0268)
06192             c = cp936ext_page004a[wc-0x0250];
06193         else if (wc >= 0x02c0 && wc < 0x02e0)
06194             c = cp936ext_page0058[wc-0x02c0];
06195         else if (wc >= 0x0390 && wc < 0x03d0)
06196             c = cp936ext_page0072[wc-0x0390];
06197         else if (wc >= 0x0400 && wc < 0x0458)
06198             c = cp936ext_page0080[wc-0x0400];
06199         else if (wc >= 0x2010 && wc < 0x2040)
06200             c = cp936ext_page0402[wc-0x2010];
06201         else if (wc >= 0x2100 && wc < 0x21a0)
06202             c = cp936ext_page0420[wc-0x2100];
06203         else if (wc >= 0x2208 && wc < 0x22c0)
06204             c = cp936ext_page0441[wc-0x2208];
06205         else if (wc == 0x2312)
06206             c = 0xa1d0;
06207         else if (wc >= 0x2460 && wc < 0x24a0)
06208             c = cp936ext_page048c[wc-0x2460];
06209         else if (wc >= 0x2500 && wc < 0x25e8)
06210             c = cp936ext_page04a0[wc-0x2500];
06211         else if (wc >= 0x2600 && wc < 0x2648)
06212             c = cp936ext_page04c0[wc-0x2600];
06213         else if (wc >= 0x3000 && wc < 0x3130)
06214             c = cp936ext_page0600[wc-0x3000];
06215         else if (wc >= 0x3220 && wc < 0x3238)
06216             c = cp936ext_page0644[wc-0x3220];
06217         else if (wc == 0x32a3)
06218             c = 0xa949;
06219         else if (wc >= 0x3388 && wc < 0x33d8)
06220             c = cp936ext_page0671[wc-0x3388];
06221         else if (wc >= 0x4e00 && wc < 0x9fa8)
06222             c = cp936ext_page09c0[wc-0x4e00];
06223         else if (wc == 0xf92c)
06224             c = 0xfd9c;
06225         else if (wc >= 0xf978 && wc < 0xf998)
06226             c = cp936ext_page1f2f[wc-0xf978];
06227         else if (wc >= 0xf9e0 && wc < 0xf9f8)
06228             c = cp936ext_page1f3c[wc-0xf9e0];
06229         else if (wc >= 0xfa08 && wc < 0xfa30)
06230             c = cp936ext_page1f41[wc-0xfa08];
06231         else if (wc >= 0xfe30 && wc < 0xfe70)
06232             c = cp936ext_page1fc6[wc-0xfe30];
06233         else if (wc >= 0xff00 && wc < 0xff60)
06234             c = cp936ext_page1fe0[wc-0xff00];
06235         else if (wc >= 0xffe0 && wc < 0xffe8)

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06236     c = cp936ext_page1ffc[wc-0xffe0];
06237     if (c != 0) {
06238         r[0] = (c >> 8); r[1] = (c & 0xff);
06239         return 2;
06240     }
06241     return RET_ILSEQ;
06242 }
06243 return RET_TOOSMALL;
06244 }
06245 #endif /* NEED_TOMB */
06246
06247 #endif /* CP936 */
06248
06249 #endif /* _WIN32 || __APPLE__ */ /* PORTIME: Unicode stuff */

```

13.267 gb2312.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/gb2312.h,v 1.5 2003/05/27 22:26:29 tsi Exp $ */
00002
00003 /*
00004  * GB2312.1980-0
00005  */
00006 #ifdef NEED_TOWC
00007 static const unsigned short gb2312_2uni_page21[831] = {
00008     /* 0x21 */
00009     0x3000, 0x3001, 0x3002, 0x30fb, 0x02c9, 0x02c7, 0x00a8, 0x3003,
00010     0x3005, 0x2015, 0xff5e, 0x2016, 0x2026, 0x2018, 0x2019, 0x201c,
00011     0x201d, 0x3014, 0x3015, 0x3008, 0x3009, 0x300a, 0x300b, 0x300c,
00012     0x300d, 0x300e, 0x300f, 0x3016, 0x3017, 0x3010, 0x3011, 0x00b1,
00013     0x00d7, 0x00f7, 0x2236, 0x2227, 0x2228, 0x2211, 0x220f, 0x222a,
00014     0x2229, 0x2208, 0x2237, 0x221a, 0x22a5, 0x2225, 0x2220, 0x2312,
00015     0x2299, 0x222b, 0x222e, 0x2261, 0x224c, 0x2248, 0x223d, 0x221d,
00016     0x2260, 0x226e, 0x226f, 0x2264, 0x2265, 0x221e, 0x2235, 0x2234,
00017     0x2642, 0x2640, 0x00b0, 0x2032, 0x2033, 0x2103, 0xff04, 0x00a4,
00018     0xffe0, 0xffe1, 0x2030, 0x00a7, 0x2116, 0x2606, 0x2605, 0x25cb,
00019     0x25cf, 0x25ce, 0x25c7, 0x25c6, 0x25a1, 0x25a0, 0x25b3, 0x25b2,
00020     0x203b, 0x2192, 0x2190, 0x2191, 0x2193, 0x3013,
00021     /* 0x22 */
00022     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00023     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00024     0x2488, 0x2489, 0x248a, 0x248b, 0x248c, 0x248d, 0x248e, 0x248f,
00025     0x2490, 0x2491, 0x2492, 0x2493, 0x2494, 0x2495, 0x2496, 0x2497,
00026     0x2498, 0x2499, 0x249a, 0x249b, 0x247a, 0x2475, 0x2476, 0x2477,
00027     0x2478, 0x2479, 0x247a, 0x247b, 0x247c, 0x247d, 0x247e, 0x247f,
00028     0x2480, 0x2481, 0x2482, 0x2483, 0x2484, 0x2485, 0x2486, 0x2487,
00029     0x2460, 0x2461, 0x2462, 0x2463, 0x2464, 0x2465, 0x2466, 0x2467,
00030     0x2468, 0x2469, 0xfffd, 0xfffd, 0x3220, 0x3221, 0x3222, 0x3223,
00031     0x3224, 0x3225, 0x3226, 0x3227, 0x3228, 0x3229, 0xfffd, 0xfffd,
00032     0x2160, 0x2161, 0x2162, 0x2163, 0x2164, 0x2165, 0x2166, 0x2167,
00033     0x2168, 0x2169, 0x216a, 0x216b, 0xfffd, 0xfffd,
00034     /* 0x23 */
00035     0xff01, 0xff02, 0xff03, 0xffe5, 0xff05, 0xff06, 0xff07, 0xff08,
00036     0xff09, 0xff0a, 0xff0b, 0xff0c, 0xff0d, 0xff0e, 0xff0f, 0xff10,
00037     0xff11, 0xff12, 0xff13, 0xff14, 0xff15, 0xff16, 0xff17, 0xff18,
00038     0xff19, 0xff1a, 0xff1b, 0xff1c, 0xff1d, 0xff1e, 0xff1f, 0xff20,
00039     0xff21, 0xff22, 0xff23, 0xff24, 0xff25, 0xff26, 0xff27, 0xff28,
00040     0xff29, 0xff2a, 0xff2b, 0xff2c, 0xff2d, 0xff2e, 0xff2f, 0xff30,
00041     0xff31, 0xff32, 0xff33, 0xff34, 0xff35, 0xff36, 0xff37, 0xff38,
00042     0xff39, 0xff3a, 0xff3b, 0xff3c, 0xff3d, 0xff3e, 0xff3f, 0xff40,
00043     0xff41, 0xff42, 0xff43, 0xff44, 0xff45, 0xff46, 0xff47, 0xff48,
00044     0xff49, 0xff4a, 0xff4b, 0xff4c, 0xff4d, 0xff4e, 0xff4f, 0xff50,
00045     0xff51, 0xff52, 0xff53, 0xff54, 0xff55, 0xff56, 0xff57, 0xff58,
00046     0xff59, 0xff5a, 0xff5b, 0xff5c, 0xff5d, 0xffe3,
00047     /* 0x24 */
00048     0x3041, 0x3042, 0x3043, 0x3044, 0x3045, 0x3046, 0x3047, 0x3048,
00049     0x3049, 0x304a, 0x304b, 0x304c, 0x304d, 0x304e, 0x304f, 0x3050,
00050     0x3051, 0x3052, 0x3053, 0x3054, 0x3055, 0x3056, 0x3057, 0x3058,
00051     0x3059, 0x305a, 0x305b, 0x305c, 0x305d, 0x305e, 0x305f, 0x3060,
00052     0x3061, 0x3062, 0x3063, 0x3064, 0x3065, 0x3066, 0x3067, 0x3068,
00053     0x3069, 0x306a, 0x306b, 0x306c, 0x306d, 0x306e, 0x306f, 0x3070,
00054     0x3071, 0x3072, 0x3073, 0x3074, 0x3075, 0x3076, 0x3077, 0x3078,
00055     0x3079, 0x307a, 0x307b, 0x307c, 0x307d, 0x307e, 0x307f, 0x3080,
00056     0x3081, 0x3082, 0x3083, 0x3084, 0x3085, 0x3086, 0x3087, 0x3088,
00057     0x3089, 0x308a, 0x308b, 0x308c, 0x308d, 0x308e, 0x308f, 0x3090,
00058     0x3091, 0x3092, 0x3093, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00059     0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00060     /* 0x25 */
00061     0x30a1, 0x30a2, 0x30a3, 0x30a4, 0x30a5, 0x30a6, 0x30a7, 0x30a8,
00062     0x30a9, 0x30aa, 0x30ab, 0x30ac, 0x30ad, 0x30ae, 0x30af, 0x30b0,
00063     0x30b1, 0x30b2, 0x30b3, 0x30b4, 0x30b5, 0x30b6, 0x30b7, 0x30b8,
00064     0x30b9, 0x30ba, 0x30bb, 0x30bc, 0x30bd, 0x30be, 0x30bf, 0x30c0,
00065     0x30c1, 0x30c2, 0x30c3, 0x30c4, 0x30c5, 0x30c6, 0x30c7, 0x30c8,
00066     0x30c9, 0x30ca, 0x30cb, 0x30cc, 0x30cd, 0x30ce, 0x30cf, 0x30d0,
00067     0x30d1, 0x30d2, 0x30d3, 0x30d4, 0x30d5, 0x30d6, 0x30d7, 0x30d8,
00068     0x30d9, 0x30da, 0x30db, 0x30dc, 0x30dd, 0x30de, 0x30df, 0x30e0,

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```
00069 0x30e1, 0x30e2, 0x30e3, 0x30e4, 0x30e5, 0x30e6, 0x30e7, 0x30e8,
00070 0x30e9, 0x30ea, 0x30eb, 0x30ec, 0x30ed, 0x30ee, 0x30ef, 0x30f0,
00071 0x30f1, 0x30f2, 0x30f3, 0x30f4, 0x30f5, 0x30f6, 0xffff, 0xffff,
00072 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00073 /* 0x26 */
00074 0x0391, 0x0392, 0x0393, 0x0394, 0x0395, 0x0396, 0x0397, 0x0398,
00075 0x0399, 0x039a, 0x039b, 0x039c, 0x039d, 0x039e, 0x039f, 0x03a0,
00076 0x03a1, 0x03a2, 0x03a3, 0x03a4, 0x03a5, 0x03a6, 0x03a7, 0x03a8, 0x03a9,
00077 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00078 0x03b1, 0x03b2, 0x03b3, 0x03b4, 0x03b5, 0x03b6, 0x03b7, 0x03b8,
00079 0x03b9, 0x03ba, 0x03bb, 0x03bc, 0x03bd, 0x03be, 0x03bf, 0x03c0,
00080 0x03c1, 0x03c2, 0x03c3, 0x03c4, 0x03c5, 0x03c6, 0x03c7, 0x03c8, 0x03c9,
00081 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00082 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00083 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00084 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00085 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00086 /* 0x27 */
00087 0x0410, 0x0411, 0x0412, 0x0413, 0x0414, 0x0415, 0x0416, 0x0417, 0x0418,
00088 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e, 0x041f, 0x0420,
00089 0x0421, 0x0422, 0x0423, 0x0424, 0x0425, 0x0426, 0x0427, 0x0428,
00090 0x0429, 0x042a, 0x042b, 0x042c, 0x042d, 0x042e, 0x042f, 0x0430,
00091 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00092 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00093 0x0431, 0x0432, 0x0433, 0x0434, 0x0435, 0x0436, 0x0437, 0x0438,
00094 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e, 0x043f, 0x0440,
00095 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446, 0x0447, 0x0448,
00096 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e, 0x044f, 0x0450,
00097 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00098 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00099 /* 0x28 */
00100 0x0101, 0x0102, 0x0103, 0x0104, 0x0105, 0x0106, 0x0107, 0x0108,
00101 0x0109, 0x010a, 0x010b, 0x010c, 0x010d, 0x010e, 0x010f, 0x0110,
00102 0x0111, 0x0112, 0x0113, 0x0114, 0x0115, 0x0116, 0x0117, 0x0118,
00103 0x0119, 0x011a, 0x011b, 0x011c, 0x011d, 0x011e, 0x011f, 0x0120,
00104 0x0121, 0x0122, 0x0123, 0x0124, 0x0125, 0x0126, 0x0127, 0x0128,
00105 0x0129, 0x012a, 0x012b, 0x012c, 0x012d, 0x012e, 0x012f, 0x0130,
00106 0x0131, 0x0132, 0x0133, 0x0134, 0x0135, 0x0136, 0x0137, 0x0138,
00107 0x0139, 0x013a, 0x013b, 0x013c, 0x013d, 0x013e, 0x013f, 0x0140,
00108 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00109 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00110 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00111 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00112 /* 0x29 */
00113 0x2501, 0x2502, 0x2503, 0x2504, 0x2505, 0x2506, 0x2507, 0x2508,
00114 0x2509, 0x250a, 0x250b, 0x250c, 0x250d, 0x250e, 0x250f, 0x2510,
00115 0x2511, 0x2512, 0x2513, 0x2514, 0x2515, 0x2516, 0x2517, 0x2518,
00116 0x2519, 0x251a, 0x251b, 0x251c, 0x251d, 0x251e, 0x251f, 0x2520,
00117 0x2521, 0x2522, 0x2523, 0x2524, 0x2525, 0x2526, 0x2527, 0x2528,
00118 0x2529, 0x252a, 0x252b, 0x252c, 0x252d, 0x252e, 0x252f, 0x2530,
00119 0x2531, 0x2532, 0x2533, 0x2534, 0x2535, 0x2536, 0x2537, 0x2538,
00120 0x2539, 0x253a, 0x253b, 0x253c, 0x253d, 0x253e, 0x253f, 0x2540,
00121 0x2541, 0x2542, 0x2543, 0x2544, 0x2545, 0x2546, 0x2547, 0x2548,
00122 0x2549, 0x254a, 0x254b, 0x254c, 0x254d, 0x254e, 0x254f, 0x2550,
00123 };
00124 static const unsigned short gb2312_2uni_page30[6768] = {
00125 /* 0x30 */
00126 0x554a, 0x963f, 0x57c3, 0x6328, 0x54ce, 0x5509, 0x54c0, 0x7691,
00127 0x764c, 0x853c, 0x77ee, 0x827e, 0x788d, 0x7231, 0x9698, 0x978d,
00128 0x6c28, 0x5b89, 0x4ffa, 0x6309, 0x6697, 0x5cb8, 0x80fa, 0x6848,
00129 0x80ae, 0x6602, 0x76ce, 0x51f9, 0x6556, 0x71ac, 0x7ff1, 0x8884,
00130 0x50b2, 0x5965, 0x61ca, 0x6fb3, 0x82ad, 0x634c, 0x6252, 0x53ed,
00131 0x5427, 0x7b06, 0x516b, 0x75a4, 0x5df4, 0x62d4, 0x8dcb, 0x9776,
00132 0x628a, 0x8019, 0x575d, 0x9738, 0x7f62, 0x7238, 0x767d, 0x67cf,
00133 0x767e, 0x6446, 0x4f70, 0x8d25, 0x62dc, 0x7a17, 0x6591, 0x73ed,
00134 0x642c, 0x6273, 0x822c, 0x9881, 0x677f, 0x7248, 0x626e, 0x62cc,
00135 0x4f34, 0x74e3, 0x534a, 0x529e, 0x7eca, 0x90a6, 0x5e2e, 0x6886,
00136 0x699c, 0x8180, 0x7ed1, 0x68d2, 0x78c5, 0x868c, 0x9551, 0x508d,
00137 0x8c24, 0x82de, 0x80de, 0x5305, 0x8912, 0x5265,
00138 /* 0x31 */
00139 0x8584, 0x96f9, 0x4fdd, 0x5821, 0x9971, 0x5b9d, 0x62b1, 0x62a5,
00140 0x66b4, 0x8c79, 0x9c8d, 0x7206, 0x676f, 0x7891, 0x60b2, 0x5351,
00141 0x5317, 0x8f88, 0x80cc, 0x8d1d, 0x94a1, 0x500d, 0x72c8, 0x5907,
00142 0x60eb, 0x7119, 0x88ab, 0x5954, 0x82ef, 0x672c, 0x7b28, 0x5d29,
00143 0x7ef7, 0x752d, 0x6cf5, 0x8e66, 0x8ff8, 0x903c, 0x9f3b, 0x6bd4,
00144 0x9119, 0x7b14, 0x5f7c, 0x78a7, 0x84d6, 0x853d, 0x6bd5, 0x6bd9,
00145 0x6bd6, 0x5e01, 0x5e87, 0x75f9, 0x95ed, 0x655d, 0x5f0a, 0x5fc5,
00146 0x8f9f, 0x58c1, 0x81c2, 0x907f, 0x965b, 0x97ad, 0x8fb9, 0x7f16,
00147 0x8d2c, 0x6241, 0x4fbf, 0x53d8, 0x535e, 0x8fa8, 0x8fa9, 0x8fab,
00148 0x904d, 0x6807, 0x5f6a, 0x8198, 0x8868, 0x9cde, 0x618b, 0x522b,
00149 0x762a, 0x5f6c, 0x658c, 0x6fd2, 0x6ee8, 0x5bbe, 0x6448, 0x5175,
00150 0x51b0, 0x67c4, 0x4e19, 0x79c9, 0x997c, 0x70b3,
00151 /* 0x32 */
00152 0x75c5, 0x5e76, 0x73bb, 0x83e0, 0x64ad, 0x62e8, 0x94b5, 0x6ce2,
00153 0x535a, 0x52c3, 0x640f, 0x94c2, 0x7b94, 0x4f2f, 0x5e1b, 0x8236,
00154 0x8116, 0x818a, 0x6e24, 0x6cca, 0x9a73, 0x6355, 0x535c, 0x54fa,
00155 0x8865, 0x57e0, 0x4e0d, 0x5e03, 0x6b65, 0x7c3f, 0x90e8, 0x6016,
```

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00156 0x64e6, 0x731c, 0x88c1, 0x6750, 0x624d, 0x8d22, 0x776c, 0x8e29,
00157 0x91c7, 0x5f69, 0x83dc, 0x8521, 0x9910, 0x53c2, 0x8695, 0x6b8b,
00158 0x60ed, 0x60e8, 0x707f, 0x82cd, 0x8231, 0x4ed3, 0x6ca7, 0x85cf,
00159 0x64cd, 0x7cd9, 0x69fd, 0x66f9, 0x8349, 0x5395, 0x7b56, 0x4fa7,
00160 0x518c, 0x6d4b, 0x5c42, 0x8e6d, 0x63d2, 0x53c9, 0x832c, 0x8336,
00161 0x67e5, 0x78b4, 0x643d, 0x5bdf, 0x5c94, 0x5dee, 0x8be7, 0x62c6,
00162 0x67f4, 0x8c7a, 0x6400, 0x63ba, 0x8749, 0x998b, 0x8c17, 0x7f20,
00163 0x94f2, 0x4ea7, 0x9610, 0x98a4, 0x660c, 0x7316,
00164 /* 0x33 */
00165 0x573a, 0x5c1d, 0x5e38, 0x957f, 0x507f, 0x80a0, 0x5382, 0x655e,
00166 0x7545, 0x5531, 0x5021, 0x8d85, 0x6284, 0x949e, 0x671d, 0x5632,
00167 0x6f6e, 0x5de2, 0x5435, 0x7092, 0x8f66, 0x626f, 0x64a4, 0x63a3,
00168 0x5f7b, 0x6f88, 0x90f4, 0x81e3, 0x8fb0, 0x5c18, 0x6668, 0x5ff1,
00169 0x6c89, 0x9648, 0x8d81, 0x886c, 0x6491, 0x79f0, 0x57ce, 0x6a59,
00170 0x6210, 0x5448, 0x4e58, 0x7a0b, 0x60e9, 0x6f84, 0x8bda, 0x627f,
00171 0x901e, 0x9a8b, 0x79e4, 0x5403, 0x75f4, 0x6301, 0x5319, 0x6c60,
00172 0x8fdf, 0x5f1b, 0x9a70, 0x803b, 0x9f7f, 0x4f88, 0x5c3a, 0x8d64,
00173 0x7fc5, 0x65a5, 0x70bd, 0x5145, 0x51b2, 0x866b, 0x5d07, 0x5ba0,
00174 0x62bd, 0x916c, 0x7574, 0x8e0c, 0x7a20, 0x6101, 0x7b79, 0x4ec7,
00175 0x7ef8, 0x7785, 0x4e11, 0x81ed, 0x521d, 0x51fa, 0x6a71, 0x53a8,
00176 0x8e87, 0x9504, 0x96cf, 0x6ec1, 0x9664, 0x695a,
00177 /* 0x34 */
00178 0x7840, 0x50a8, 0x77d7, 0x6410, 0x89e6, 0x5904, 0x63e3, 0x5ddd,
00179 0x7a7f, 0x693d, 0x4f20, 0x8239, 0x5598, 0x4e32, 0x75ae, 0x7a97,
00180 0x5e62, 0x5e8a, 0x95ef, 0x521b, 0x5439, 0x708a, 0x6376, 0x9524,
00181 0x5782, 0x6625, 0x693f, 0x9187, 0x5507, 0x6df3, 0x7ea7, 0x8822,
00182 0x6233, 0x7ef0, 0x75b5, 0x8328, 0x78c1, 0x96cc, 0x8f9e, 0x6148,
00183 0x74f7, 0x8bcd, 0x6b64, 0x523a, 0x8d50, 0x6b21, 0x806a, 0x8471,
00184 0x56f1, 0x5306, 0x4ece, 0x4e1b, 0x51d1, 0x7c97, 0x918b, 0x7c07,
00185 0x4fc3, 0x8e7f, 0x7be1, 0x7a9c, 0x6467, 0x5d14, 0x50ac, 0x8106,
00186 0x7601, 0x7cb9, 0x6dec, 0x7fe0, 0x6751, 0x5b58, 0x5bf8, 0x78cb,
00187 0x64ae, 0x6413, 0x63aa, 0x632b, 0x9519, 0x642d, 0x8f8e, 0x7b54,
00188 0x7629, 0x6253, 0x5927, 0x5446, 0x6b79, 0x50a3, 0x6234, 0x5e26,
00189 0x6b86, 0x4ee3, 0x8d37, 0x888b, 0x5f85, 0x902e,
00190 /* 0x35 */
00191 0x6020, 0x803d, 0x62c5, 0x4e39, 0x5355, 0x90f8, 0x63b8, 0x80c6,
00192 0x65e6, 0x6c2e, 0x4f46, 0x60ee, 0x6de1, 0x8bde, 0x5f39, 0x86cb,
00193 0x5f53, 0x6321, 0x515a, 0x8361, 0x6863, 0x5200, 0x6363, 0x8e48,
00194 0x5012, 0x5c9b, 0x7977, 0x5bfc, 0x5230, 0x7a3b, 0x60bc, 0x9053,
00195 0x76d7, 0x5fb7, 0x5f97, 0x7684, 0x8e6c, 0x706f, 0x767b, 0x7b49,
00196 0x77aa, 0x51f3, 0x9093, 0x5824, 0x4f4e, 0x6ef4, 0x8fea, 0x654c,
00197 0x7b1b, 0x72c4, 0x6da4, 0x7fdf, 0x5ae1, 0x62b5, 0x5e95, 0x5730,
00198 0x8482, 0x7b2c, 0x5e1d, 0x5f1f, 0x9012, 0x7f14, 0x98a0, 0x6382,
00199 0x6ec7, 0x7898, 0x70b9, 0x5178, 0x975b, 0x57ab, 0x7535, 0x4f43,
00200 0x7538, 0x5e97, 0x60e6, 0x5960, 0x6dc0, 0x6bbf, 0x7889, 0x53fc,
00201 0x96d5, 0x51cb, 0x5201, 0x6389, 0x540a, 0x9493, 0x8c03, 0x8dcc,
00202 0x7239, 0x789f, 0x8776, 0x8fed, 0x8c0d, 0x53e0,
00203 /* 0x36 */
00204 0x4e01, 0x76ef, 0x53ee, 0x9489, 0x9876, 0x9f0e, 0x952d, 0x5b9a,
00205 0x8ba2, 0x4e22, 0x4e1c, 0x51ac, 0x8463, 0x61c2, 0x52a8, 0x680b,
00206 0x4f97, 0x606b, 0x51bb, 0x6d1e, 0x515c, 0x6296, 0x6597, 0x9661,
00207 0x8c46, 0x9017, 0x75d8, 0x90fd, 0x7763, 0x6bd2, 0x728a, 0x72ec,
00208 0x8bfb, 0x5835, 0x7779, 0x8d4c, 0x675c, 0x9540, 0x809a, 0x5ea6,
00209 0x6e21, 0x5992, 0x7aef, 0x77ed, 0x953b, 0x6bb5, 0x65ad, 0x7f0e,
00210 0x5806, 0x5151, 0x961f, 0x5bf9, 0x58a9, 0x5428, 0x8e72, 0x6566,
00211 0x987f, 0x56e4, 0x949d, 0x76fe, 0x9041, 0x6387, 0x54c6, 0x591a,
00212 0x593a, 0x579b, 0x8eb2, 0x6735, 0x8dfa, 0x8235, 0x5241, 0x6f0f,
00213 0x5815, 0x86fe, 0x5ce8, 0x9e45, 0x4fc4, 0x989d, 0x8bb9, 0x5a25,
00214 0x6076, 0x5384, 0x627c, 0x904f, 0x9102, 0x997f, 0x6069, 0x800c,
00215 0x513f, 0x8033, 0x5c14, 0x9975, 0x6d31, 0x4e8c,
00216 /* 0x37 */
00217 0x8d30, 0x53d1, 0x7f5a, 0x7b4f, 0x4f10, 0x4e4f, 0x9600, 0x6cd5,
00218 0x73d0, 0x85e9, 0x5e06, 0x756a, 0x7ffb, 0x6a0a, 0x77fe, 0x9492,
00219 0x7e41, 0x51e1, 0x70e6, 0x53cd, 0x8fd4, 0x8303, 0x8d29, 0x72af,
00220 0x996d, 0x6cdb, 0x574a, 0x82b3, 0x65b9, 0x80aa, 0x623f, 0x9632,
00221 0x59a8, 0x4eff, 0x8bbf, 0x7eba, 0x653e, 0x83f2, 0x975e, 0x5561,
00222 0x98de, 0x80a5, 0x532a, 0x8bfd, 0x5420, 0x80ba, 0x5e9f, 0x6cb8,
00223 0x8d39, 0x82ac, 0x915a, 0x5429, 0x6c1b, 0x5206, 0x7eb7, 0x575f,
00224 0x711a, 0x6c7e, 0x7c89, 0x594b, 0x4efd, 0x5fff, 0x6124, 0x7caa,
00225 0x4e30, 0x5c01, 0x67ab, 0x8702, 0x5cf0, 0x950b, 0x98ce, 0x75af,
00226 0x70fd, 0x9022, 0x51af, 0x7f1d, 0x8bbd, 0x5949, 0x51e4, 0x4f5b,
00227 0x5426, 0x592b, 0x6577, 0x80a4, 0x5b75, 0x6276, 0x62c2, 0x8f90,
00228 0x5e45, 0x6c1f, 0x7b26, 0x4f0f, 0x4fd8, 0x670d,
00229 /* 0x38 */
00230 0x6d6e, 0x6daa, 0x798f, 0x88b1, 0x5f17, 0x752b, 0x629a, 0x8f85,
00231 0x4fef, 0x91dc, 0x65a7, 0x812f, 0x8151, 0x5e9c, 0x8150, 0x8d74,
00232 0x526f, 0x8986, 0x8d4b, 0x590d, 0x5085, 0x4ed8, 0x961c, 0x7236,
00233 0x8179, 0x8d1f, 0x5bcc, 0x8ba3, 0x9644, 0x5987, 0x7f1a, 0x5490,
00234 0x5676, 0x560e, 0x8be5, 0x6539, 0x6982, 0x9499, 0x76d6, 0x6e89,
00235 0x5e72, 0x7518, 0x6746, 0x67d1, 0x7aff, 0x809d, 0x8d76, 0x611f,
00236 0x79c6, 0x6562, 0x8d63, 0x5188, 0x521a, 0x94a2, 0x7f38, 0x809b,
00237 0x7eb2, 0x5c97, 0x6e2f, 0x6760, 0x7bd9, 0x768b, 0x9ad8, 0x818f,
00238 0x7f94, 0x7cd5, 0x641e, 0x9550, 0x7a3f, 0x544a, 0x54e5, 0x6b4c,
00239 0x6401, 0x6208, 0x9e3d, 0x80f3, 0x7599, 0x5272, 0x9769, 0x845b,
00240 0x683c, 0x86e4, 0x9601, 0x9694, 0x94ec, 0x4e2a, 0x5404, 0x7ed9,
00241 0x6839, 0x8ddf, 0x8015, 0x66f4, 0x5e9a, 0x7fb9,
00242 /* 0x39 */
```

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00243 0x57c2, 0x803f, 0x6897, 0x5de5, 0x653b, 0x529f, 0x606d, 0x9f9a,
00244 0x4f9b, 0x8eac, 0x516c, 0x5bab, 0x5f13, 0x5de9, 0x6c5e, 0x62f1,
00245 0x8d21, 0x5171, 0x94a9, 0x52fe, 0x6c9f, 0x82df, 0x72d7, 0x57a2,
00246 0x6784, 0x8d2d, 0x591f, 0x8f9c, 0x83c7, 0x5495, 0x7b8d, 0x4f30,
00247 0x6cbd, 0x5b64, 0x59d1, 0x9f13, 0x53e4, 0x86ca, 0x9aa8, 0x8c37,
00248 0x80a1, 0x6545, 0x987e, 0x56fa, 0x96c7, 0x522e, 0x74dc, 0x5250,
00249 0x5be1, 0x6302, 0x8902, 0x4e56, 0x62d0, 0x602a, 0x68fa, 0x5173,
00250 0x5b98, 0x51a0, 0x89c2, 0x7ba1, 0x9986, 0x7f50, 0x60ef, 0x704c,
00251 0x8d2f, 0x5149, 0x5e7f, 0x901b, 0x7470, 0x89c4, 0x572d, 0x7845,
00252 0x5f52, 0x9f9f, 0x95fa, 0x8f68, 0x9b3c, 0x8be1, 0x7678, 0x6842,
00253 0x67dc, 0x8dea, 0x8d35, 0x523d, 0x8f8a, 0x6eda, 0x68cd, 0x9505,
00254 0x90ed, 0x56fd, 0x679c, 0x88f9, 0x8fc7, 0x54c8,
00255 /* 0x3a */
00256 0x9ab8, 0x5b69, 0x6d77, 0x6c26, 0x4ea5, 0x5bb3, 0x9a87, 0x9163,
00257 0x61a8, 0x90af, 0x97e9, 0x542b, 0x6db5, 0x5bd2, 0x51fd, 0x558a,
00258 0x7f55, 0x7ff0, 0x64bc, 0x634d, 0x65f1, 0x61be, 0x608d, 0x710a,
00259 0x6c57, 0x6c49, 0x592f, 0x676d, 0x822a, 0x58d5, 0x568e, 0x8c6a,
00260 0x6beb, 0x90dd, 0x597d, 0x8017, 0x53f7, 0x6d69, 0x5475, 0x559d,
00261 0x8377, 0x83cf, 0x6838, 0x79be, 0x548c, 0x4f55, 0x5408, 0x76d2,
00262 0x8c89, 0x9602, 0x6cb3, 0x6db8, 0x8d6b, 0x8910, 0x9e64, 0x8d3a,
00263 0x563f, 0x9ed1, 0x75d5, 0x5f88, 0x72e0, 0x6068, 0x54fc, 0x4ea8,
00264 0x6a2a, 0x8861, 0x6052, 0x8f70, 0x54c4, 0x70d8, 0x8679, 0x9e3f,
00265 0x6d2a, 0x5b88, 0x5f18, 0x7ea2, 0x5589, 0x4faf, 0x733a, 0x543c,
00266 0x539a, 0x5019, 0x540e, 0x547c, 0x4e4e, 0x5ffd, 0x745a, 0x58f6,
00267 0x846b, 0x80e1, 0x8774, 0x72d0, 0x7cca, 0x6e56,
00268 /* 0x3b */
00269 0x5f27, 0x864e, 0x552c, 0x62a4, 0x4e92, 0x6caa, 0x6237, 0x82b1,
00270 0x54d7, 0x534e, 0x733e, 0x6ed1, 0x753b, 0x5212, 0x5316, 0x8bdd,
00271 0x69d0, 0x5f8a, 0x6000, 0x6dee, 0x574f, 0x6b22, 0x73a2, 0x6853,
00272 0x8fd8, 0x7f13, 0x6362, 0x60a3, 0x5524, 0x75ea, 0x8c62, 0x7115,
00273 0x6da3, 0x5ba6, 0x5e7b, 0x8352, 0x614c, 0x9ec4, 0x78fa, 0x8757,
00274 0x7c27, 0x7687, 0x51f0, 0x60f6, 0x714c, 0x6643, 0x5e4c, 0x604d,
00275 0x8c0e, 0x7070, 0x6325, 0x8f89, 0x5fbd, 0x6062, 0x86d4, 0x56de,
00276 0x6bc1, 0x6094, 0x6167, 0x5349, 0x60e0, 0x6666, 0x8d3f, 0x79fd,
00277 0x4f1a, 0x70e9, 0x6c47, 0x8bb3, 0x8bf2, 0x7ed8, 0x8364, 0x660f,
00278 0x5a5a, 0x9b42, 0x6d51, 0x6df7, 0x8c41, 0x6d3b, 0x4f19, 0x706b,
00279 0x83b7, 0x6216, 0x60d1, 0x970d, 0x8d27, 0x7978, 0x51fb, 0x573e,
00280 0x57fa, 0x673a, 0x7578, 0x7a3d, 0x79ef, 0x7b95,
00281 /* 0x3c */
00282 0x808c, 0x9965, 0x8ff9, 0x6fc0, 0x8ba5, 0x9e21, 0x59ec, 0x7ee9,
00283 0x7f09, 0x5409, 0x6781, 0x68d8, 0x8f91, 0x7c4d, 0x96c6, 0x53ca,
00284 0x6025, 0x75be, 0x6c72, 0x5373, 0x5ac9, 0x7ea7, 0x6324, 0x51e0,
00285 0x810a, 0x5df1, 0x84df, 0x6280, 0x5180, 0x5b63, 0x4f0e, 0x796d,
00286 0x5242, 0x60b8, 0x6d4e, 0x5bc4, 0x5bc2, 0x8ba1, 0x8bb0, 0x65e2,
00287 0x5fcc, 0x9645, 0x5993, 0x7ee7, 0x7eaa, 0x5609, 0x67b7, 0x5939,
00288 0x4f73, 0x5bb6, 0x52a0, 0x835a, 0x988a, 0x8d3e, 0x7532, 0x94be,
00289 0x5047, 0x7a3c, 0x4ef7, 0x67b6, 0x9a7e, 0x5ac1, 0x6b7c, 0x76d1,
00290 0x575a, 0x5c16, 0x7b3a, 0x95f4, 0x714e, 0x517c, 0x80a9, 0x8270,
00291 0x5978, 0x7f04, 0x8327, 0x68c0, 0x67ec, 0x78b1, 0x7877, 0x62e3,
00292 0x6361, 0x7b80, 0x4fed, 0x526a, 0x51cf, 0x8350, 0x69db, 0x9274,
00293 0x8df5, 0x8d31, 0x89c1, 0x952e, 0x7bad, 0x4ef6,
00294 /* 0x3d */
00295 0x5065, 0x8230, 0x5251, 0x996f, 0x6e10, 0x6e85, 0x6da7, 0x5efa,
00296 0x50f5, 0x59dc, 0x5c06, 0x6d46, 0x6c5f, 0x7586, 0x848b, 0x6868,
00297 0x5956, 0x8bb2, 0x5320, 0x9171, 0x964d, 0x8549, 0x6912, 0x7901,
00298 0x7126, 0x80f6, 0x4ea4, 0x90ca, 0x6d47, 0x9a84, 0x5a07, 0x56bc,
00299 0x6405, 0x94f0, 0x77eb, 0x4fa5, 0x811a, 0x72e1, 0x89d2, 0x997a,
00300 0x7f34, 0x7ede, 0x527f, 0x6559, 0x9175, 0x8f7f, 0x8f83, 0x53eb,
00301 0x7a96, 0x63ed, 0x63a5, 0x7686, 0x79f8, 0x8857, 0x9636, 0x622a,
00302 0x52ab, 0x8282, 0x6854, 0x6770, 0x6377, 0x776b, 0x7aed, 0x6d01,
00303 0x7ed3, 0x89e3, 0x59d0, 0x6212, 0x85c9, 0x82a5, 0x754c, 0x501f,
00304 0x4ecb, 0x75a5, 0x8beb, 0x5c4a, 0x5dfe, 0x7b4b, 0x65a4, 0x91d1,
00305 0x4eca, 0x6d25, 0x895f, 0x7d27, 0x9526, 0x4ec5, 0x8c28, 0x8fdb,
00306 0x9773, 0x664b, 0x7981, 0x8fd1, 0x70ec, 0x6d78,
00307 /* 0x3e */
00308 0x5c3d, 0x52b2, 0x8346, 0x5162, 0x830e, 0x775b, 0x6676, 0x9cb8,
00309 0x4eac, 0x60ca, 0x7cbe, 0x7cb3, 0x7ecf, 0x4e95, 0x8b66, 0x666f,
00310 0x9888, 0x9759, 0x5883, 0x656c, 0x955c, 0x5f84, 0x75c9, 0x9756,
00311 0x7adf, 0x7ade, 0x51c0, 0x70af, 0x7a98, 0x63ea, 0x7a76, 0x7ea0,
00312 0x7396, 0x97ed, 0x4e45, 0x7078, 0x4e5d, 0x9152, 0x53a9, 0x6551,
00313 0x65e7, 0x81fc, 0x8205, 0x548e, 0x5c31, 0x759a, 0x97a0, 0x62d8,
00314 0x72d9, 0x75bd, 0x5c45, 0x9a79, 0x83ca, 0x5c40, 0x5480, 0x77e9,
00315 0x4e3e, 0x6cae, 0x805a, 0x62d2, 0x636e, 0x5de8, 0x5177, 0x8ddd,
00316 0x8e1e, 0x952f, 0x4ff1, 0x53e5, 0x60e7, 0x70ac, 0x5267, 0x6350,
00317 0x9e43, 0x5a1f, 0x5026, 0x7737, 0x5377, 0x7ee2, 0x6485, 0x652b,
00318 0x6289, 0x6398, 0x5014, 0x7235, 0x89c9, 0x51b3, 0x8bc0, 0x7edd,
00319 0x5747, 0x83cc, 0x94a7, 0x519b, 0x541b, 0x5cfb,
00320 /* 0x3f */
00321 0x4fca, 0x7ae3, 0x6d5a, 0x90e1, 0x9a8f, 0x5580, 0x5496, 0x5361,
00322 0x54af, 0x5f00, 0x63e9, 0x6977, 0x51ef, 0x6168, 0x520a, 0x582a,
00323 0x52d8, 0x574e, 0x780d, 0x770b, 0x5eb7, 0x6177, 0x7ce0, 0x625b,
00324 0x6297, 0x4ea2, 0x7095, 0x8003, 0x62f7, 0x70e4, 0x9760, 0x5777,
00325 0x82db, 0x67ef, 0x68f5, 0x78d5, 0x9897, 0x79d1, 0x58f3, 0x54b3,
00326 0x53ef, 0x6e34, 0x514b, 0x523b, 0x5ba2, 0x8bfe, 0x80af, 0x5543,
00327 0x57a6, 0x6073, 0x5751, 0x542d, 0x7a7a, 0x6050, 0x5b54, 0x63a7,
00328 0x62a0, 0x53e3, 0x6263, 0x5bc7, 0x67af, 0x54ed, 0x7a9f, 0x82e6,
00329 0x9177, 0x5e93, 0x88e4, 0x5938, 0x57ae, 0x630e, 0x8de8, 0x80ef,
```

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00330 0x5757, 0x7b77, 0x4fa9, 0x5feb, 0x5bbd, 0x6b3e, 0x5321, 0x7b50,
00331 0x72c2, 0x6846, 0x77ff, 0x7736, 0x65f7, 0x51b5, 0x4e8f, 0x76d4,
00332 0x5cbf, 0x7aa5, 0x8475, 0x594e, 0x9b41, 0x5080,
00333 /* 0x40 */
00334 0x9988, 0x6127, 0x6e83, 0x5764, 0x6606, 0x6346, 0x56f0, 0x62ec,
00335 0x6269, 0x5ed3, 0x9614, 0x5783, 0x62c9, 0x5587, 0x8721, 0x814a,
00336 0x8fa3, 0x5566, 0x83b1, 0x6765, 0x8d56, 0x84dd, 0x5a6a, 0x680f,
00337 0x62e6, 0x7bee, 0x9611, 0x5170, 0x6f9c, 0x8c30, 0x63fd, 0x89c8,
00338 0x61d2, 0x7f06, 0x70c2, 0x6ee5, 0x7405, 0x6994, 0x72fc, 0x5eca,
00339 0x90ce, 0x6717, 0x6d6a, 0x635e, 0x52b3, 0x7262, 0x8001, 0x4f6c,
00340 0x59e5, 0x916a, 0x70d9, 0x6d9d, 0x52d2, 0x4e50, 0x96f7, 0x956d,
00341 0x857e, 0x78ca, 0x7d2f, 0x5121, 0x5792, 0x64c2, 0x808b, 0x7c7b,
00342 0x6cea, 0x68f1, 0x695e, 0x51b7, 0x5398, 0x68a8, 0x7281, 0x9ece,
00343 0x7bf1, 0x72f8, 0x79bb, 0x6f13, 0x7406, 0x674e, 0x91cc, 0x9ca4,
00344 0x793c, 0x8389, 0x8354, 0x540f, 0x6817, 0x4e3d, 0x5389, 0x52b1,
00345 0x783e, 0x5386, 0x5229, 0x5088, 0x4f8b, 0x4fd0,
00346 /* 0x41 */
00347 0x75e2, 0x7acb, 0x7c92, 0x6ca5, 0x96b6, 0x529b, 0x7483, 0x54e9,
00348 0x4fe9, 0x8054, 0x83b2, 0x8fde, 0x9570, 0x5ec9, 0x601c, 0x6d9f,
00349 0x5e18, 0x655b, 0x8138, 0x94fe, 0x604b, 0x70bc, 0x7ec3, 0x7cae,
00350 0x51c9, 0x6881, 0x7cb1, 0x826f, 0x4e24, 0x8f86, 0x91cf, 0x667e,
00351 0x4eae, 0x8c05, 0x64a9, 0x804a, 0x50da, 0x7597, 0x71ce, 0x5be5,
00352 0x8fbd, 0x6f66, 0x4e86, 0x6482, 0x9563, 0x5ed6, 0x6599, 0x5217,
00353 0x88c2, 0x70c8, 0x52a3, 0x730e, 0x7433, 0x6797, 0x78f7, 0x9716,
00354 0x4e34, 0x90bb, 0x9cde, 0x6dcf, 0x51db, 0x8d41, 0x541d, 0x62ce,
00355 0x73b2, 0x83f1, 0x96f6, 0x9f84, 0x94c3, 0x4f36, 0x7f9a, 0x51cc,
00356 0x7075, 0x9675, 0x5cad, 0x9886, 0x53e6, 0x4ee4, 0x6e9c, 0x7409,
00357 0x69b4, 0x786b, 0x998f, 0x7559, 0x5218, 0x7624, 0x6d41, 0x67f3,
00358 0x516d, 0x9f99, 0x804b, 0x5499, 0x7b3c, 0x7abf,
00359 /* 0x42 */
00360 0x9686, 0x5784, 0x62e2, 0x9647, 0x697c, 0x5a04, 0x6402, 0x7bd3,
00361 0x6f0f, 0x964b, 0x82a6, 0x5362, 0x9885, 0x5e90, 0x7089, 0x63b3,
00362 0x5364, 0x864f, 0x9c81, 0x9e93, 0x788c, 0x9732, 0x8def, 0x8d42,
00363 0x9e7f, 0x6f5e, 0x7984, 0x5f55, 0x9646, 0x622e, 0x9a74, 0x5415,
00364 0x94dd, 0x4fa3, 0x65c5, 0x5c65, 0x5c61, 0x7f15, 0x8651, 0x6c2f,
00365 0x5f8b, 0x7387, 0x6ee4, 0x7eff, 0x5ce6, 0x631b, 0x5b6a, 0x6ee6,
00366 0x5375, 0x4e71, 0x63a0, 0x7565, 0x62a1, 0x8f6e, 0x4f26, 0x4ed1,
00367 0x6ca6, 0x7eb6, 0x8bba, 0x841d, 0x87ba, 0x7f57, 0x903b, 0x9523,
00368 0x7ba9, 0x9aa1, 0x88f8, 0x843d, 0x6d1b, 0x9a86, 0x7edc, 0x5988,
00369 0x9ebb, 0x739b, 0x7801, 0x8682, 0x9a6c, 0x9a82, 0x561b, 0x5417,
00370 0x57cb, 0x4e70, 0x9ea6, 0x5356, 0x8fc8, 0x8109, 0x7792, 0x9992,
00371 0x86ee, 0x6ee1, 0x8513, 0x66fc, 0x6162, 0x6f2b,
00372 /* 0x43 */
00373 0x8c29, 0x8292, 0x832b, 0x76f2, 0x6c13, 0x5fd9, 0x83bd, 0x732b,
00374 0x8305, 0x951a, 0x6bdb, 0x77db, 0x94c6, 0x536f, 0x8302, 0x5192,
00375 0x5e3d, 0x8c8c, 0x8d38, 0x4e48, 0x73ab, 0x679a, 0x6885, 0x9176,
00376 0x9709, 0x7164, 0x6ca1, 0x7709, 0x5a92, 0x9541, 0x6bcf, 0x7f8e,
00377 0x6627, 0x5bd0, 0x59b9, 0x5a9a, 0x95e8, 0x95f7, 0x4eec, 0x840c,
00378 0x8499, 0x6aac, 0x76df, 0x9530, 0x731b, 0x68a6, 0x5b5f, 0x772f,
00379 0x919a, 0x9761, 0x7cdc, 0x8ff7, 0x8c1c, 0x5f25, 0x7c73, 0x79d8,
00380 0x89c5, 0x6ccc, 0x871c, 0x5bc6, 0x5e42, 0x68c9, 0x7720, 0x7ef5,
00381 0x5195, 0x514d, 0x52c9, 0x5a29, 0x7f05, 0x9762, 0x82d7, 0x63cf,
00382 0x7784, 0x85d0, 0x79d2, 0x6e3a, 0x5e99, 0x5999, 0x8511, 0x706d,
00383 0x6c11, 0x62bf, 0x76bf, 0x654f, 0x60af, 0x95fd, 0x660e, 0x879f,
00384 0x9e23, 0x94ed, 0x540d, 0x547d, 0x8c2c, 0x6478,
00385 /* 0x44 */
00386 0x6479, 0x8611, 0x6a21, 0x819c, 0x78e8, 0x6469, 0x9b54, 0x62b9,
00387 0x672b, 0x83ab, 0x58a8, 0x9ed8, 0x6cab, 0x6f20, 0x5bde, 0x964c,
00388 0x8c0b, 0x725f, 0x67d0, 0x62c7, 0x7261, 0x4ea9, 0x59c6, 0x6bcd,
00389 0x5893, 0x66ae, 0x5e55, 0x52df, 0x6155, 0x6728, 0x76ee, 0x776e,
00390 0x7267, 0x7a46, 0x62ff, 0x54ea, 0x5450, 0x94a0, 0x90a3, 0x5a1c,
00391 0x7eb3, 0x6c16, 0x4e43, 0x5976, 0x8010, 0x5948, 0x5357, 0x7537,
00392 0x96be, 0x56ca, 0x6320, 0x8111, 0x607c, 0x95f9, 0x6dd6, 0x5462,
00393 0x9981, 0x5185, 0x5ae9, 0x80fd, 0x59ae, 0x9713, 0x502a, 0x6ce5,
00394 0x5c3c, 0x62df, 0x4f60, 0x533f, 0x817b, 0x9006, 0x6eba, 0x852b,
00395 0x62c8, 0x5e74, 0x78be, 0x64b5, 0x637b, 0x5ff5, 0x5a18, 0x917f,
00396 0x9e1f, 0x5c3f, 0x634f, 0x8042, 0x5b7d, 0x556e, 0x954a, 0x954d,
00397 0x6d85, 0x60a8, 0x67e0, 0x72de, 0x51dd, 0x5b81,
00398 /* 0x45 */
00399 0x62e7, 0x6cde, 0x725b, 0x626d, 0x94ae, 0x7ebd, 0x8113, 0x6d53,
00400 0x519c, 0x5f04, 0x5974, 0x52aa, 0x6012, 0x5973, 0x6696, 0x8650,
00401 0x759f, 0x632a, 0x61e6, 0x7cef, 0x8bfa, 0x54e6, 0x6b27, 0x9e25,
00402 0x6bb4, 0x85d5, 0x5455, 0x5076, 0x6ca4, 0x556a, 0x8db4, 0x722c,
00403 0x5e15, 0x6015, 0x7436, 0x62cd, 0x6392, 0x724c, 0x5f98, 0x6e43,
00404 0x6d3e, 0x6500, 0x6f58, 0x76d8, 0x78d0, 0x76fc, 0x7554, 0x5224,
00405 0x53db, 0x4e53, 0x5e9e, 0x65c1, 0x802a, 0x80d6, 0x629b, 0x5486,
00406 0x5228, 0x70ae, 0x888d, 0x8dd1, 0x6ce1, 0x5478, 0x80da, 0x57f9,
00407 0x88f4, 0x8d54, 0x966a, 0x914d, 0x4f69, 0x6c9b, 0x55b7, 0x76c6,
00408 0x7830, 0x62a8, 0x70f9, 0x6f8e, 0x5f6d, 0x84ec, 0x68da, 0x787c,
00409 0x7bf7, 0x81a8, 0x670b, 0x9e4f, 0x6367, 0x78b0, 0x576f, 0x7812,
00410 0x9739, 0x6279, 0x62ab, 0x5288, 0x7435, 0x6bd7,
00411 /* 0x46 */
00412 0x5564, 0x813e, 0x75b2, 0x76ae, 0x5339, 0x75de, 0x50fb, 0x5c41,
00413 0x8b6c, 0x7bc7, 0x504f, 0x7247, 0x9a97, 0x98d8, 0x6f02, 0x74e2,
00414 0x7968, 0x6487, 0x77a5, 0x62fc, 0x9891, 0x8d2b, 0x54c1, 0x8058,
00415 0x4e52, 0x576a, 0x82f9, 0x840d, 0x5e73, 0x51ed, 0x74f6, 0x8bc4,
00416 0x5c4f, 0x5761, 0x6cfc, 0x9887, 0x5a46, 0x7834, 0x9b44, 0x8feb,
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00417 0x7c95, 0x5256, 0x6251, 0x94fa, 0x4ec6, 0x8386, 0x8461, 0x83e9,
00418 0x84b2, 0x57d4, 0x6734, 0x5703, 0x666e, 0x6d66, 0x8c31, 0x66dd,
00419 0x7011, 0x671f, 0x6b3a, 0x6816, 0x621a, 0x59bb, 0x4e03, 0x51c4,
00420 0x6f06, 0x67d2, 0x6c8f, 0x5176, 0x68cb, 0x5947, 0x6b67, 0x7566,
00421 0x5d0e, 0x8110, 0x9f50, 0x65d7, 0x7948, 0x7941, 0x9a91, 0x8d77,
00422 0x5c82, 0x4e5e, 0x4f01, 0x542f, 0x5951, 0x780c, 0x5668, 0x6c14,
00423 0x8fc4, 0x5f03, 0x6c7d, 0x6ce3, 0x8bab, 0x6390,
00424 /* 0x47 */
00425 0x6070, 0x6d3d, 0x7275, 0x6266, 0x948e, 0x94c5, 0x5343, 0x8fc1,
00426 0x7b7e, 0x4edf, 0x8c26, 0x4e7e, 0x9ed4, 0x94b1, 0x94b3, 0x524d,
00427 0x6f5c, 0x9063, 0x6d45, 0x8c34, 0x5811, 0x5d4c, 0x6b20, 0x6b49,
00428 0x67aa, 0x545b, 0x8154, 0x7f8c, 0x5899, 0x8537, 0x5f3a, 0x62a2,
00429 0x6a47, 0x9539, 0x6572, 0x6084, 0x6865, 0x77a7, 0x4e54, 0x4fa8,
00430 0x5de7, 0x9798, 0x64ac, 0x7fd8, 0x5ced, 0x4fcf, 0x7a8d, 0x5207,
00431 0x8304, 0x4e14, 0x602f, 0x7a83, 0x94a6, 0x4fb5, 0x4eb2, 0x79e6,
00432 0x7434, 0x52e4, 0x82b9, 0x64d2, 0x79bd, 0x5bdd, 0x6c81, 0x9752,
00433 0x8f7b, 0x6c22, 0x503e, 0x537f, 0x6e05, 0x64ce, 0x6674, 0x6c30,
00434 0x60c5, 0x9877, 0x8bf7, 0x5e86, 0x743c, 0x7a77, 0x79cb, 0x4e18,
00435 0x90b1, 0x7403, 0x6c42, 0x56da, 0x914b, 0x6cc5, 0x8d8b, 0x533a,
00436 0x86c6, 0x66f2, 0x8eaf, 0x5c48, 0x9a71, 0x6e20,
00437 /* 0x48 */
00438 0x53d6, 0x5a36, 0x9f8b, 0x8da3, 0x53bb, 0x5708, 0x98a7, 0x6743,
00439 0x919b, 0x6cc9, 0x5168, 0x75ca, 0x62f3, 0x72ac, 0x5238, 0x529d,
00440 0x7f3a, 0x7094, 0x7638, 0x5374, 0x9e4a, 0x69b7, 0x786e, 0x96c0,
00441 0x88d9, 0x7fa4, 0x7136, 0x71c3, 0x5189, 0x67d3, 0x74e4, 0x58e4,
00442 0x6518, 0x56b7, 0x8ba9, 0x9976, 0x6270, 0x7ed5, 0x60f9, 0x70ed,
00443 0x58ec, 0x4ec1, 0x4eba, 0x5fcd, 0x97e7, 0x4efb, 0x8ba4, 0x5203,
00444 0x598a, 0x7eab, 0x6254, 0x4ecd, 0x65e5, 0x620e, 0x8338, 0x84c9,
00445 0x8363, 0x878d, 0x7194, 0x6eb6, 0x5bb9, 0x7ed2, 0x5197, 0x63c9,
00446 0x67d4, 0x8089, 0x8339, 0x8815, 0x5112, 0x5b7a, 0x5982, 0x8fb1,
00447 0x4e73, 0x6c5d, 0x5165, 0x8925, 0x8f6f, 0x962e, 0x854a, 0x745e,
00448 0x9510, 0x95f0, 0x6da6, 0x82e5, 0x5f31, 0x6492, 0x6d12, 0x8428,
00449 0x816e, 0x9cc3, 0x585e, 0x8d5b, 0x4e09, 0x53c1,
00450 /* 0x49 */
00451 0x4f1e, 0x6563, 0x6851, 0x55d3, 0x4e27, 0x6414, 0x9a9a, 0x626b,
00452 0x5ac2, 0x745f, 0x8272, 0x6da9, 0x68ee, 0x50e7, 0x838e, 0x7802,
00453 0x6740, 0x5239, 0x6c99, 0x7eb1, 0x50bb, 0x5565, 0x715e, 0x7b5b,
00454 0x6652, 0x73ca, 0x82eb, 0x6749, 0x5c71, 0x5220, 0x717d, 0x886b,
00455 0x95ea, 0x9655, 0x64c5, 0x8d61, 0x81b3, 0x5584, 0x6c55, 0x6247,
00456 0x7f2e, 0x5892, 0x4f24, 0x5546, 0x8d4f, 0x664c, 0x4e0a, 0x5c1a,
00457 0x88f3, 0x68a2, 0x634e, 0x7a0d, 0x70e7, 0x828d, 0x52fa, 0x97f6,
00458 0x5c11, 0x54e8, 0x90b5, 0x7ecd, 0x5962, 0x8d4a, 0x86c7, 0x820c,
00459 0x820d, 0x8d66, 0x6444, 0x5c04, 0x6151, 0x6d89, 0x793e, 0x8bbe,
00460 0x7837, 0x7533, 0x547b, 0x4f38, 0x8eab, 0x6df1, 0x5a20, 0x7ec5,
00461 0x795e, 0x6c88, 0x5ba1, 0x5a76, 0x751a, 0x80be, 0x614e, 0x6e17,
00462 0x58f0, 0x751f, 0x7525, 0x7272, 0x5347, 0x7ef3,
00463 /* 0x4a */
00464 0x7701, 0x76db, 0x5269, 0x80dc, 0x5723, 0x5e08, 0x5931, 0x72ee,
00465 0x65bd, 0x6e7f, 0x8bd7, 0x5c38, 0x8671, 0x5341, 0x77f3, 0x62fe,
00466 0x65f6, 0x4ec0, 0x98df, 0x8680, 0x5b9e, 0x8bc6, 0x53f2, 0x77e2,
00467 0x4f7f, 0x5c4e, 0x9a76, 0x59cb, 0x5f0f, 0x793a, 0x58eb, 0x4e16,
00468 0x67ff, 0x4e8b, 0x62ed, 0x8a93, 0x901d, 0x52bf, 0x662f, 0x55dc,
00469 0x566c, 0x9002, 0x4ed5, 0x4f8d, 0x91ca, 0x9970, 0x6c0f, 0x5e02,
00470 0x6043, 0x5ba4, 0x89c6, 0x8bd5, 0x6536, 0x624b, 0x9996, 0x5b88,
00471 0x5bff, 0x6388, 0x552e, 0x53d7, 0x7626, 0x517d, 0x852c, 0x67a2,
00472 0x68b3, 0x6b8a, 0x6292, 0x8f93, 0x53d4, 0x8212, 0x6dd1, 0x758f,
00473 0x4e66, 0x8d4e, 0x5b70, 0x719f, 0x85af, 0x6691, 0x66d9, 0x7f72,
00474 0x8700, 0x9ecd, 0x9f20, 0x5c5e, 0x672f, 0x8ff0, 0x6811, 0x675f,
00475 0x620d, 0x7ad6, 0x5885, 0x5eb6, 0x6570, 0x6f31,
00476 /* 0x4b */
00477 0x6055, 0x5237, 0x800d, 0x6454, 0x8870, 0x7529, 0x5e05, 0x6813,
00478 0x62f4, 0x971c, 0x53cc, 0x723d, 0x8c01, 0x6c34, 0x7761, 0x7a0e,
00479 0x542e, 0x77ac, 0x987a, 0x821c, 0x8bf4, 0x7855, 0x6714, 0x70c1,
00480 0x65af, 0x6495, 0x5636, 0x601d, 0x79c1, 0x53f8, 0x4e1d, 0x6b7b,
00481 0x8086, 0x5bfa, 0x55e3, 0x56db, 0x4f3a, 0x4f3c, 0x9972, 0x5df3,
00482 0x677e, 0x8038, 0x6002, 0x9882, 0x9001, 0x5b8b, 0x8bbc, 0x8bf5,
00483 0x641c, 0x8258, 0x64de, 0x55fd, 0x82cf, 0x9165, 0x4fd7, 0x7d20,
00484 0x901f, 0x7c9f, 0x50f3, 0x5851, 0x6eaf, 0x5bbf, 0x8bc9, 0x8083,
00485 0x9178, 0x849c, 0x7b97, 0x867d, 0x968b, 0x968f, 0x7ee5, 0x9ad3,
00486 0x788e, 0x5c81, 0x7a57, 0x9042, 0x96a7, 0x795f, 0x5b59, 0x635f,
00487 0x7b0b, 0x84d1, 0x68ad, 0x5506, 0x7f29, 0x7410, 0x7d22, 0x9501,
00488 0x6240, 0x584c, 0x4ed6, 0x5b83, 0x5979, 0x5854,
00489 /* 0x4c */
00490 0x736d, 0x631e, 0x8e4b, 0x8e0f, 0x80ce, 0x82d4, 0x62ac, 0x53f0,
00491 0x6cf0, 0x915e, 0x592a, 0x6001, 0x6c70, 0x574d, 0x644a, 0x8d2a,
00492 0x762b, 0x6ee9, 0x575b, 0x6a80, 0x75f0, 0x66fd, 0x8c2d, 0x8c08,
00493 0x5766, 0x6bef, 0x8892, 0x78b3, 0x63a2, 0x53f9, 0x70ad, 0x6c64,
00494 0x5858, 0x642a, 0x5802, 0x68e0, 0x819b, 0x5510, 0x7cd6, 0x5018,
00495 0x8eba, 0x6dc3, 0x8d9f, 0x70eb, 0x638f, 0x6d9b, 0x6ed4, 0x7ee6,
00496 0x8404, 0x6843, 0x9003, 0x6dd8, 0x9676, 0x8ba8, 0x5957, 0x7279,
00497 0x85e4, 0x817e, 0x75bc, 0x8a8a, 0x68af, 0x5254, 0x8e22, 0x9511,
00498 0x63d0, 0x9898, 0x8e44, 0x557c, 0x4f53, 0x66ff, 0x568f, 0x60d5,
00499 0x6d95, 0x5243, 0x5c49, 0x5929, 0x6dfb, 0x586b, 0x7530, 0x751c,
00500 0x606c, 0x8214, 0x8146, 0x6311, 0x6761, 0x8fe2, 0x773a, 0x8df3,
00501 0x8d34, 0x94c1, 0x5e16, 0x5385, 0x542c, 0x70c3,
00502 /* 0x4d */
00503 0x6c40, 0x5ef7, 0x505c, 0x4ead, 0x5ead, 0x633a, 0x8247, 0x901a,
```

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00504 0x6850, 0x916e, 0x77b3, 0x540c, 0x94dc, 0x5f64, 0x7ae5, 0x6876,
00505 0x6345, 0x7b52, 0x7edf, 0x75db, 0x5077, 0x6295, 0x5934, 0x900f,
00506 0x51f8, 0x79c3, 0x7a81, 0x56fe, 0x5f92, 0x9014, 0x6d82, 0x5c60,
00507 0x571f, 0x5410, 0x5154, 0x6e4d, 0x56e2, 0x63a8, 0x9893, 0x817f,
00508 0x8715, 0x892a, 0x9000, 0x541e, 0x5c6f, 0x81c0, 0x62d6, 0x6258,
00509 0x8131, 0x9e35, 0x9640, 0x9a6e, 0x9a7c, 0x692d, 0x59a5, 0x62d3,
00510 0x553e, 0x6316, 0x54c7, 0x86d9, 0x6d3c, 0x5a03, 0x74e6, 0x889c,
00511 0x6b6a, 0x5916, 0x8c4c, 0x5f2f, 0x6e7e, 0x73a9, 0x987d, 0x4e38,
00512 0x70f7, 0x5b8c, 0x7897, 0x633d, 0x665a, 0x7696, 0x60cb, 0x5b9b,
00513 0x5a49, 0x4e07, 0x8155, 0x6c6a, 0x738b, 0x4ea1, 0x6789, 0x7f51,
00514 0x5f80, 0x65fa, 0x671b, 0x5fd8, 0x5984, 0x5a01,
00515 /* 0x4e */
00516 0x5dcd, 0x5fae, 0x5371, 0x97e6, 0x8fdd, 0x6845, 0x56f4, 0x552f,
00517 0x60df, 0x4e3a, 0x6f4d, 0x7ef4, 0x82c7, 0x840e, 0x59d4, 0x4f1f,
00518 0x4f2a, 0x5c3e, 0x7eac, 0x672a, 0x851a, 0x5473, 0x754f, 0x80c3,
00519 0x5582, 0x9b4f, 0x4f4d, 0x6e2d, 0x8c13, 0x5c09, 0x6170, 0x536b,
00520 0x761f, 0x6e29, 0x868a, 0x6587, 0x95fb, 0x7eb9, 0x543b, 0x7a33,
00521 0x7d0a, 0x95ee, 0x55e1, 0x7fc1, 0x74ee, 0x631d, 0x8717, 0x6da1,
00522 0x7a9d, 0x6211, 0x65a1, 0x5367, 0x63e1, 0x6c83, 0x5deb, 0x545c,
00523 0x94a8, 0x4e4c, 0x6c61, 0x8bec, 0x5c4b, 0x65e0, 0x829c, 0x68a7,
00524 0x543e, 0x5434, 0x6bcb, 0x6b66, 0x4e94, 0x6342, 0x5348, 0x821e,
00525 0x4f0d, 0x4fae, 0x575e, 0x620a, 0x96fe, 0x6664, 0x7269, 0x52ff,
00526 0x52a1, 0x609f, 0x8bef, 0x6614, 0x7199, 0x6790, 0x897f, 0x7852,
00527 0x77fd, 0x6670, 0x563b, 0x5438, 0x9521, 0x727a,
00528 /* 0x4f */
00529 0x7a00, 0x606f, 0x5e0c, 0x6089, 0x819d, 0x5915, 0x60dc, 0x7184,
00530 0x70ef, 0x6eaa, 0x6c50, 0x7280, 0x6a84, 0x88ad, 0x5e2d, 0x4e60,
00531 0x5ab3, 0x559c, 0x94e3, 0x6d17, 0x7cfb, 0x9699, 0x620f, 0x7ec6,
00532 0x778e, 0x867e, 0x5323, 0x971e, 0x8f96, 0x6687, 0x5ce1, 0x4fa0,
00533 0x72ed, 0x4e0b, 0x53a6, 0x590f, 0x5413, 0x6380, 0x9528, 0x5148,
00534 0x4ed9, 0x9c9c, 0x7ea4, 0x54b8, 0x8d24, 0x8854, 0x8237, 0x95f2,
00535 0x6d8e, 0x5f26, 0x5acc, 0x663e, 0x9669, 0x73b0, 0x732e, 0x53bf,
00536 0x817a, 0x9985, 0x7fa1, 0x5baa, 0x9677, 0x9650, 0x7ebf, 0x76f8,
00537 0x53a2, 0x9576, 0x9999, 0x7bb1, 0x8944, 0x6e58, 0x4e61, 0x7fd4,
00538 0x7965, 0x8be6, 0x60f3, 0x54cd, 0x4eab, 0x9879, 0x5df7, 0x6a61,
00539 0x50cf, 0x5411, 0x8c61, 0x8427, 0x785d, 0x9704, 0x524a, 0x54ee,
00540 0x56a3, 0x9500, 0x6d88, 0x5bb5, 0x6dc6, 0x6653,
00541 /* 0x50 */
00542 0x5c0f, 0x5b5d, 0x6821, 0x8096, 0x5578, 0x7b11, 0x6548, 0x6954,
00543 0x4e9b, 0x6b47, 0x874e, 0x978b, 0x534f, 0x631f, 0x643a, 0x90aa,
00544 0x659c, 0x80c1, 0x8c10, 0x5199, 0x68b0, 0x5378, 0x87f9, 0x61c8,
00545 0x6cc4, 0x6cfb, 0x8c22, 0x5c51, 0x85aa, 0x82af, 0x950c, 0x6b23,
00546 0x8f9b, 0x65b0, 0x5ffb, 0x5fc3, 0x4fe1, 0x8845, 0x661f, 0x8165,
00547 0x7329, 0x60fa, 0x5174, 0x5211, 0x578b, 0x5f62, 0x90a2, 0x884c,
00548 0x9192, 0x5e78, 0x674f, 0x6027, 0x59d3, 0x5144, 0x51f6, 0x80f8,
00549 0x5308, 0x6c79, 0x96c4, 0x718a, 0x4f11, 0x4fee, 0x7f9e, 0x673d,
00550 0x55c5, 0x9508, 0x79c0, 0x8896, 0x7ee3, 0x589f, 0x620c, 0x9700,
00551 0x865a, 0x5618, 0x987b, 0x5f90, 0x8bb8, 0x84c4, 0x9157, 0x53d9,
00552 0x65ed, 0x5e8f, 0x755c, 0x6064, 0x7d6e, 0x5a7f, 0x7eea, 0x7eed,
00553 0x8f69, 0x55a7, 0x5ba3, 0x60ac, 0x65cb, 0x7384,
00554 /* 0x51 */
00555 0x9009, 0x7663, 0x7729, 0x7eda, 0x9774, 0x859b, 0x5b66, 0x7a74,
00556 0x96ea, 0x8840, 0x52cb, 0x718f, 0x5faa, 0x65ec, 0x8be2, 0x5bfb,
00557 0x9a6f, 0x5de1, 0x6b89, 0x6c5b, 0x8bad, 0x8baf, 0x900a, 0x8fc5,
00558 0x538b, 0x62bc, 0x9e26, 0x9e2d, 0x5440, 0x4e2b, 0x82bd, 0x7259,
00559 0x869c, 0x5d16, 0x8859, 0x6daf, 0x96c5, 0x54d1, 0x4e9a, 0x8bb6,
00560 0x7109, 0x54bd, 0x9609, 0x70df, 0x6df9, 0x76d0, 0x4e25, 0x7814,
00561 0x8712, 0x5ca9, 0x5ef6, 0x8a00, 0x989c, 0x960e, 0x708e, 0x6cbf,
00562 0x5944, 0x63a9, 0x773c, 0x884d, 0x6f14, 0x8273, 0x5830, 0x71d5,
00563 0x538c, 0x781a, 0x96c1, 0x5501, 0x5f66, 0x7130, 0x5bb4, 0x8c1a,
00564 0x9a8c, 0x6b83, 0x592e, 0x9e2f, 0x79e7, 0x6768, 0x626c, 0x4f6f,
00565 0x75a1, 0x7f8a, 0x6d0b, 0x9633, 0x6c27, 0x4ef0, 0x75d2, 0x517b,
00566 0x6837, 0x6f3e, 0x9080, 0x8170, 0x5996, 0x7476,
00567 /* 0x52 */
00568 0x6447, 0x5c27, 0x9065, 0x7a91, 0x8c23, 0x59da, 0x54ac, 0x8200,
00569 0x836f, 0x8981, 0x8000, 0x6930, 0x564e, 0x8036, 0x7237, 0x91ce,
00570 0x51b6, 0x4e5f, 0x9875, 0x6396, 0x4e1a, 0x53f6, 0x66f3, 0x814b,
00571 0x591c, 0x6db2, 0x4e00, 0x58f9, 0x533b, 0x63d6, 0x94f1, 0x4f9d,
00572 0x4f0a, 0x8863, 0x9890, 0x5937, 0x9057, 0x79fb, 0x4eea, 0x80f0,
00573 0x7591, 0x6c82, 0x5b9c, 0x59e8, 0x5f5d, 0x6905, 0x8681, 0x501a,
00574 0x5df2, 0x4e59, 0x77e3, 0x4ee5, 0x827a, 0x6291, 0x6613, 0x9091,
00575 0x5c79, 0x4ebf, 0x5f79, 0x81c6, 0x9038, 0x8084, 0x75ab, 0x4ea6,
00576 0x88d4, 0x610f, 0x6bc5, 0x5fc6, 0x4e49, 0x76ca, 0x6ea2, 0x8be3,
00577 0x8bae, 0x8c0a, 0x8bd1, 0x5f02, 0x7ffc, 0x7fcc, 0x7ece, 0x8335,
00578 0x836b, 0x56e0, 0x6bb7, 0x97f3, 0x9634, 0x59fb, 0x541f, 0x94f6,
00579 0x6deb, 0x5bc5, 0x996e, 0x5c39, 0x5f15, 0x9690,
00580 /* 0x53 */
00581 0x5370, 0x82f1, 0x6a31, 0x5a74, 0x9e70, 0x5e94, 0x7f28, 0x83b9,
00582 0x8424, 0x8425, 0x8367, 0x8747, 0x8fce, 0x8d62, 0x76c8, 0x5f71,
00583 0x9896, 0x786c, 0x6620, 0x54df, 0x62e5, 0x4f63, 0x81c3, 0x75c8,
00584 0x5eb8, 0x96cd, 0x8e0a, 0x86f9, 0x548f, 0x6cf3, 0x6d8c, 0x6c38,
00585 0x607f, 0x52c7, 0x7528, 0x5e7d, 0x4f18, 0x60a0, 0x5fe7, 0x5c24,
00586 0x7531, 0x90ae, 0x94c0, 0x72b9, 0x6cb9, 0x6e38, 0x9149, 0x6709,
00587 0x53cb, 0x53f3, 0x4f51, 0x91c9, 0x8bf1, 0x53c8, 0x5e7c, 0x8fc2,
00588 0x6de4, 0x4e8e, 0x76c2, 0x6986, 0x865e, 0x611a, 0x820e, 0x4f59,
00589 0x4fde, 0x903c, 0x9c7c, 0x6109, 0x6e1d, 0x6e14, 0x9685, 0x4e88,
00590 0x5a31, 0x96e8, 0x4e0e, 0x5c7f, 0x79b9, 0x5b87, 0x8bed, 0x7fbd,

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```
00591 0x7389, 0x57df, 0x828b, 0x90c1, 0x5401, 0x9047, 0x55bb, 0x5cea,
00592 0x5fa1, 0x6108, 0x6b32, 0x72f1, 0x80b2, 0x8a89,
00593 /* 0x54 */
00594 0x6d74, 0x5bd3, 0x88d5, 0x9884, 0x8c6b, 0x9a6d, 0x9e33, 0x6e0a,
00595 0x51a4, 0x5143, 0x57a3, 0x8881, 0x539f, 0x63f4, 0x8f95, 0x56ed,
00596 0x5458, 0x5706, 0x733f, 0x6e90, 0x7f18, 0x8fd8, 0x82d1, 0x613f,
00597 0x6028, 0x9662, 0x66f0, 0x7ea6, 0x8d8a, 0x8dc3, 0x94a5, 0x5cb3,
00598 0x7ca4, 0x6708, 0x60a6, 0x9605, 0x8018, 0x4e91, 0x90e7, 0x5300,
00599 0x9668, 0x5141, 0x8fd0, 0x8574, 0x915d, 0x6655, 0x97f5, 0x5b55,
00600 0x531d, 0x7838, 0x6742, 0x683d, 0x54c9, 0x707e, 0x5bb0, 0x8f7d,
00601 0x518d, 0x5728, 0x54b1, 0x6512, 0x6682, 0x8d5e, 0x8d43, 0x810f,
00602 0x846c, 0x906e, 0x7cdf, 0x51ff, 0x85fb, 0x67a3, 0x65e9, 0x6fa1,
00603 0x86a4, 0x8e81, 0x566a, 0x9020, 0x7682, 0x7076, 0x71e5, 0x8d23,
00604 0x62e9, 0x5219, 0x6cfd, 0x8d3c, 0x600e, 0x589e, 0x618e, 0x66fe,
00605 0x8d60, 0x624e, 0x55b3, 0x6e23, 0x672d, 0x8f67,
00606 /* 0x55 */
00607 0x94e1, 0x95f8, 0x7728, 0x6805, 0x69a8, 0x548b, 0x4e4d, 0x70b8,
00608 0x8bc8, 0x6458, 0x658b, 0x5b85, 0x7a84, 0x503a, 0x5be8, 0x77bb,
00609 0x6be1, 0x8a79, 0x7c98, 0x6cbe, 0x76cf, 0x65a9, 0x8f97, 0x5d2d,
00610 0x5c55, 0x8638, 0x6808, 0x5360, 0x6218, 0x7ad9, 0x6e5b, 0x7efd,
00611 0x6a1f, 0x7ae0, 0x7ae0, 0x5f70, 0x6f33, 0x5f20, 0x638c, 0x6da8, 0x6756,
00612 0x4e08, 0x5e10, 0x8d26, 0x4ed7, 0x80c0, 0x7634, 0x969c, 0x62db,
00613 0x662d, 0x627e, 0x6cbc, 0x8d75, 0x7167, 0x7f69, 0x5146, 0x8087,
00614 0x53ec, 0x906e, 0x6298, 0x54f2, 0x86f0, 0x8f99, 0x8005, 0x9517,
00615 0x8517, 0x8fd9, 0x6d59, 0x73cd, 0x659f, 0x771f, 0x7504, 0x7827,
00616 0x81fb, 0x8d1e, 0x9488, 0x4fa6, 0x6795, 0x75b9, 0x8bca, 0x9707,
00617 0x632f, 0x9547, 0x9635, 0x84b8, 0x6323, 0x7741, 0x5f81, 0x72f0,
00618 0x4e89, 0x6014, 0x6574, 0x62ef, 0x6b63, 0x653f,
00619 /* 0x56 */
00620 0x5e27, 0x75c7, 0x90d1, 0x8bc1, 0x829d, 0x679d, 0x652f, 0x5431,
00621 0x8718, 0x77e5, 0x80a2, 0x8102, 0x6c41, 0x4e4b, 0x7ec7, 0x804c,
00622 0x76f4, 0x690d, 0x6b96, 0x6267, 0x503c, 0x4f84, 0x5740, 0x6307,
00623 0x6b62, 0x8db8, 0x53ea, 0x65e8, 0x7eb8, 0x5fd7, 0x631a, 0x63b7,
00624 0x81f3, 0x81f4, 0x7f6e, 0x5e1c, 0x5cd9, 0x5236, 0x667a, 0x79e9,
00625 0x7a1a, 0x8d28, 0x7099, 0x75d4, 0x6ede, 0x6cbb, 0x7a92, 0x4e2d,
00626 0x76c5, 0x5f6e, 0x949f, 0x8877, 0x7ec8, 0x79cd, 0x80bf, 0x91cd,
00627 0x4ef2, 0x4f17, 0x821f, 0x5468, 0x5dde, 0x6d32, 0x8bcc, 0x7ca5,
00628 0x8f74, 0x8098, 0x5e1a, 0x5492, 0x76b1, 0x5b99, 0x663c, 0x9aa4,
00629 0x73e0, 0x682a, 0x86db, 0x6731, 0x732a, 0x8bf8, 0x8bdb, 0x9010,
00630 0x7af9, 0x70db, 0x716e, 0x62c4, 0x77a9, 0x5631, 0x4e3b, 0x8457,
00631 0x67f1, 0x52a9, 0x86c0, 0x8d2e, 0x94f8, 0x7b51,
00632 /* 0x57 */
00633 0x4f4f, 0x6ce8, 0x795d, 0x9a7b, 0x6293, 0x722a, 0x62fd, 0x4e13,
00634 0x7816, 0x8f6c, 0x64b0, 0x8d5a, 0x7bc6, 0x6869, 0x5e84, 0x88c5,
00635 0x5986, 0x649e, 0x58e8, 0x72b6, 0x690e, 0x9525, 0x8ff8, 0x8d58,
00636 0x5760, 0x7f00, 0x8c06, 0x51c6, 0x6349, 0x62d9, 0x5353, 0x684c,
00637 0x7422, 0x8301, 0x914c, 0x5544, 0x7740, 0x707c, 0x6d4a, 0x5179,
00638 0x54a8, 0x8d44, 0x59ff, 0x6ecb, 0x6dc4, 0x5b5c, 0x7d2b, 0x4ed4,
00639 0x7c7d, 0x6ed3, 0x5b50, 0x81ea, 0x6e0d, 0x5b57, 0x9b03, 0x68d5,
00640 0x8e2a, 0x5b97, 0x7efc, 0x603b, 0x7eb5, 0x90b9, 0x8d70, 0x594f,
00641 0x63cd, 0x79df, 0x8db3, 0x5352, 0x65cf, 0x7956, 0x8bc5, 0x963b,
00642 0x7ec4, 0x94bb, 0x7e82, 0x5634, 0x9189, 0x6700, 0x7f6a, 0x5c0a,
00643 0x9075, 0x6628, 0x5de6, 0x4f50, 0x67de, 0x505a, 0x4f5c, 0x5750,
00644 0x5ea7, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00645 /* 0x58 */
00646 0x4e8d, 0x4e0c, 0x5140, 0x4e10, 0x5eff, 0x5345, 0x4e15, 0x4e98,
00647 0x4e1e, 0x9b32, 0x5b6c, 0x5669, 0x4e28, 0x79ba, 0x4e3f, 0x5315,
00648 0x4e47, 0x592d, 0x723b, 0x536e, 0x6c10, 0x56df, 0x80e4, 0x9997,
00649 0x6bd3, 0x777e, 0x9f17, 0x4e36, 0x4e9f, 0x9f10, 0x4e5c, 0x4e69,
00650 0x4e93, 0x8288, 0x5b5b, 0x556c, 0x560f, 0x4ec4, 0x538d, 0x539d,
00651 0x53a3, 0x53a5, 0x53ae, 0x9765, 0x8d5d, 0x531a, 0x53f5, 0x5326,
00652 0x532e, 0x533e, 0x8d5c, 0x5366, 0x5363, 0x5202, 0x5208, 0x520e,
00653 0x522d, 0x5233, 0x523f, 0x5240, 0x524c, 0x525e, 0x5261, 0x525c,
00654 0x84af, 0x527d, 0x5282, 0x5281, 0x5290, 0x5293, 0x5182, 0x7f54,
00655 0x4ebb, 0x4ec3, 0x4ec9, 0x4ec2, 0x4ee8, 0x4ee1, 0x4eeb, 0x4ede,
00656 0x4f1b, 0x4ef3, 0x4f22, 0x4f64, 0x4ef5, 0x4f25, 0x4f27, 0x4f09,
00657 0x4f2b, 0x4f5e, 0x4f67, 0x6538, 0x4f5a, 0x4f5d,
00658 /* 0x59 */
00659 0x4f5f, 0x4f57, 0x4f32, 0x4f3d, 0x4f76, 0x4f74, 0x4f91, 0x4f89,
00660 0x4f83, 0x4f8f, 0x4f7e, 0x4f7b, 0x4faa, 0x4f7c, 0x4fac, 0x4f94,
00661 0x4fe6, 0x4fe8, 0x4fea, 0x4fc5, 0x4fda, 0x4fe3, 0x4fdc, 0x4fd1,
00662 0x4fdf, 0x4ff8, 0x5029, 0x504c, 0x4ff3, 0x502c, 0x500f, 0x502e,
00663 0x502d, 0x4ffe, 0x501c, 0x500c, 0x5025, 0x5028, 0x507e, 0x5043,
00664 0x5055, 0x5048, 0x504e, 0x506c, 0x507b, 0x50a5, 0x50a7, 0x50a9,
00665 0x50ba, 0x50d6, 0x5106, 0x50ed, 0x50ec, 0x50e6, 0x50ee, 0x5107,
00666 0x510b, 0x4edd, 0x6c3d, 0x4f58, 0x4f65, 0x4fce, 0x9fa0, 0x6c46,
00667 0x7c74, 0x516e, 0x5dfd, 0x9ec9, 0x9998, 0x5181, 0x5914, 0x52f9,
00668 0x530d, 0x8a07, 0x5310, 0x51eb, 0x5919, 0x5155, 0x4ea0, 0x5156,
00669 0x4eb3, 0x886e, 0x88a4, 0x4eb5, 0x8114, 0x88d2, 0x7980, 0x5b34,
00670 0x8803, 0x7fb8, 0x51ab, 0x51b1, 0x51bd, 0x51bc,
00671 /* 0x5a */
00672 0x51c7, 0x5196, 0x51a2, 0x51a5, 0x8ba0, 0x8ba6, 0x8ba7, 0x8baa,
00673 0x8bb4, 0x8bb5, 0x8bb7, 0x8bc2, 0x8bc3, 0x8bcb, 0x8bcf, 0x8bce,
00674 0x8bd2, 0x8bd3, 0x8bd4, 0x8bd6, 0x8bd8, 0x8bd9, 0x8bdc, 0x8bdf,
00675 0x8be0, 0x8be4, 0x8be8, 0x8be9, 0x8bee, 0x8bf0, 0x8bf7, 0x8bf6,
00676 0x8bf9, 0x8bfc, 0x8bff, 0x8c00, 0x8c02, 0x8c04, 0x8c07, 0x8c0c,
00677 0x8c0f, 0x8c11, 0x8c12, 0x8c14, 0x8c15, 0x8c16, 0x8c19, 0x8c1b,
```

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00678 0x8c18, 0x8c1d, 0x8c1f, 0x8c20, 0x8c21, 0x8c25, 0x8c27, 0x8c2a,
00679 0x8c2b, 0x8c2e, 0x8c2f, 0x8c32, 0x8c33, 0x8c35, 0x8c36, 0x5369,
00680 0x537a, 0x961d, 0x9622, 0x962d, 0x9621, 0x9631, 0x962a, 0x963d,
00681 0x9642, 0x9649, 0x9654, 0x965f, 0x9667, 0x966c, 0x9672, 0x9674,
00682 0x9688, 0x968d, 0x9697, 0x96b0, 0x9097, 0x909b, 0x909d, 0x9099,
00683 0x90ac, 0x90a1, 0x90b4, 0x90b3, 0x90b6, 0x90ba,
00684 /* 0x5b */
00685 0x90b8, 0x90b0, 0x90cf, 0x90c5, 0x90be, 0x90d0, 0x90c4, 0x90c7,
00686 0x90d3, 0x90e6, 0x90e2, 0x90dc, 0x90d7, 0x90db, 0x90eb, 0x90ef,
00687 0x90fe, 0x9104, 0x9122, 0x911e, 0x9123, 0x9131, 0x912f, 0x9139,
00688 0x9143, 0x9146, 0x520d, 0x5942, 0x52a2, 0x52ac, 0x52ad, 0x52be,
00689 0x54ff, 0x52d0, 0x52d6, 0x52f0, 0x53df, 0x71ee, 0x77cd, 0x5ef4,
00690 0x51f5, 0x51fc, 0x9b2f, 0x53b6, 0x5f01, 0x755a, 0x5def, 0x574c,
00691 0x57a9, 0x57a1, 0x587e, 0x58bc, 0x58c5, 0x58d1, 0x5729, 0x572c,
00692 0x572a, 0x5733, 0x5738, 0x5739, 0x572e, 0x572f, 0x575c, 0x573b,
00693 0x5769, 0x5785, 0x576b, 0x5786, 0x577c, 0x577b, 0x5768, 0x576d,
00694 0x5776, 0x5773, 0x57ad, 0x57a4, 0x578c, 0x57b2, 0x57cf, 0x57a7,
00695 0x57b4, 0x5793, 0x57a0, 0x57d5, 0x57d8, 0x57da, 0x57d9, 0x57d2,
00696 0x57b8, 0x57f4, 0x57ef, 0x57f8, 0x57e4, 0x57dd,
00697 /* 0x5c */
00698 0x580b, 0x580d, 0x57fd, 0x57ed, 0x5800, 0x581e, 0x5819, 0x5844,
00699 0x5820, 0x5865, 0x586c, 0x5881, 0x5889, 0x589a, 0x5880, 0x99a8,
00700 0x9f19, 0x61ff, 0x8279, 0x827d, 0x827f, 0x828f, 0x828a, 0x82a8,
00701 0x8284, 0x828e, 0x8291, 0x8297, 0x8299, 0x82ab, 0x82b8, 0x82be,
00702 0x82b0, 0x82c8, 0x82ca, 0x82e3, 0x8298, 0x82b7, 0x82ae, 0x82cb,
00703 0x82cc, 0x82c1, 0x82a9, 0x82b4, 0x82a1, 0x82aa, 0x829f, 0x82c4,
00704 0x82ce, 0x82a4, 0x82e1, 0x8309, 0x82f7, 0x82e4, 0x830f, 0x8307,
00705 0x82dc, 0x82f4, 0x82d2, 0x82d8, 0x830c, 0x82fb, 0x82d3, 0x8311,
00706 0x831a, 0x8306, 0x8314, 0x8315, 0x82e0, 0x82d5, 0x831c, 0x8351,
00707 0x835b, 0x835c, 0x8308, 0x8308, 0x8392, 0x833c, 0x8334, 0x8331, 0x839b,
00708 0x835e, 0x832f, 0x834f, 0x8347, 0x8343, 0x835f, 0x8340, 0x8317,
00709 0x8360, 0x832d, 0x833a, 0x8333, 0x8366, 0x8365,
00710 /* 0x5d */
00711 0x8368, 0x831b, 0x8369, 0x836c, 0x836a, 0x836d, 0x836e, 0x83b0,
00712 0x8378, 0x83b3, 0x83b4, 0x83a0, 0x83aa, 0x8393, 0x839c, 0x8385,
00713 0x837c, 0x83b6, 0x83a9, 0x837d, 0x83b8, 0x837b, 0x8398, 0x839e,
00714 0x83a8, 0x83ba, 0x83bc, 0x83c1, 0x8401, 0x83e5, 0x83d8, 0x5807,
00715 0x8418, 0x840b, 0x83dd, 0x83fd, 0x83d6, 0x841c, 0x8438, 0x8411,
00716 0x8406, 0x83d4, 0x83df, 0x840f, 0x8403, 0x83f8, 0x83f9, 0x83ea,
00717 0x83c5, 0x83c0, 0x8426, 0x83f0, 0x83e1, 0x845c, 0x8451, 0x845a,
00718 0x8459, 0x8473, 0x8487, 0x8488, 0x847a, 0x8489, 0x8478, 0x843c,
00719 0x8446, 0x8469, 0x8476, 0x848c, 0x848e, 0x8431, 0x846d, 0x84c1,
00720 0x84cd, 0x84d0, 0x84e6, 0x84bd, 0x84d3, 0x84ca, 0x84bf, 0x84ba,
00721 0x84e0, 0x84a1, 0x84b9, 0x84b4, 0x8497, 0x84e5, 0x84e3, 0x850c,
00722 0x750d, 0x8538, 0x84f0, 0x8539, 0x851f, 0x853a,
00723 /* 0x5e */
00724 0x8556, 0x853b, 0x84ff, 0x84fc, 0x8559, 0x8548, 0x8568, 0x8564,
00725 0x855e, 0x857a, 0x77a2, 0x8543, 0x8572, 0x857b, 0x85a4, 0x85a8,
00726 0x8587, 0x858f, 0x8579, 0x85ae, 0x859c, 0x8585, 0x85b9, 0x85b7,
00727 0x85b0, 0x85d3, 0x85c1, 0x85dc, 0x85ff, 0x8627, 0x8605, 0x8629,
00728 0x8616, 0x863c, 0x5efe, 0x5f08, 0x593c, 0x5941, 0x8037, 0x5955,
00729 0x595a, 0x5958, 0x530f, 0x5c22, 0x5c25, 0x5c2c, 0x5c34, 0x624c,
00730 0x626a, 0x629f, 0x62bb, 0x62ca, 0x62da, 0x62d7, 0x62ee, 0x6322,
00731 0x62f6, 0x6339, 0x634b, 0x6343, 0x63ad, 0x63f6, 0x6371, 0x637a,
00732 0x638e, 0x63b4, 0x636d, 0x63ac, 0x638a, 0x6369, 0x63ae, 0x63bc,
00733 0x63f2, 0x63f8, 0x63e0, 0x63ff, 0x63c4, 0x63de, 0x63ce, 0x6452,
00734 0x63c6, 0x63be, 0x6445, 0x6441, 0x640b, 0x641b, 0x6420, 0x640c,
00735 0x6426, 0x6421, 0x645e, 0x6484, 0x646d, 0x6496,
00736 /* 0x5f */
00737 0x647a, 0x64b7, 0x64b8, 0x6499, 0x64ba, 0x64c0, 0x64d0, 0x64d7,
00738 0x64e4, 0x64e2, 0x6509, 0x6525, 0x652e, 0x5f0b, 0x5fd2, 0x7519,
00739 0x5f11, 0x535f, 0x53f1, 0x53fd, 0x53e9, 0x53e8, 0x53fb, 0x5412,
00740 0x5416, 0x5406, 0x544b, 0x5452, 0x5453, 0x5454, 0x5456, 0x5443,
00741 0x5421, 0x5457, 0x5459, 0x5423, 0x5432, 0x5482, 0x5494, 0x5477,
00742 0x5471, 0x5464, 0x549a, 0x549b, 0x5484, 0x5476, 0x5466, 0x549d,
00743 0x54d0, 0x54ad, 0x54c2, 0x54b4, 0x54d2, 0x54a7, 0x54a6, 0x54d3,
00744 0x54d4, 0x5472, 0x54a3, 0x54d5, 0x54bb, 0x54bf, 0x54cc, 0x54d9,
00745 0x54da, 0x54dc, 0x54a9, 0x54aa, 0x54a4, 0x54dd, 0x54cf, 0x54de,
00746 0x551b, 0x54e7, 0x5520, 0x54fd, 0x5514, 0x54f3, 0x5522, 0x5523,
00747 0x550f, 0x5511, 0x5527, 0x552a, 0x5567, 0x558f, 0x55b5, 0x5549,
00748 0x556d, 0x5541, 0x5555, 0x553f, 0x5550, 0x553c,
00749 /* 0x60 */
00750 0x5537, 0x5556, 0x5575, 0x5576, 0x5577, 0x5533, 0x5530, 0x555c,
00751 0x558b, 0x55d2, 0x5583, 0x55b1, 0x55b9, 0x5588, 0x5581, 0x559f,
00752 0x557e, 0x55d6, 0x5591, 0x557b, 0x55df, 0x55bd, 0x55be, 0x5594,
00753 0x5599, 0x55ea, 0x55f7, 0x55c9, 0x561f, 0x55d1, 0x55fe, 0x55ec,
00754 0x55d4, 0x55e6, 0x55dd, 0x55c4, 0x55ef, 0x55e5, 0x55f2, 0x55f3,
00755 0x55cc, 0x55cd, 0x55e8, 0x55f5, 0x55e4, 0x8f94, 0x561e, 0x5608,
00756 0x560c, 0x5601, 0x5624, 0x5623, 0x55fe, 0x5600, 0x5627, 0x562d,
00757 0x5658, 0x5639, 0x5657, 0x5657, 0x562c, 0x564d, 0x5662, 0x5659, 0x565c,
00758 0x564c, 0x5654, 0x5686, 0x5664, 0x5671, 0x566b, 0x567b, 0x567c,
00759 0x5685, 0x5693, 0x56af, 0x56d4, 0x56d7, 0x56dd, 0x56e1, 0x56f5,
00760 0x56eb, 0x56f9, 0x56ff, 0x5704, 0x570a, 0x5709, 0x571c, 0x5e0f,
00761 0x5e19, 0x5e14, 0x5e11, 0x5e31, 0x5e3b, 0x5e3c,
00762 /* 0x61 */
00763 0x5e37, 0x5e44, 0x5e54, 0x5e5b, 0x5e5e, 0x5e61, 0x5c8c, 0x5c7a,
00764 0x5c8d, 0x5c90, 0x5c96, 0x5c88, 0x5c98, 0x5c99, 0x5c91, 0x5c9a,

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00765 0x5c9c, 0x5cb5, 0x5ca2, 0x5cbd, 0x5cac, 0x5cab, 0x5cbl, 0x5ca3,
00766 0x5cc1, 0x5cb7, 0x5cc4, 0x5cd2, 0x5ce4, 0x5ccb, 0x5ce5, 0x5d02,
00767 0x5d03, 0x5d27, 0x5d26, 0x5d2e, 0x5d24, 0x5d1e, 0x5d06, 0x5d1b,
00768 0x5d58, 0x5d3e, 0x5d34, 0x5d3d, 0x5d6c, 0x5d5b, 0x5d6f, 0x5d5d,
00769 0x5d6b, 0x5d4b, 0x5d4a, 0x5d69, 0x5d74, 0x5d82, 0x5d99, 0x5d9d,
00770 0x8c73, 0x5db7, 0x5dc5, 0x5f73, 0x5f77, 0x5f82, 0x5f87, 0x5f89,
00771 0x5f8c, 0x5f95, 0x5f99, 0x5f9c, 0x5fa8, 0x5fad, 0x5fb5, 0x5fbc,
00772 0x8862, 0x5f61, 0x72ad, 0x72b0, 0x72b4, 0x72b7, 0x72b8, 0x72c3,
00773 0x72c1, 0x72ce, 0x72cd, 0x72d2, 0x72e8, 0x72ef, 0x72e9, 0x72f2,
00774 0x72f4, 0x72f7, 0x7301, 0x72f3, 0x7303, 0x72fa,
00775 /* 0x62 */
00776 0x72fb, 0x7317, 0x7313, 0x7321, 0x730a, 0x731e, 0x731d, 0x7315,
00777 0x7322, 0x7339, 0x7325, 0x732c, 0x7338, 0x7331, 0x7350, 0x734d,
00778 0x7357, 0x7360, 0x736c, 0x736f, 0x737e, 0x821b, 0x5925, 0x98e7,
00779 0x5924, 0x5902, 0x9963, 0x9967, 0x9968, 0x9969, 0x996a, 0x996b,
00780 0x996c, 0x9974, 0x9977, 0x997d, 0x9980, 0x9984, 0x9987, 0x998a,
00781 0x998d, 0x9990, 0x9991, 0x9993, 0x9994, 0x9995, 0x5e80, 0x5e91,
00782 0x5e8b, 0x5e96, 0x5ea5, 0x5ea0, 0x5eb9, 0x5eb5, 0x5ebe, 0x5eb3,
00783 0x8d53, 0x5ed2, 0x5ed1, 0x5edb, 0x5ee8, 0x5eea, 0x81ba, 0x5fc4,
00784 0x5fc9, 0x5fd6, 0x5fcf, 0x6003, 0x5fee, 0x6004, 0x5fe1, 0x5fe4,
00785 0x5ffe, 0x6005, 0x6006, 0x600e, 0x5fea, 0x5fed, 0x5ff8, 0x6019, 0x6035,
00786 0x6026, 0x601b, 0x600f, 0x600d, 0x6029, 0x602b, 0x600a, 0x603f,
00787 0x6021, 0x6078, 0x6079, 0x607b, 0x607a, 0x6042,
00788 /* 0x63 */
00789 0x606a, 0x607d, 0x6096, 0x609a, 0x60ad, 0x609d, 0x6083, 0x6092,
00790 0x608c, 0x609b, 0x60ec, 0x60bb, 0x60b1, 0x60dd, 0x60db, 0x60c6,
00791 0x60da, 0x60b4, 0x6120, 0x6126, 0x6115, 0x6123, 0x60f4, 0x6100,
00792 0x610e, 0x612b, 0x614a, 0x6175, 0x61ac, 0x6194, 0x61a7, 0x61b7,
00793 0x61d4, 0x61f5, 0x5fdd, 0x96b3, 0x95e9, 0x95eb, 0x95f1, 0x95f3,
00794 0x95f5, 0x95f6, 0x95fc, 0x95fe, 0x9603, 0x9604, 0x9606, 0x9608,
00795 0x960a, 0x960b, 0x960c, 0x960d, 0x960f, 0x9612, 0x9615, 0x9616,
00796 0x9617, 0x9619, 0x961a, 0x4e2c, 0x723f, 0x6215, 0x6c35, 0x6c54,
00797 0x6c5c, 0x6c4a, 0x6ca3, 0x6c85, 0x6c90, 0x6c94, 0x6c8c, 0x6c68,
00798 0x6c69, 0x6c74, 0x6c76, 0x6c86, 0x6ca9, 0x6cd0, 0x6cd4, 0x6cad,
00799 0x6cf7, 0x6cf8, 0x6cf1, 0x6cd7, 0x6cb2, 0x6ce0, 0x6cd6, 0x6cfa,
00800 0x6ceb, 0x6cee, 0x6cb1, 0x6cd3, 0x6cef, 0x6cfe,
00801 /* 0x64 */
00802 0x6d39, 0x6d27, 0x6d0c, 0x6d43, 0x6d48, 0x6d07, 0x6d04, 0x6d19,
00803 0x6d0e, 0x6d2b, 0x6d4d, 0x6d4e, 0x6d35, 0x6d1a, 0x6d4f, 0x6d52,
00804 0x6d54, 0x6d33, 0x6d91, 0x6d6f, 0x6d9e, 0x6da0, 0x6d5e, 0x6d93,
00805 0x6d94, 0x6d5c, 0x6d60, 0x6d7c, 0x6d63, 0x6e1a, 0x6dc7, 0x6dc5,
00806 0x6dde, 0x6e0e, 0x6dbf, 0x6de0, 0x6e11, 0x6de6, 0x6dd9, 0x6dd9,
00807 0x6e16, 0x6dab, 0x6e0c, 0x6dae, 0x6e2b, 0x6e6e, 0x6e4e, 0x6e6b,
00808 0x6eb2, 0x6e5f, 0x6e86, 0x6e53, 0x6e54, 0x6e32, 0x6e25, 0x6e44,
00809 0x6edf, 0x6eb1, 0x6e98, 0x6ee0, 0x6f2d, 0x6ee2, 0x6ea5, 0x6ea7,
00810 0x6ebd, 0x6ebb, 0x6eb7, 0x6ed7, 0x6eb4, 0x6ecf, 0x6e8f, 0x6ec2,
00811 0x6e9f, 0x6f62, 0x6f46, 0x6f47, 0x6f24, 0x6f15, 0x6ef9, 0x6f2f,
00812 0x6f36, 0x6f4b, 0x6f74, 0x6f2a, 0x6f09, 0x6f29, 0x6f89, 0x6f8d,
00813 0x6f8c, 0x6f78, 0x6f72, 0x6f7c, 0x6f7a, 0x6fd1,
00814 /* 0x65 */
00815 0x6fc9, 0x6fa7, 0x6fb9, 0x6fb6, 0x6fc2, 0x6fe1, 0x6fee, 0x6fde,
00816 0x6fe0, 0x6fef, 0x701a, 0x7023, 0x701b, 0x7039, 0x7035, 0x704f,
00817 0x705e, 0x5b80, 0x5b84, 0x5b95, 0x5b93, 0x5ba5, 0x5bb8, 0x752f,
00818 0x9a9e, 0x6434, 0x5be4, 0x5bee, 0x8930, 0x5bf0, 0x8e47, 0x8b07,
00819 0x8fb6, 0x8fd3, 0x8fd5, 0x8fe5, 0x8fee, 0x8fe4, 0x8fe9, 0x8fe6,
00820 0x8ff3, 0x8fe8, 0x9005, 0x9004, 0x900b, 0x9026, 0x9011, 0x900d,
00821 0x9016, 0x9021, 0x9035, 0x9036, 0x902d, 0x902f, 0x9044, 0x9051,
00822 0x9052, 0x9050, 0x9068, 0x9058, 0x9062, 0x905b, 0x66b9, 0x9074,
00823 0x907d, 0x9082, 0x9088, 0x9083, 0x908b, 0x5f50, 0x5f57, 0x5f56,
00824 0x5f58, 0x5c3b, 0x54ab, 0x5c50, 0x5c59, 0x5b71, 0x5c63, 0x5c66,
00825 0x7fbc, 0x5f2a, 0x5f29, 0x5f2d, 0x8274, 0x5f3c, 0x9b3b, 0x5c6e,
00826 0x5981, 0x5983, 0x598d, 0x59a9, 0x59aa, 0x59a3,
00827 /* 0x66 */
00828 0x5997, 0x59ca, 0x59ab, 0x599e, 0x59a4, 0x59d2, 0x59b2, 0x59af,
00829 0x59d7, 0x59be, 0x5a05, 0x5a06, 0x59dd, 0x5a08, 0x59e3, 0x59d8,
00830 0x59f9, 0x5a0c, 0x5a09, 0x5a32, 0x5a34, 0x5a11, 0x5a23, 0x5a13,
00831 0x5a40, 0x5a67, 0x5a4a, 0x5a55, 0x5a3c, 0x5a62, 0x5a75, 0x80ec,
00832 0x5aaa, 0x5a9b, 0x5a77, 0x5a7a, 0x5abe, 0x5aeb, 0x5ab2, 0x5ad2,
00833 0x5ad4, 0x5ab8, 0x5ae0, 0x5ae3, 0x5af1, 0x5ad6, 0x5ae6, 0x5ad8,
00834 0x5adc, 0x5b09, 0x5b17, 0x5b16, 0x5b32, 0x5b37, 0x5b40, 0x5c15,
00835 0x5c1c, 0x5b5a, 0x5b65, 0x5b73, 0x5b51, 0x5b53, 0x5b62, 0x9a75,
00836 0x9a77, 0x9a78, 0x9a7a, 0x9a7f, 0x9a7d, 0x9a80, 0x9a81, 0x9a85,
00837 0x9a88, 0x9a8a, 0x9a90, 0x9a92, 0x9a93, 0x9a96, 0x9a98, 0x9a9b,
00838 0x9a9c, 0x9a9d, 0x9a9f, 0x9aa0, 0x9aa2, 0x9aa3, 0x9aa5, 0x9aa7,
00839 0x7e9f, 0x7ea1, 0x7ea3, 0x7ea5, 0x7ea8, 0x7ea9,
00840 /* 0x67 */
00841 0x7ead, 0x7eb0, 0x7ebe, 0x7ec0, 0x7ec1, 0x7ec2, 0x7ec9, 0x7ecb,
00842 0x7ecc, 0x7ed0, 0x7ed4, 0x7ed7, 0x7edb, 0x7ee0, 0x7ee1, 0x7ee8,
00843 0x7eeb, 0x7eee, 0x7eef, 0x7ef1, 0x7ef2, 0x7f0d, 0x7ef6, 0x7efa,
00844 0x7efb, 0x7efe, 0x7f01, 0x7f02, 0x7f03, 0x7f07, 0x7f08, 0x7f0b,
00845 0x7f0c, 0x7f0f, 0x7f11, 0x7f12, 0x7f17, 0x7f19, 0x7f1c, 0x7f1b,
00846 0x7f1f, 0x7f21, 0x7f22, 0x7f23, 0x7f24, 0x7f25, 0x7f26, 0x7f27,
00847 0x7f2a, 0x7f2b, 0x7f2c, 0x7f2d, 0x7f2f, 0x7f30, 0x7f31, 0x7f32,
00848 0x7f33, 0x7f35, 0x5e7a, 0x757f, 0x5ddb, 0x753e, 0x9095, 0x738e,
00849 0x7391, 0x73ae, 0x73a2, 0x739f, 0x73cf, 0x73c2, 0x73d1, 0x73b7,
00850 0x73b3, 0x73c0, 0x73c9, 0x73c8, 0x73e5, 0x73d9, 0x987c, 0x740a,
00851 0x73e9, 0x73e7, 0x73de, 0x73ba, 0x73f2, 0x740f, 0x742a, 0x745b,
```

```
00852 0x7426, 0x7425, 0x7428, 0x7430, 0x742e, 0x742c,
00853 /* 0x68 */
00854 0x741b, 0x741a, 0x7441, 0x745c, 0x7457, 0x7455, 0x7459, 0x7477,
00855 0x746d, 0x747e, 0x749c, 0x748e, 0x7480, 0x7481, 0x7487, 0x748b,
00856 0x749e, 0x74a8, 0x74a9, 0x7490, 0x74a7, 0x74d2, 0x74ba, 0x97ea,
00857 0x97eb, 0x97ec, 0x674c, 0x6753, 0x675e, 0x6748, 0x6769, 0x67a5,
00858 0x6787, 0x676a, 0x6773, 0x6798, 0x67a7, 0x6775, 0x67a8, 0x679e,
00859 0x67ad, 0x678b, 0x6777, 0x677c, 0x67f0, 0x6809, 0x67d8, 0x680a,
00860 0x67e9, 0x67b0, 0x680c, 0x67d9, 0x67b5, 0x67da, 0x67b3, 0x67dd,
00861 0x6800, 0x67c3, 0x67b8, 0x67e2, 0x680e, 0x67c1, 0x67fd, 0x6832,
00862 0x6833, 0x6860, 0x6861, 0x684e, 0x6862, 0x6844, 0x6864, 0x6883,
00863 0x681d, 0x6855, 0x6866, 0x6841, 0x6867, 0x6840, 0x683e, 0x684a,
00864 0x6849, 0x6829, 0x68b5, 0x688f, 0x6874, 0x6877, 0x6893, 0x686b,
00865 0x68c2, 0x696e, 0x68fc, 0x691f, 0x6920, 0x68f9,
00866 /* 0x69 */
00867 0x6924, 0x68f0, 0x690b, 0x6901, 0x6957, 0x68e3, 0x6910, 0x6971,
00868 0x6939, 0x6960, 0x6942, 0x695d, 0x6984, 0x696b, 0x6980, 0x6998,
00869 0x6978, 0x6934, 0x69cc, 0x6987, 0x6988, 0x69ce, 0x6989, 0x6966,
00870 0x6963, 0x6979, 0x699b, 0x69a7, 0x69bb, 0x69ab, 0x69ad, 0x69d4,
00871 0x69b1, 0x69c1, 0x69ca, 0x69df, 0x6995, 0x69e0, 0x698d, 0x69ff,
00872 0x6a2f, 0x69ed, 0x6a17, 0x6a18, 0x6a65, 0x69f2, 0x6a44, 0x6a3e,
00873 0x6aa0, 0x6a50, 0x6a5b, 0x6a35, 0x6a8e, 0x6a79, 0x6a3d, 0x6a28,
00874 0x6a58, 0x6a7c, 0x6a91, 0x6a90, 0x6aa9, 0x6a97, 0x6aaab, 0x7337,
00875 0x7352, 0x6b81, 0x6b82, 0x6b87, 0x6b84, 0x6b92, 0x6b93, 0x6b8d,
00876 0x6b9a, 0x6b9b, 0x6ba1, 0x6baa, 0x8f6b, 0x8f6d, 0x8f71, 0x8f72,
00877 0x8f73, 0x8f75, 0x8f76, 0x8f78, 0x8f77, 0x8f79, 0x8f7a, 0x8f7c,
00878 0x8f7e, 0x8f81, 0x8f82, 0x8f84, 0x8f87, 0x8f8b,
00879 /* 0x6a */
00880 0x8f8d, 0x8f8e, 0x8f8f, 0x8f98, 0x8f9a, 0x8ece, 0x620b, 0x6217,
00881 0x621b, 0x621f, 0x6222, 0x6221, 0x6225, 0x6224, 0x622c, 0x81e7,
00882 0x74ef, 0x74f4, 0x74ff, 0x750f, 0x7511, 0x7513, 0x6534, 0x65ee,
00883 0x65ef, 0x65f0, 0x660a, 0x6619, 0x6772, 0x6603, 0x6615, 0x6600,
00884 0x7085, 0x66f7, 0x661d, 0x6634, 0x6631, 0x6636, 0x6635, 0x8006,
00885 0x665f, 0x6654, 0x6641, 0x664f, 0x6656, 0x6661, 0x6657, 0x6677,
00886 0x6684, 0x668c, 0x66a7, 0x669d, 0x66be, 0x66db, 0x66dc, 0x66e6,
00887 0x66e9, 0x8d32, 0x8d33, 0x8d36, 0x8d3b, 0x8d3d, 0x8d40, 0x8d45,
00888 0x8d46, 0x8d48, 0x8d49, 0x8d47, 0x8d4d, 0x8d55, 0x8d59, 0x89c7,
00889 0x89ca, 0x89cb, 0x89cc, 0x89ce, 0x89cf, 0x89d0, 0x89d1, 0x726e,
00890 0x729f, 0x725d, 0x7266, 0x726f, 0x727e, 0x727f, 0x7284, 0x728b,
00891 0x728d, 0x728f, 0x7292, 0x6308, 0x6332, 0x63b0,
00892 /* 0x6b */
00893 0x643f, 0x64d8, 0x8004, 0x6bea, 0x6bf3, 0x6bfd, 0x6bf5, 0x6bf9,
00894 0x6c05, 0x6c07, 0x6c06, 0x6c0d, 0x6c15, 0x6c18, 0x6c19, 0x6c1a,
00895 0x6c21, 0x6c29, 0x6c24, 0x6c2a, 0x6c32, 0x6535, 0x6555, 0x656b,
00896 0x724d, 0x7252, 0x7256, 0x7230, 0x8662, 0x5216, 0x809f, 0x809c,
00897 0x8093, 0x80bc, 0x670a, 0x80bd, 0x80b1, 0x80ab, 0x80ad, 0x80b4,
00898 0x80b7, 0x80e7, 0x80e8, 0x80e9, 0x80ea, 0x80db, 0x80c2, 0x80c4,
00899 0x80d9, 0x80cd, 0x80d7, 0x6710, 0x80dd, 0x80eb, 0x80f1, 0x80f4,
00900 0x80ed, 0x810d, 0x810e, 0x80f2, 0x80fc, 0x6715, 0x8112, 0x8c5a,
00901 0x8136, 0x811e, 0x812c, 0x8118, 0x8132, 0x8148, 0x814c, 0x8153,
00902 0x8174, 0x8159, 0x815a, 0x8171, 0x8160, 0x8169, 0x817c, 0x817d,
00903 0x816d, 0x8167, 0x584d, 0x5ab5, 0x8188, 0x8182, 0x8191, 0x6ed5,
00904 0x81a3, 0x81aa, 0x81cc, 0x6726, 0x81ca, 0x81bb,
00905 /* 0x6c */
00906 0x81c1, 0x81a6, 0x6b24, 0x6b37, 0x6b39, 0x6b43, 0x6b46, 0x6b59,
00907 0x98d1, 0x98d2, 0x98d3, 0x98d5, 0x98d9, 0x98da, 0x6bb3, 0x5f40,
00908 0x6bc2, 0x89f3, 0x6590, 0x9f51, 0x6593, 0x65bc, 0x65c6, 0x65c4,
00909 0x65c3, 0x65cc, 0x65ce, 0x65d2, 0x65d6, 0x7080, 0x709c, 0x7096,
00910 0x709d, 0x70bb, 0x70c0, 0x70b7, 0x70ab, 0x70b1, 0x70e8, 0x70ca,
00911 0x7110, 0x7113, 0x7116, 0x712f, 0x7131, 0x7173, 0x715c, 0x7168,
00912 0x7145, 0x7172, 0x714a, 0x7178, 0x717a, 0x7198, 0x71b3, 0x71b5,
00913 0x71a8, 0x71a0, 0x71e0, 0x71d4, 0x71e7, 0x71f9, 0x721d, 0x7228,
00914 0x706c, 0x7118, 0x7166, 0x71b9, 0x623e, 0x623d, 0x6243, 0x6248,
00915 0x6249, 0x793b, 0x7940, 0x7946, 0x7949, 0x795b, 0x795c, 0x7953,
00916 0x795a, 0x7962, 0x7957, 0x7960, 0x796f, 0x7967, 0x797a, 0x7985,
00917 0x798a, 0x799a, 0x79a7, 0x79b3, 0x5fd1, 0x5fd0,
00918 /* 0x6d */
00919 0x603c, 0x605d, 0x605a, 0x6067, 0x6041, 0x6059, 0x6063, 0x60ab,
00920 0x6106, 0x610d, 0x615d, 0x61a9, 0x619d, 0x61cb, 0x61d1, 0x6206,
00921 0x8080, 0x807f, 0x6c93, 0x6cf6, 0x6dfc, 0x77f6, 0x77f8, 0x7800,
00922 0x7809, 0x7817, 0x7818, 0x7811, 0x65ab, 0x782d, 0x781c, 0x781d,
00923 0x7839, 0x783a, 0x783b, 0x781f, 0x783c, 0x7825, 0x782c, 0x7823,
00924 0x7829, 0x784e, 0x786d, 0x7856, 0x7857, 0x7826, 0x7850, 0x7847,
00925 0x784c, 0x786a, 0x789b, 0x7893, 0x789a, 0x7887, 0x789c, 0x78a1,
00926 0x78a3, 0x78b2, 0x78b9, 0x78a5, 0x78d4, 0x78d9, 0x78c9, 0x78ec,
00927 0x78f2, 0x7905, 0x78f4, 0x7913, 0x7924, 0x791e, 0x7934, 0x9f9b,
00928 0x9ef9, 0x9efb, 0x9efc, 0x7f04, 0x7704, 0x770d, 0x7f69, 0x7707,
00929 0x7708, 0x771a, 0x7722, 0x7719, 0x772d, 0x7726, 0x7735, 0x7738,
00930 0x7750, 0x7751, 0x7747, 0x7743, 0x775a, 0x7768,
00931 /* 0x6e */
00932 0x7762, 0x7765, 0x777f, 0x778d, 0x777d, 0x7780, 0x778c, 0x7791,
00933 0x779f, 0x77a0, 0x77b0, 0x77b5, 0x77bd, 0x753a, 0x7540, 0x754e,
00934 0x754b, 0x7548, 0x755b, 0x7572, 0x7579, 0x7583, 0x7f58, 0x7f61,
00935 0x7f5f, 0x8a48, 0x7f68, 0x7f74, 0x7f71, 0x7f79, 0x7f81, 0x7f7e,
00936 0x76cd, 0x76e5, 0x8832, 0x9485, 0x9486, 0x9487, 0x948b, 0x948a,
00937 0x948c, 0x948d, 0x948f, 0x9490, 0x9494, 0x9497, 0x9495, 0x949a,
00938 0x949b, 0x949c, 0x94a3, 0x94a4, 0x94ab, 0x94aa, 0x94ad, 0x94ac,
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00939 0x94af, 0x94b0, 0x94b2, 0x94b4, 0x94b6, 0x94b7, 0x94b8, 0x94b9,
00940 0x94ba, 0x94bc, 0x94bd, 0x94bf, 0x94c4, 0x94c8, 0x94c9, 0x94ca,
00941 0x94cb, 0x94cc, 0x94cd, 0x94ce, 0x94d0, 0x94d1, 0x94d2, 0x94d5,
00942 0x94d6, 0x94d7, 0x94d9, 0x94d8, 0x94db, 0x94de, 0x94df, 0x94e0,
00943 0x94e2, 0x94e4, 0x94e5, 0x94e7, 0x94e8, 0x94ea,
00944 /* 0x6f */
00945 0x94e9, 0x94eb, 0x94ee, 0x94ef, 0x94f3, 0x94f4, 0x94f5, 0x94f7,
00946 0x94f9, 0x94fc, 0x94fd, 0x94ff, 0x9503, 0x9502, 0x9506, 0x9507,
00947 0x9509, 0x950a, 0x950d, 0x950e, 0x950f, 0x9512, 0x9513, 0x9514,
00948 0x9515, 0x9516, 0x9518, 0x951b, 0x951d, 0x951e, 0x951f, 0x9522,
00949 0x952a, 0x952b, 0x9529, 0x952c, 0x9531, 0x9532, 0x9534, 0x9536,
00950 0x9537, 0x9538, 0x953c, 0x953e, 0x953f, 0x9542, 0x9535, 0x9544,
00951 0x9545, 0x9546, 0x9549, 0x954c, 0x954e, 0x954f, 0x9552, 0x9553,
00952 0x9554, 0x9556, 0x9557, 0x9558, 0x9559, 0x955b, 0x955e, 0x955f,
00953 0x955d, 0x9561, 0x9562, 0x9564, 0x9565, 0x9566, 0x9567, 0x9568,
00954 0x9569, 0x956a, 0x956b, 0x956c, 0x956f, 0x9571, 0x9572, 0x9573,
00955 0x953a, 0x77e7, 0x77ec, 0x96c9, 0x79d5, 0x79ed, 0x79e3, 0x79eb,
00956 0x7a06, 0x5d47, 0x7a03, 0x7a02, 0x7a1e, 0x7a14,
00957 /* 0x70 */
00958 0x7a39, 0x7a37, 0x7a51, 0x9ecf, 0x99a5, 0x7a70, 0x7688, 0x768e,
00959 0x7693, 0x7699, 0x76a4, 0x74de, 0x74e0, 0x752c, 0x9e20, 0x9e22,
00960 0x9e28, 0x9e29, 0x9e2a, 0x9e2b, 0x9e2c, 0x9e32, 0x9e31, 0x9e36,
00961 0x9e38, 0x9e37, 0x9e39, 0x9e3a, 0x9e3e, 0x9e41, 0x9e42, 0x9e44,
00962 0x9e46, 0x9e47, 0x9e48, 0x9e49, 0x9e4b, 0x9e4c, 0x9e4e, 0x9e51,
00963 0x9e55, 0x9e57, 0x9e5a, 0x9e5b, 0x9e5c, 0x9e5e, 0x9e63, 0x9e66,
00964 0x9e67, 0x9e68, 0x9e69, 0x9e6a, 0x9e6b, 0x9e6c, 0x9e71, 0x9e6d,
00965 0x9e73, 0x7592, 0x759d, 0x7594, 0x7596, 0x75a0, 0x759d, 0x75ac, 0x75a3,
00966 0x75b3, 0x75b4, 0x75b8, 0x75c4, 0x75b1, 0x75b0, 0x75c3, 0x75c2,
00967 0x75d6, 0x75cd, 0x75e3, 0x75e8, 0x75e6, 0x75e4, 0x75eb, 0x75e7,
00968 0x7603, 0x75f1, 0x75fc, 0x75ff, 0x7610, 0x7600, 0x7605, 0x760c,
00969 0x7617, 0x760a, 0x7625, 0x7618, 0x7615, 0x7619,
00970 /* 0x71 */
00971 0x761b, 0x763c, 0x7622, 0x7620, 0x7640, 0x762d, 0x7630, 0x763f,
00972 0x7635, 0x7643, 0x763e, 0x7633, 0x764d, 0x765e, 0x7654, 0x765c,
00973 0x7656, 0x766b, 0x766f, 0x7fca, 0x7ae6, 0x7a78, 0x7a79, 0x7a80,
00974 0x7a86, 0x7a88, 0x7a95, 0x7aa6, 0x7aa0, 0x7aac, 0x7aa8, 0x7aad,
00975 0x7ab3, 0x8864, 0x8869, 0x8872, 0x887d, 0x887f, 0x8882, 0x88a2,
00976 0x88c6, 0x88b7, 0x88bc, 0x88c9, 0x88e2, 0x88ce, 0x88e3, 0x88e5,
00977 0x88f1, 0x891a, 0x88fc, 0x88e8, 0x88fe, 0x88f0, 0x8921, 0x8919,
00978 0x8913, 0x891b, 0x890a, 0x8934, 0x892b, 0x8936, 0x8941, 0x8966,
00979 0x897b, 0x758b, 0x80e5, 0x76b2, 0x76b4, 0x77dc, 0x8012, 0x8014,
00980 0x8016, 0x801c, 0x8020, 0x8022, 0x8025, 0x8026, 0x8027, 0x8029,
00981 0x8028, 0x8031, 0x800b, 0x8035, 0x8043, 0x8046, 0x804d, 0x8052,
00982 0x8069, 0x8071, 0x8983, 0x9878, 0x9880, 0x9883,
00983 /* 0x72 */
00984 0x9889, 0x988c, 0x988d, 0x988f, 0x9894, 0x989a, 0x989b, 0x989e,
00985 0x989f, 0x98a1, 0x98a2, 0x98a5, 0x98a6, 0x864d, 0x8654, 0x866c,
00986 0x866e, 0x8671, 0x867a, 0x867c, 0x867b, 0x86a8, 0x868d, 0x868b,
00987 0x86ac, 0x869d, 0x86a7, 0x86a3, 0x86aa, 0x8693, 0x86a9, 0x86b6,
00988 0x86c4, 0x86b5, 0x86ce, 0x86b0, 0x86ba, 0x86b1, 0x86af, 0x86c9,
00989 0x86cf, 0x86b4, 0x86e9, 0x86f1, 0x86f2, 0x86ed, 0x86f3, 0x86d0,
00990 0x8713, 0x86de, 0x86f4, 0x86df, 0x86d8, 0x86d1, 0x8703, 0x8707,
00991 0x86f8, 0x8708, 0x870a, 0x870d, 0x8709, 0x8723, 0x873b, 0x871e,
00992 0x8725, 0x872e, 0x871a, 0x873e, 0x8748, 0x8734, 0x8731, 0x8729,
00993 0x8737, 0x873f, 0x8782, 0x8722, 0x877d, 0x877e, 0x877b, 0x8760,
00994 0x8770, 0x874c, 0x876e, 0x878b, 0x8753, 0x8763, 0x877c, 0x8764,
00995 0x8759, 0x8765, 0x8793, 0x87af, 0x87a8, 0x87d2,
00996 /* 0x73 */
00997 0x87c6, 0x8788, 0x8785, 0x87ad, 0x8797, 0x8783, 0x87ab, 0x87e5,
00998 0x87ac, 0x87b5, 0x87b3, 0x87cb, 0x87d3, 0x87bd, 0x87d1, 0x87c0,
00999 0x87ca, 0x87db, 0x87ea, 0x87e0, 0x87ee, 0x8816, 0x8813, 0x87fe,
01000 0x880a, 0x881b, 0x8821, 0x8839, 0x883c, 0x7f36, 0x7f42, 0x7f44,
01001 0x7f45, 0x8210, 0x7afa, 0x7afd, 0x7b08, 0x7b03, 0x7b04, 0x7b15,
01002 0x7b0a, 0x7b2b, 0x7b0f, 0x7b47, 0x7b38, 0x7b2a, 0x7b19, 0x7b2e,
01003 0x7b31, 0x7b20, 0x7b25, 0x7b24, 0x7b33, 0x7b3e, 0x7b1e, 0x7b58,
01004 0x7b5a, 0x7b45, 0x7b75, 0x7b4c, 0x7b5d, 0x7b60, 0x7b6e, 0x7b7b,
01005 0x7b62, 0x7b72, 0x7b71, 0x7b90, 0x7ba6, 0x7ba7, 0x7bb8, 0x7bac,
01006 0x7b9d, 0x7ba8, 0x7b85, 0x7baa, 0x7b9c, 0x7ba2, 0x7bab, 0x7bb4,
01007 0x7bd1, 0x7bc1, 0x7bcc, 0x7bdd, 0x7bda, 0x7be5, 0x7be6, 0x7bea,
01008 0x7c0c, 0x7bfe, 0x7bfc, 0x7c0f, 0x7c16, 0x7c0b,
01009 /* 0x74 */
01010 0x7c1f, 0x7c2a, 0x7c26, 0x7c38, 0x7c41, 0x7c40, 0x81fe, 0x8201,
01011 0x8202, 0x8204, 0x81ec, 0x8844, 0x8221, 0x8222, 0x8223, 0x822d,
01012 0x822f, 0x8228, 0x822b, 0x822c, 0x8238, 0x823b, 0x8232, 0x8234, 0x823e,
01013 0x8244, 0x8249, 0x824b, 0x824f, 0x825a, 0x825f, 0x8268, 0x887e,
01014 0x8885, 0x8888, 0x88d8, 0x88df, 0x895e, 0x7f9d, 0x7f9f, 0x7fa7,
01015 0x7faf, 0x7fb0, 0x7fb2, 0x7fb2, 0x7fc7, 0x6549, 0x7c91, 0x7c9d, 0x7c9c,
01016 0x7c9e, 0x7ca2, 0x7cb2, 0x7cbc, 0x7cbd, 0x7cc1, 0x7cc7, 0x7ccc,
01017 0x7ccd, 0x7cc8, 0x7cc5, 0x7cd7, 0x7ce8, 0x826e, 0x66a8, 0x7fb7,
01018 0x7fce, 0x7fd5, 0x7fe5, 0x7fe1, 0x7fe6, 0x7fe9, 0x7fee, 0x7ff3,
01019 0x7cf8, 0x7d77, 0x7da6, 0x7dae, 0x7e47, 0x7e9b, 0x9eb8, 0x9eb4,
01020 0x8d73, 0x8d84, 0x8d94, 0x8d91, 0x8db1, 0x8d67, 0x8d6d, 0x8c47,
01021 0x8c49, 0x914a, 0x9150, 0x914e, 0x914f, 0x9164,
01022 /* 0x75 */
01023 0x9162, 0x9161, 0x9170, 0x9169, 0x916f, 0x917d, 0x917e, 0x9172,
01024 0x9174, 0x9179, 0x918c, 0x9185, 0x9190, 0x918d, 0x9191, 0x91a2,
01025 0x91a3, 0x91aa, 0x91ad, 0x91ae, 0x91af, 0x91b5, 0x91b4, 0x91ba,
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01026 0x8c55, 0x9e7e, 0x8db8, 0x8deb, 0x8e05, 0x8e59, 0x8e69, 0x8db5,
01027 0x8dbf, 0x8dbc, 0x8dba, 0x8dc4, 0x8dd6, 0x8dd7, 0x8dda, 0x8dde,
01028 0x8dce, 0x8dcf, 0x8ddb, 0x8dc6, 0x8dec, 0x8df7, 0x8dff, 0x8de3,
01029 0x8df9, 0x8dfb, 0x8de4, 0x8e09, 0x8dfd, 0x8e14, 0x8e1d, 0x8e1f,
01030 0x8e2c, 0x8e2e, 0x8e23, 0x8e2f, 0x8e3a, 0x8e40, 0x8e39, 0x8e35,
01031 0x8e3d, 0x8e31, 0x8e49, 0x8e41, 0x8e42, 0x8e51, 0x8e52, 0x8e4a,
01032 0x8e70, 0x8e76, 0x8e7c, 0x8e6f, 0x8e74, 0x8e85, 0x8e8f, 0x8e94,
01033 0x8e90, 0x8e9c, 0x8e9e, 0x8c78, 0x8c82, 0x8c8a, 0x8c85, 0x8c98,
01034 0x8c94, 0x659b, 0x89d6, 0x89de, 0x89da, 0x89dc,
01035 /* 0x76 */
01036 0x89e5, 0x89eb, 0x89ef, 0x8a3e, 0x8b26, 0x9753, 0x96e9, 0x96f3,
01037 0x96ef, 0x9706, 0x9701, 0x9708, 0x970f, 0x970e, 0x972a, 0x972d,
01038 0x9730, 0x973e, 0x9f80, 0x9f83, 0x9f85, 0x9f86, 0x9f87, 0x9f88,
01039 0x9f89, 0x9f8a, 0x9f8c, 0x9efe, 0x9f0b, 0x9f0d, 0x96b9, 0x96bc,
01040 0x96bd, 0x96ce, 0x96d2, 0x77bf, 0x96e0, 0x928e, 0x92ae, 0x92c8,
01041 0x933e, 0x936a, 0x93ca, 0x938f, 0x943e, 0x946b, 0x9c7f, 0x9c82,
01042 0x9c85, 0x9c86, 0x9c87, 0x9c88, 0x7a23, 0x9c8b, 0x9c8e, 0x9c90,
01043 0x9c91, 0x9c92, 0x9c94, 0x9c95, 0x9c9a, 0x9c9b, 0x9c9c, 0x9c9f,
01044 0x9ca0, 0x9ca1, 0x9ca2, 0x9ca3, 0x9ca5, 0x9ca6, 0x9ca7, 0x9ca8,
01045 0x9ca9, 0x9cab, 0x9cad, 0x9cae, 0x9cb0, 0x9cb1, 0x9cb2, 0x9cb3,
01046 0x9cb4, 0x9cb5, 0x9cb6, 0x9cb7, 0x9cba, 0x9cbb, 0x9cbc, 0x9cbd,
01047 0x9cc4, 0x9cc5, 0x9cc6, 0x9cc7, 0x9cca, 0x9ccb,
01048 /* 0x77 */
01049 0x9ccc, 0x9ccd, 0x9cce, 0x9ccf, 0x9cd0, 0x9cd3, 0x9cd4, 0x9cd5,
01050 0x9cd7, 0x9cd8, 0x9cd9, 0x9cdc, 0x9cdd, 0x9cdf, 0x9ce2, 0x977c,
01051 0x9785, 0x9791, 0x9792, 0x9794, 0x97af, 0x97ab, 0x97a3, 0x97b2,
01052 0x97b4, 0x9ab1, 0x9ab0, 0x9ab7, 0x9e58, 0x9ab6, 0x9aba, 0x9abc,
01053 0x9ac1, 0x9ac0, 0x9ac5, 0x9ac2, 0x9acb, 0x9acc, 0x9ad1, 0x9b45,
01054 0x9b43, 0x9b47, 0x9b49, 0x9b48, 0x9b4d, 0x9b51, 0x98e8, 0x990d,
01055 0x992e, 0x9955, 0x9954, 0x9adf, 0x9ae1, 0x9ae6, 0x9ae7, 0x9aeb,
01056 0x9afb, 0x9aed, 0x9af9, 0x9b08, 0x9b0f, 0x9b13, 0x9b1f, 0x9b23,
01057 0x9ebd, 0x9ebe, 0x7e3b, 0x9e82, 0x9e87, 0x9e88, 0x9e8b, 0x9e92,
01058 0x93d6, 0x9e9d, 0x9e9f, 0x9edb, 0x9edc, 0x9edd, 0x9ee0, 0x9edf,
01059 0x9ee2, 0x9ee9, 0x9ee7, 0x9ee5, 0x9eea, 0x9eef, 0x9f22, 0x9f2c,
01060 0x9f2f, 0x9f39, 0x9f37, 0x9f3d, 0x9f3e, 0x9f44,
01061 };
01062
01063 static int
01064 gb2312_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
01065 {
01066     unsigned char c1 = (s[0] & 0x7F);
01067     if ((c1 >= 0x21 && c1 <= 0x29) || (c1 >= 0x30 && c1 <= 0x77)) {
01068         if (n >= 2) {
01069             unsigned char c2 = (s[1] & 0x7F);
01070             if (c2 >= 0x21 && c2 < 0x7F) {
01071                 unsigned int i = 94 * (c1 - 0x21) + (c2 - 0x21);
01072                 unsigned short wc = 0xffffd;
01073                 if (i < 1410) {
01074                     if (i < 831)
01075                         wc = gb2312_2uni_page21[i];
01076                     else {
01077                         if (i < 8178)
01078                             wc = gb2312_2uni_page30[i-1410];
01079                     }
01080                     if (wc != 0xffffd) {
01081                         *pwc = (ucs4_t) wc;
01082                         return 2;
01083                     }
01084                 }
01085                 return RET_ILSEQ;
01086             }
01087             return RET_TOOFEW(0);
01088         }
01089         return RET_ILSEQ;
01090     }
01091 #endif /* NEED_TOWC */
01092
01093 #ifndef NEED_TOMB
01094 static const unsigned short gb2312_2charset[7445] = {
01095     0x2168, 0x216c, 0x2127, 0x2163, 0x2140, 0x2141, 0x2824, 0x2822,
01096     0x2828, 0x2826, 0x283a, 0x282c, 0x282a, 0x2830, 0x282e, 0x2142,
01097     0x2834, 0x2832, 0x2839, 0x2821, 0x2825, 0x2827, 0x2829, 0x282d,
01098     0x2831, 0x2823, 0x282b, 0x282f, 0x2833, 0x2835, 0x2836, 0x2837,
01099     0x2838, 0x2126, 0x2125, 0x2621, 0x2622, 0x2623, 0x2624, 0x2625,
01100     0x2626, 0x2627, 0x2628, 0x2629, 0x262a, 0x262b, 0x262c, 0x262d,
01101     0x262e, 0x262f, 0x2630, 0x2631, 0x2632, 0x2633, 0x2634, 0x2635,
01102     0x2636, 0x2637, 0x2638, 0x2639, 0x2641, 0x2642, 0x2643, 0x2644, 0x2645,
01103     0x2646, 0x2647, 0x2648, 0x2649, 0x264a, 0x264b, 0x264c, 0x264d,
01104     0x264e, 0x264f, 0x2650, 0x2651, 0x2652, 0x2653, 0x2654, 0x2655,
01105     0x2656, 0x2657, 0x2658, 0x2727, 0x2721, 0x2722, 0x2723, 0x2724,
01106     0x2725, 0x2726, 0x2728, 0x2729, 0x272a, 0x272b, 0x272c, 0x272d,
01107     0x272e, 0x272f, 0x2730, 0x2731, 0x2732, 0x2733, 0x2734, 0x2735,
01108     0x2736, 0x2737, 0x2738, 0x2739, 0x273a, 0x273b, 0x273c, 0x273d,
01109     0x273e, 0x273f, 0x2740, 0x2741, 0x2751, 0x2752, 0x2753, 0x2754,
01110     0x2755, 0x2756, 0x2758, 0x2759, 0x275a, 0x275b, 0x275c, 0x275d,
01111     0x275e, 0x275f, 0x2760, 0x2761, 0x2762, 0x2763, 0x2764, 0x2765,
01112     0x2766, 0x2767, 0x2768, 0x2769, 0x276a, 0x276b, 0x276c, 0x276d,

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01113 0x276e, 0x276f, 0x2770, 0x2771, 0x2757, 0x212a, 0x212c, 0x212e,
01114 0x212f, 0x2130, 0x2131, 0x212d, 0x216b, 0x2164, 0x2165, 0x2179,
01115 0x2166, 0x216d, 0x2271, 0x2272, 0x2273, 0x2274, 0x2275, 0x2276,
01116 0x2277, 0x2278, 0x2279, 0x227a, 0x227b, 0x227c, 0x217b, 0x217c,
01117 0x217a, 0x217d, 0x214a, 0x2147, 0x2146, 0x214c, 0x2158, 0x215e,
01118 0x214f, 0x214e, 0x225a, 0x2144, 0x2145, 0x2149, 0x2148, 0x2152, 0x2153,
01119 0x2160, 0x215f, 0x2143, 0x214b, 0x2157, 0x2156, 0x2155, 0x2159,
01120 0x2154, 0x215c, 0x215d, 0x215a, 0x215b, 0x2151, 0x214d, 0x2150,
01121 0x2259, 0x225a, 0x225b, 0x225c, 0x225d, 0x225e, 0x225f, 0x2260,
01122 0x2261, 0x2262, 0x2245, 0x2246, 0x2247, 0x2248, 0x2249, 0x224a,
01123 0x224b, 0x224c, 0x224d, 0x224e, 0x224f, 0x2250, 0x2251, 0x2252,
01124 0x2253, 0x2254, 0x2255, 0x2256, 0x2257, 0x2258, 0x2231, 0x2232,
01125 0x2233, 0x2234, 0x2235, 0x2236, 0x2237, 0x2238, 0x2239, 0x223a,
01126 0x223b, 0x223c, 0x223d, 0x223e, 0x223f, 0x2240, 0x2241, 0x2242,
01127 0x2243, 0x2244, 0x2924, 0x2925, 0x2926, 0x2927, 0x2928, 0x2929,
01128 0x292a, 0x292b, 0x292c, 0x292d, 0x292e, 0x292f, 0x2930, 0x2931,
01129 0x2932, 0x2933, 0x2934, 0x2935, 0x2936, 0x2937, 0x2938, 0x2939,
01130 0x293a, 0x293b, 0x293c, 0x293d, 0x293e, 0x293f, 0x2940, 0x2941,
01131 0x2942, 0x2943, 0x2944, 0x2945, 0x2946, 0x2947, 0x2948, 0x2949,
01132 0x294a, 0x294b, 0x294c, 0x294d, 0x294e, 0x294f, 0x2950, 0x2951,
01133 0x2952, 0x2953, 0x2954, 0x2955, 0x2956, 0x2957, 0x2958, 0x2959,
01134 0x295a, 0x295b, 0x295c, 0x295d, 0x295e, 0x295f, 0x2960, 0x2961,
01135 0x2962, 0x2963, 0x2964, 0x2965, 0x2966, 0x2967, 0x2968, 0x2969,
01136 0x296a, 0x296b, 0x296c, 0x296d, 0x296e, 0x296f, 0x2176, 0x2175,
01137 0x2178, 0x2177, 0x2174, 0x2173, 0x2170, 0x2172, 0x2171, 0x216f,
01138 0x216e, 0x2162, 0x2161, 0x2121, 0x2122, 0x2123, 0x2128, 0x2129,
01139 0x2134, 0x2135, 0x2136, 0x2137, 0x2138, 0x2139, 0x213a, 0x213b,
01140 0x213e, 0x213f, 0x217e, 0x2132, 0x2133, 0x213c, 0x213d, 0x2421,
01141 0x2422, 0x2423, 0x2424, 0x2425, 0x2426, 0x2427, 0x2428, 0x2429,
01142 0x242a, 0x242b, 0x242c, 0x242d, 0x242e, 0x242f, 0x2430, 0x2431,
01143 0x2432, 0x2433, 0x2434, 0x2435, 0x2436, 0x2437, 0x2438, 0x2439,
01144 0x243a, 0x243b, 0x243c, 0x243d, 0x243e, 0x243f, 0x2440, 0x2441,
01145 0x2442, 0x2443, 0x2444, 0x2445, 0x2446, 0x2447, 0x2448, 0x2449,
01146 0x244a, 0x244b, 0x244c, 0x244d, 0x244e, 0x244f, 0x2450, 0x2451,
01147 0x2452, 0x2453, 0x2454, 0x2455, 0x2456, 0x2457, 0x2458, 0x2459,
01148 0x245a, 0x245b, 0x245c, 0x245d, 0x245e, 0x245f, 0x2460, 0x2461,
01149 0x2462, 0x2463, 0x2464, 0x2465, 0x2466, 0x2467, 0x2468, 0x2469,
01150 0x246a, 0x246b, 0x246c, 0x246d, 0x246e, 0x246f, 0x2470, 0x2471,
01151 0x2472, 0x2473, 0x2521, 0x2522, 0x2523, 0x2524, 0x2525, 0x2526,
01152 0x2527, 0x2528, 0x2529, 0x252a, 0x252b, 0x252c, 0x252d, 0x252e,
01153 0x252f, 0x2530, 0x2531, 0x2532, 0x2533, 0x2534, 0x2535, 0x2536,
01154 0x2537, 0x2538, 0x2539, 0x253a, 0x253b, 0x253c, 0x253d, 0x253e,
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01165 0x285c, 0x285d, 0x285e, 0x285f, 0x2860, 0x2861, 0x2862, 0x2863,
01166 0x2864, 0x2865, 0x2866, 0x2867, 0x2868, 0x2869, 0x2265, 0x2266,
01167 0x2267, 0x2268, 0x2269, 0x226a, 0x226b, 0x226c, 0x226d, 0x226e,
01168 0x523b, 0x3621, 0x465f, 0x4d72, 0x5549, 0x487d, 0x494f, 0x4f42,
01169 0x5822, 0x323b, 0x536b, 0x5824, 0x3373, 0x5728, 0x4752, 0x5827,
01170 0x4a40, 0x4770, 0x317b, 0x5235, 0x3454, 0x362b, 0x4b3f, 0x5829,
01171 0x362a, 0x413d, 0x514f, 0x4925, 0x582d, 0x3876, 0x513e, 0x635c,
01172 0x5650, 0x3761, 0x342e, 0x4159, 0x583c, 0x4d68, 0x3524, 0x4e2a,
01173 0x5677, 0x4076, 0x3e59, 0x582f, 0x444b, 0x3e43, 0x5831, 0x4334,
01174 0x5265, 0x562e, 0x4e5a, 0x5527, 0x3a75, 0x3726, 0x4056, 0x4639,
01175 0x4552, 0x4747, 0x3954, 0x334b, 0x5252, 0x583f, 0x3e45, 0x4672,
01176 0x5232, 0x4f30, 0x4f67, 0x4a69, 0x5840, 0x4272, 0x4252, 0x4869,
01177 0x472c, 0x414b, 0x5368, 0x5579, 0x4a42, 0x367e, 0x5821, 0x535a,
01178 0x3f77, 0x5446, 0x3b25, 0x5841, 0x4e65, 0x3e2e, 0x5828, 0x5147,
01179 0x5029, 0x583d, 0x596f, 0x4d76, 0x3f3a, 0x3d3b, 0x3a25, 0x5260,
01180 0x327a, 0x3a60, 0x4436, 0x4f6d, 0x3e29, 0x4d24, 0x4141, 0x4757,
01181 0x5971, 0x5974, 0x484b, 0x5869, 0x525a, 0x4a32, 0x484a, 0x586c,
01182 0x586a, 0x5846, 0x3d76, 0x464d, 0x3370, 0x586b, 0x3d71, 0x3d69,
01183 0x4854, 0x3453, 0x4258, 0x3256, 0x5750, 0x4a4b, 0x4b7b, 0x554c,
01184 0x3836, 0x4f49, 0x595a, 0x5870, 0x472a, 0x586e, 0x347a, 0x416e,
01185 0x5254, 0x586d, 0x5247, 0x586f, 0x4347, 0x5176, 0x5659, 0x5872,
01186 0x5875, 0x3c7e, 0x3c5b, 0x484e, 0x375d, 0x3742, 0x4673, 0x5878,
01187 0x5241, 0x4e69, 0x3c3f, 0x377c, 0x3725, 0x505d, 0x565a, 0x5345,
01188 0x3b6f, 0x3b61, 0x5871, 0x4921, 0x4e30, 0x342b, 0x5873, 0x494b,
01189 0x5876, 0x4257, 0x4e57, 0x5877, 0x4e31, 0x5879, 0x322e, 0x3940, 0x5923,
01190 0x3069, 0x4166, 0x496c, 0x4b45, 0x4b46, 0x5924, 0x3568, 0x352b,
01191 0x4e3b, 0x354d, 0x5721, 0x5774, 0x5353, 0x4c65, 0x3a4e, 0x5922,
01192 0x595c, 0x5360, 0x587d, 0x3770, 0x5777, 0x587e, 0x587a, 0x5921,
01193 0x4463, 0x5336, 0x5874, 0x595d, 0x587b, 0x4565, 0x4050, 0x5170,
01194 0x305b, 0x3c51, 0x5926, 0x5925, 0x592c, 0x592e, 0x592b, 0x4a39,
01195 0x5929, 0x5631, 0x335e, 0x5928, 0x407d, 0x4a4c, 0x592a, 0x5927,
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01197 0x3260, 0x4748, 0x3f6b, 0x592d, 0x592f, 0x4e6a, 0x3a6e, 0x4756,
01198 0x3163, 0x3459, 0x366d, 0x5934, 0x3f21, 0x595e, 0x474e, 0x407e,
01199 0x5938, 0x4b57, 0x377d, 0x5935, 0x5937, 0x3123, 0x5361, 0x5939,

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01202 0x593f, 0x5339, 0x3e73, 0x4c48, 0x3a72, 0x5250, 0x5943, 0x3d68,
01203 0x332b, 0x5945, 0x3e6b, 0x5946, 0x593b, 0x445f, 0x593e, 0x5941,
01204 0x5940, 0x552e, 0x5635, 0x4763, 0x5948, 0x3c59, 0x594a, 0x593c,
01205 0x594b, 0x462b, 0x5949, 0x5776, 0x4d23, 0x3d21, 0x594c, 0x453c,
01206 0x4d35, 0x594d, 0x5947, 0x3325, 0x3f7e, 0x3835, 0x407c, 0x3078,
01207 0x3476, 0x594e, 0x594f, 0x3422, 0x5950, 0x345f, 0x3041, 0x5951,
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01209 0x5957, 0x4b5b, 0x3d29, 0x4627, 0x5953, 0x5958, 0x5959, 0x4865,
01210 0x405c, 0x3679, 0x5823, 0x544a, 0x542a, 0x5056, 0x3364, 0x5557,
01211 0x4f48, 0x3962, 0x3f4b, 0x4362, 0x3652, 0x4d43, 0x596e, 0x5970,
01212 0x3533, 0x3635, 0x3e24, 0x486b, 0x482b, 0x304b, 0x392b, 0x4179,
01213 0x5962, 0x403c, 0x3932, 0x3958, 0x504b, 0x3178, 0x4664, 0x3e5f,
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01215 0x445a, 0x3854, 0x483d, 0x3261, 0x5459, 0x4330, 0x4361, 0x5a22,
01216 0x485f, 0x5034, 0x3e7c, 0x4529, 0x395a, 0x5a23, 0x5429, 0x5a24,
01217 0x597b, 0x362c, 0x376b, 0x3179, 0x597c, 0x3365, 0x3e76, 0x3f76,
01218 0x5231, 0x4064, 0x3633, 0x597e, 0x597d, 0x3e3b, 0x4660, 0x573c,
01219 0x5a21, 0x4139, 0x3572, 0x4168, 0x3c75, 0x3455, 0x415d, 0x447d,
01220 0x3c38, 0x3732, 0x376f, 0x596c, 0x463e, 0x3f2d, 0x3b4b, 0x354a,
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01222 0x5464, 0x3536, 0x3573, 0x5856, 0x4850, 0x3756, 0x4750, 0x5857,
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01225 0x3170, 0x5859, 0x394e, 0x353d, 0x585a, 0x5646, 0x4b22, 0x482f,
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01227 0x4c6a, 0x4f77, 0x585d, 0x4730, 0x3950, 0x3d23, 0x4c5e, 0x464a,
01228 0x5860, 0x585e, 0x585f, 0x307e, 0x3e67, 0x4a23, 0x3c74, 0x3831,
01229 0x386e, 0x5862, 0x3d4b, 0x5864, 0x5863, 0x457c, 0x5865, 0x5866,
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02025 0x212b, 0x2169, 0x216a, 0x237e, 0x2324,
02026 };
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02028 static const Summary16 gb2312_uni2indx_page00[70] = {
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02033 { 5, 0x0000 }, { 5, 0x0080 }, { 6, 0x3703 }, { 13, 0x168c },
02034 /* 0x0100 */
02035 { 19, 0x0002 }, { 20, 0x0808 }, { 22, 0x0800 }, { 23, 0x0000 },
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02047 { 35, 0x0000 }, { 35, 0xffff }, { 50, 0x03fb }, { 59, 0xffff },
02048 { 74, 0x03fb }, { 83, 0x0000 }, { 83, 0x0000 }, { 83, 0x0000 },
02049 /* 0x0400 */
02050 { 83, 0x0002 }, { 84, 0xffff }, { 100, 0xffff }, { 116, 0xffff },
02051 { 132, 0xffff }, { 148, 0x0002 },
02052 };
02053 static const Summary16 gb2312_uni2indx_page20[101] = {
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02055 { 149, 0x0000 }, { 149, 0x3360 }, { 155, 0x0040 }, { 156, 0x080d },
02056 { 160, 0x0000 }, { 160, 0x0000 }, { 160, 0x0000 }, { 160, 0x0000 },
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02058 { 160, 0x0000 }, { 160, 0x0000 }, { 160, 0x0000 }, { 160, 0x0000 },
02059 /* 0x2100 */
02060 { 160, 0x0008 }, { 161, 0x0040 }, { 162, 0x0000 }, { 162, 0x0000 },
02061 { 162, 0x0000 }, { 162, 0x0000 }, { 162, 0xffff }, { 174, 0x0000 },
02062 { 174, 0x0000 }, { 174, 0x000f }, { 178, 0x0000 }, { 178, 0x0000 },
02063 { 178, 0x0000 }, { 178, 0x0000 }, { 178, 0x0000 }, { 178, 0x0000 },
02064 /* 0x2200 */
02065 { 178, 0x8100 }, { 180, 0x6402 }, { 184, 0x4fa1 }, { 192, 0x20f0 },
02066 { 197, 0x1100 }, { 199, 0x0000 }, { 199, 0xc033 }, { 205, 0x0000 },
02067 { 205, 0x0000 }, { 205, 0x0200 }, { 206, 0x0020 }, { 207, 0x0000 },
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02069 /* 0x2300 */

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02077 { 230, 0xffff }, { 246, 0xffff }, { 258, 0x0000 }, { 258, 0x0000 },
02078 { 258, 0x0000 }, { 258, 0x0000 }, { 258, 0x0000 }, { 258, 0x0000 },
02079 /* 0x2500 */
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02081 { 322, 0xffff }, { 334, 0x0000 }, { 334, 0x0000 }, { 334, 0x0000 },
02082 { 334, 0x0000 }, { 334, 0x0000 }, { 334, 0x0003 }, { 336, 0x000c },
02083 { 338, 0xc8c0 }, { 343, 0x0000 }, { 343, 0x0000 }, { 343, 0x0000 },
02084 /* 0x2600 */
02085 { 343, 0x0060 }, { 345, 0x0000 }, { 345, 0x0000 }, { 345, 0x0000 },
02086 { 345, 0x0005 },
02087 };
02088 static const Summary16 gb2312_uni2indx_page30[35] = {
02089 /* 0x3000 */
02090 { 347, 0xff2f }, { 360, 0x00fb }, { 367, 0x0000 }, { 367, 0x0000 },
02091 { 367, 0xffff }, { 382, 0xffff }, { 398, 0xffff }, { 414, 0xffff },
02092 { 430, 0xffff }, { 446, 0x000f }, { 450, 0xffff }, { 465, 0xffff },
02093 { 481, 0xffff }, { 497, 0xffff }, { 513, 0xffff }, { 529, 0x087f },
02094 /* 0x3100 */
02095 { 537, 0xffe0 }, { 548, 0xffff }, { 564, 0x03ff }, { 574, 0x0000 },
02096 { 574, 0x0000 }, { 574, 0x0000 }, { 574, 0x0000 }, { 574, 0x0000 },
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02098 { 574, 0x0000 }, { 574, 0x0000 }, { 574, 0x0000 }, { 574, 0x0000 },
02099 /* 0x3200 */
02100 { 574, 0x0000 }, { 574, 0x0000 }, { 574, 0x03ff },
02101 };
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02105 { 628, 0xfba8 }, { 638, 0xf35d }, { 649, 0x0243 }, { 653, 0x400b },
02106 { 657, 0xfb40 }, { 665, 0x8d3e }, { 674, 0x7bf7 }, { 687, 0x8c2c },
02107 { 693, 0x6eff }, { 706, 0xe3fa }, { 717, 0x1d3a }, { 725, 0xa8ed },
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02349 { 4865, 0xfbff }, { 4880, 0xbffe }, { 4894, 0xffff }, { 4910, 0x057f },
02350 { 4919, 0x0034 }, { 4922, 0x85b3 }, { 4930, 0x4706 }, { 4936, 0x4216 },
02351 { 4941, 0x5402 }, { 4945, 0xe410 }, { 4950, 0x8092 }, { 4954, 0xb305 },
02352 { 4961, 0x5422 }, { 4966, 0x8130 }, { 4970, 0x4263 }, { 4976, 0x180b },
02353 /* 0x8000 */
02354 { 4981, 0x387b }, { 4990, 0x13f5 }, { 4999, 0x07e5 }, { 5007, 0xa9ea },
02355 { 5016, 0x3c4c }, { 5023, 0x0514 }, { 5027, 0x0600 }, { 5029, 0x8002 },
02356 { 5031, 0x1ad9 }, { 5039, 0xbd48 }, { 5047, 0xee37 }, { 5058, 0xf496 },
02357 { 5067, 0x705f }, { 5076, 0x7ec0 }, { 5084, 0xbfb2 }, { 5095, 0x355f },
02358 /* 0x8100 */
02359 { 5105, 0xe644 }, { 5112, 0x455f }, { 5121, 0x9000 }, { 5123, 0x4146 },
02360 { 5128, 0x1d40 }, { 5133, 0x063b }, { 5140, 0x62a1 }, { 5146, 0xfe13 },
02361 { 5156, 0x8505 }, { 5161, 0x3902 }, { 5166, 0x0548 }, { 5170, 0x0c08 },
02362 { 5173, 0x144f }, { 5180, 0x0000 }, { 5180, 0x3488 }, { 5185, 0x5818 },
02363 /* 0x8200 */
02364 { 5190, 0x3077 }, { 5198, 0xd815 }, { 5205, 0xbd0e }, { 5214, 0x4bfb },
02365 { 5225, 0x8a90 }, { 5230, 0x8500 }, { 5233, 0xc100 }, { 5236, 0xe61d },
02366 { 5245, 0xed14 }, { 5253, 0xb386 }, { 5261, 0xff72 }, { 5273, 0x639b },
02367 { 5282, 0xfd92 }, { 5292, 0xd9be }, { 5303, 0x887b }, { 5311, 0x0a92 },
02368 /* 0x8300 */
02369 { 5316, 0xd3fe }, { 5328, 0x1cb2 }, { 5335, 0xb980 }, { 5341, 0x177a },
02370 { 5350, 0x82c9 }, { 5356, 0xdc17 }, { 5365, 0xffff }, { 5380, 0x3980 },
02371 { 5385, 0x4260 }, { 5389, 0x590c }, { 5395, 0x0f01 }, { 5400, 0x37df },
02372 { 5412, 0x94a3 }, { 5419, 0xb150 }, { 5425, 0x0623 }, { 5430, 0x2307 },
02373 /* 0x8400 */
02374 { 5436, 0xf85a }, { 5445, 0x3102 }, { 5449, 0x01f0 }, { 5454, 0x3102 },
02375 { 5458, 0x0040 }, { 5459, 0x1e82 }, { 5465, 0x3a0a }, { 5471, 0x056a },
02376 { 5477, 0x5b84 }, { 5484, 0x1280 }, { 5487, 0x8002 }, { 5489, 0xa714 },
02377 { 5496, 0x2612 }, { 5501, 0xa04b }, { 5507, 0x1069 }, { 5512, 0x9001 },
02378 /* 0x8500 */
02379 { 5515, 0x1000 }, { 5516, 0x848a }, { 5521, 0x1802 }, { 5524, 0x3f80 },
02380 { 5531, 0x0708 }, { 5535, 0x4240 }, { 5538, 0x0110 }, { 5540, 0x4e14 },
02381 { 5546, 0x80b0 }, { 5550, 0x1800 }, { 5552, 0xc510 }, { 5557, 0x0281 },
02382 { 5560, 0x8202 }, { 5563, 0x1029 }, { 5567, 0x0210 }, { 5569, 0x8800 },
02383 /* 0x8600 */
02384 { 5571, 0x0020 }, { 5572, 0x0042 }, { 5574, 0x0280 }, { 5576, 0x1100 },
02385 { 5578, 0xe000 }, { 5581, 0x4413 }, { 5586, 0x5804 }, { 5590, 0xfe02 },
02386 { 5598, 0x3c07 }, { 5605, 0x3028 }, { 5609, 0x9798 }, { 5617, 0x0473 },
02387 { 5623, 0xcd1 }, { 5632, 0xcb13 }, { 5640, 0x6210 }, { 5644, 0x431f },
02388 /* 0x8700 */
02389 { 5652, 0x278d }, { 5660, 0x55ac }, { 5668, 0x422e }, { 5674, 0xc892 },
02390 { 5680, 0x5380 }, { 5685, 0x0288 }, { 5688, 0x4039 }, { 5693, 0x7851 },
02391 { 5700, 0x292c }, { 5706, 0x8088 }, { 5709, 0xb900 }, { 5714, 0x2428 },
02392 { 5718, 0x0c41 }, { 5722, 0x080e }, { 5726, 0x4421 }, { 5730, 0x4200 },
02393 /* 0x8800 */
02394 { 5732, 0x0408 }, { 5734, 0x0868 }, { 5738, 0x0006 }, { 5740, 0x1204 },
02395 { 5743, 0x3031 }, { 5748, 0x0290 }, { 5751, 0x5b3e }, { 5761, 0xe085 },
02396 { 5767, 0x2936 }, { 5774, 0x1044 }, { 5777, 0x2814 }, { 5781, 0x1082 },
02397 { 5784, 0x4266 }, { 5790, 0x8334 }, { 5796, 0x013c }, { 5801, 0x531b },
02398 /* 0x8900 */
02399 { 5809, 0x0404 }, { 5811, 0x0e0d }, { 5817, 0x0c22 }, { 5821, 0x0051 },
02400 { 5824, 0x0012 }, { 5826, 0xc000 }, { 5828, 0x0040 }, { 5829, 0x8800 },
02401 { 5831, 0x004a }, { 5834, 0x0000 }, { 5834, 0x0000 }, { 5834, 0x0000 },
02402 { 5834, 0xdf6 }, { 5847, 0x5447 }, { 5854, 0x8868 }, { 5859, 0x0008 },
02403 /* 0x8a00 */
02404 { 5860, 0x0081 }, { 5862, 0x0000 }, { 5862, 0x0000 }, { 5862, 0x4000 },
02405 { 5863, 0x0100 }, { 5864, 0x0000 }, { 5864, 0x0000 }, { 5864, 0x0200 },
02406 { 5865, 0x0600 }, { 5867, 0x0008 }, { 5868, 0x0000 }, { 5868, 0x0000 },
02407 { 5868, 0x0000 }, { 5868, 0x0000 }, { 5868, 0x0000 }, { 5868, 0x0000 },
02408 /* 0x8b00 */
02409 { 5868, 0x0080 }, { 5869, 0x0000 }, { 5869, 0x0040 }, { 5870, 0x0000 },
02410 { 5870, 0x0000 }, { 5870, 0x0000 }, { 5870, 0x1040 }, { 5872, 0x0000 },
02411 { 5872, 0x0000 }, { 5872, 0x0000 }, { 5872, 0xffff }, { 5887, 0xf7fd },
02412 { 5901, 0xffff }, { 5916, 0xffff }, { 5931, 0xbfff }, { 5946, 0xffff },
02413 /* 0x8c00 */
02414 { 5962, 0xfdf }, { 5977, 0xbfff }, { 5992, 0xffff }, { 6008, 0x00ff },
02415 { 6016, 0x12c2 }, { 6021, 0x0420 }, { 6023, 0x0c06 }, { 6027, 0x0708 },
02416 { 6031, 0x1624 }, { 6036, 0x0110 }, { 6038, 0x0000 }, { 6038, 0x0000 },
02417 { 6038, 0x0000 }, { 6038, 0x0000 }, { 6038, 0x0000 }, { 6038, 0x0000 },
```

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02418 /* 0x8d00 */
02419 { 6038, 0x0000 }, { 6038, 0xe000 }, { 6041, 0xffff }, { 6056, 0xffff },
02420 { 6072, 0xffff }, { 6088, 0x7f79 }, { 6100, 0x28df }, { 6109, 0x00f9 },
02421 { 6115, 0x0c32 }, { 6120, 0x8012 }, { 6123, 0x0008 }, { 6124, 0xd53a },
02422 { 6133, 0xd858 }, { 6140, 0xec2c }, { 6148, 0x9d18 }, { 6155, 0x2fa8 },
02423 /* 0x8e00 */
02424 { 6163, 0x9620 }, { 6168, 0xe010 }, { 6172, 0xd60c }, { 6179, 0x2622 },
02425 { 6184, 0x0f97 }, { 6193, 0x0206 }, { 6196, 0xb240 }, { 6201, 0x9055 },
02426 { 6207, 0x80a2 }, { 6211, 0x5011 }, { 6215, 0x9800 }, { 6218, 0x0404 },
02427 { 6220, 0x4000 }, { 6221, 0x0000 }, { 6221, 0x0000 }, { 6221, 0x0000 },
02428 /* 0x8f00 */
02429 { 6221, 0x0000 }, { 6221, 0x0000 }, { 6221, 0x0000 }, { 6221, 0x0000 },
02430 { 6221, 0x0000 }, { 6221, 0x0000 }, { 6221, 0xfbc0 }, { 6230, 0xffff },
02431 { 6246, 0xeffe }, { 6260, 0xdfb }, { 6274, 0xb08 }, { 6278, 0x6243 },
02432 { 6284, 0x41b6 }, { 6291, 0xfb3b }, { 6303, 0x6f74 }, { 6313, 0x2389 },
02433 /* 0x9000 */
02434 { 6319, 0xae7f }, { 6331, 0xecd7 }, { 6342, 0xe047 }, { 6349, 0x5960 },
02435 { 6355, 0xa096 }, { 6361, 0x098f }, { 6368, 0x612c }, { 6374, 0xa030 },
02436 { 6378, 0x090d }, { 6383, 0x2aaa }, { 6390, 0xd44e }, { 6398, 0x4f7b },
02437 { 6409, 0xc4b2 }, { 6416, 0x388b }, { 6423, 0xa9c6 }, { 6431, 0x6110 },
02438 /* 0x9100 */
02439 { 6435, 0x0014 }, { 6437, 0x4200 }, { 6439, 0x800c }, { 6442, 0x0202 },
02440 { 6444, 0xfe48 }, { 6453, 0x6485 }, { 6459, 0xd63e }, { 6469, 0xe3f7 },
02441 { 6481, 0x3aa2 }, { 6487, 0xc07 }, { 6492, 0xe40c }, { 6498, 0x0430 },
02442 { 6501, 0xf680 }, { 6508, 0x1002 }, { 6510, 0x0000 }, { 6510, 0x0000 },
02443 /* 0x9200 */
02444 { 6510, 0x0000 }, { 6510, 0x0000 }, { 6510, 0x0000 }, { 6510, 0x0000 },
02445 { 6510, 0x0000 }, { 6510, 0x0000 }, { 6510, 0x0000 }, { 6510, 0x0010 },
02446 { 6511, 0x4000 }, { 6512, 0x0000 }, { 6512, 0x4000 }, { 6513, 0x0000 },
02447 { 6513, 0x0100 }, { 6514, 0x0000 }, { 6514, 0x0000 }, { 6514, 0x0000 },
02448 /* 0x9300 */
02449 { 6514, 0x0000 }, { 6514, 0x0000 }, { 6514, 0x0000 }, { 6514, 0x4000 },
02450 { 6515, 0x0000 }, { 6515, 0x0000 }, { 6515, 0x0400 }, { 6516, 0x0000 },
02451 { 6516, 0x8000 }, { 6517, 0x0000 }, { 6517, 0x0000 }, { 6517, 0x0000 },
02452 { 6517, 0x0400 }, { 6518, 0x0040 }, { 6519, 0x0000 }, { 6519, 0x0000 },
02453 /* 0x9400 */
02454 { 6519, 0x0000 }, { 6519, 0x0000 }, { 6519, 0x0000 }, { 6519, 0x4000 },
02455 { 6520, 0x0000 }, { 6520, 0x0000 }, { 6520, 0x0800 }, { 6521, 0x0000 },
02456 { 6521, 0xffe0 }, { 6532, 0xfabd }, { 6545, 0xffff }, { 6561, 0xffff },
02457 { 6577, 0x7f7f }, { 6591, 0xfbe7 }, { 6604, 0xffbf }, { 6619, 0xf7ff },
02458 /* 0x9500 */
02459 { 6634, 0xffff }, { 6650, 0xffff }, { 6665, 0xff7e }, { 6679, 0xdf7 },
02460 { 6693, 0xf6f7 }, { 6706, 0xfbfd }, { 6720, 0xbffe }, { 6734, 0x804f },
02461 { 6740, 0x0000 }, { 6740, 0x0000 }, { 6740, 0x0000 }, { 6740, 0x0000 },
02462 { 6740, 0x0000 }, { 6740, 0x0000 }, { 6740, 0xef00 }, { 6747, 0x7fff },
02463 /* 0x9600 */
02464 { 6762, 0xff7f }, { 6777, 0xb6f7 }, { 6789, 0x4406 }, { 6793, 0xb87e },
02465 { 6803, 0x3bf5 }, { 6814, 0x8831 }, { 6819, 0x1796 }, { 6827, 0x00f4 },
02466 { 6832, 0xa960 }, { 6838, 0x1391 }, { 6844, 0x0080 }, { 6845, 0x7249 },
02467 { 6852, 0xf2f3 }, { 6863, 0x0024 }, { 6865, 0x8701 }, { 6870, 0x42c8 },
02468 /* 0x9700 */
02469 { 6875, 0xe3d3 }, { 6885, 0x5048 }, { 6889, 0x2400 }, { 6891, 0x4305 },
02470 { 6896, 0x0000 }, { 6896, 0x4a4c }, { 6902, 0x0227 }, { 6907, 0x1058 },
02471 { 6911, 0x2820 }, { 6914, 0x0116 }, { 6918, 0xa809 }, { 6923, 0x0014 },
02472 { 6925, 0x0000 }, { 6925, 0x0000 }, { 6925, 0x3ec0 }, { 6932, 0x0068 },
02473 /* 0x9800 */
02474 { 6935, 0x0000 }, { 6935, 0x0000 }, { 6935, 0x0000 }, { 6935, 0x0000 },
02475 { 6935, 0x0000 }, { 6935, 0x0000 }, { 6935, 0x0000 }, { 6935, 0xffe0 },
02476 { 6946, 0xb7ff }, { 6960, 0xfddb }, { 6973, 0x00f7 }, { 6980, 0x0000 },
02477 { 6980, 0x4000 }, { 6981, 0xc72e }, { 6990, 0x0180 }, { 6992, 0x0000 },
02478 /* 0x9900 */
02479 { 6992, 0x2000 }, { 6993, 0x0001 }, { 6994, 0x4000 }, { 6995, 0x0000 },
02480 { 6995, 0x0000 }, { 6995, 0x0030 }, { 6997, 0xffa8 }, { 7008, 0xb4f7 },
02481 { 7019, 0xadf3 }, { 7030, 0x03ff }, { 7040, 0x0120 }, { 7042, 0x0000 },
02482 { 7042, 0x0000 }, { 7042, 0x0000 }, { 7042, 0x0000 }, { 7042, 0x0000 },
02483 /* 0x9a00 */
02484 { 7042, 0x0000 }, { 7042, 0x0000 }, { 7042, 0x0000 }, { 7042, 0x0000 },
02485 { 7042, 0x0000 }, { 7042, 0x0000 }, { 7042, 0xf000 }, { 7046, 0xffffb },
02486 { 7061, 0x9df7 }, { 7073, 0xfdcf }, { 7086, 0x01bf }, { 7094, 0x15c3 },
02487 { 7101, 0x1827 }, { 7107, 0x810a }, { 7111, 0xa842 }, { 7116, 0x0a00 },
02488 /* 0x9b00 */
02489 { 7118, 0x8108 }, { 7121, 0x8008 }, { 7123, 0x8008 }, { 7125, 0x1804 },
02490 { 7128, 0xa3be }, { 7138, 0x0012 }, { 7140, 0x0000 }, { 7140, 0x0000 },
02491 { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x0000 },
02492 { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x0000 },
02493 /* 0x9c00 */
02494 { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x0000 },
02495 { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x0000 }, { 7140, 0x9000 },
02496 { 7142, 0x69e6 }, { 7151, 0xdc37 }, { 7161, 0x6bff }, { 7174, 0x3dff },
02497 { 7187, 0xfc8 }, { 7198, 0xf3f9 }, { 7210, 0x0004 },
02498 };
02499 static const Summary16 gb2312_uni2indx_page9e[27] = {
02500 /* 0x9e00 */
02501 { 7211, 0x0000 }, { 7211, 0x8000 }, { 7212, 0xbf6f }, { 7225, 0xe7ee },
02502 { 7237, 0xdf6e }, { 7251, 0x5da2 }, { 7259, 0x3fd8 }, { 7269, 0xc00b },
02503 { 7274, 0x0984 }, { 7278, 0xa00c }, { 7282, 0x0040 }, { 7283, 0x6910 },
02504 { 7288, 0xe210 }, { 7293, 0xb912 }, { 7300, 0x86a5 }, { 7307, 0x5a00 },

```

```

02505  /* 0x9f00 */
02506  { 7311, 0x6800 }, { 7314, 0x0289 }, { 7318, 0x9005 }, { 7322, 0x6a80 },
02507  { 7327, 0x0010 }, { 7328, 0x0003 }, { 7330, 0x0000 }, { 7330, 0x8000 },
02508  { 7331, 0x1ff9 }, { 7342, 0x8e00 }, { 7346, 0x0001 },
02509  };
02510  static const Summary16 gb2312_uni2indx_pageff[15] = {
02511  /* 0xff00 */
02512  { 7347, 0xffffe }, { 7362, 0xfffff }, { 7378, 0xfffff }, { 7394, 0xfffff },
02513  { 7410, 0xfffff }, { 7426, 0x7fff }, { 7441, 0x0000 }, { 7441, 0x0000 },
02514  { 7441, 0x0000 }, { 7441, 0x0000 }, { 7441, 0x0000 }, { 7441, 0x0000 },
02515  { 7441, 0x0000 }, { 7441, 0x0000 }, { 7441, 0x002b },
02516  };
02517
02518  static int
02519  gb2312_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
02520  {
02521  (void)conv;
02522  if (n >= 2) {
02523  const Summary16 *summary = NULL;
02524  if (wc < 0x0460)
02525  summary = &gb2312_uni2indx_page00[(wc>>4)];
02526  else if (wc >= 0x2000 && wc < 0x2650)
02527  summary = &gb2312_uni2indx_page20[(wc>>4)-0x200];
02528  else if (wc >= 0x3000 && wc < 0x3230)
02529  summary = &gb2312_uni2indx_page30[(wc>>4)-0x300];
02530  else if (wc >= 0x4e00 && wc < 0x9cf0)
02531  summary = &gb2312_uni2indx_page4e[(wc>>4)-0x4e0];
02532  else if (wc >= 0x9e00 && wc < 0x9fb0)
02533  summary = &gb2312_uni2indx_page9e[(wc>>4)-0x9e0];
02534  else if (wc >= 0xff00 && wc < 0xffff0)
02535  summary = &gb2312_uni2indx_pageff[(wc>>4)-0xff0];
02536  if (summary) {
02537  unsigned short used = summary->used;
02538  unsigned int i = wc & 0x0f;
02539  if (used & ((unsigned short) 1 << i)) {
02540  unsigned short c;
02541  /* Keep in `used' only the bits 0..i-1. */
02542  used &= ((unsigned short) 1 << i) - 1;
02543  /* Add `summary->indx' and the number of bits set in `used'. */
02544  used = (used & 0x5555) + ((used & 0xaaaa) >> 1);
02545  used = (used & 0x3333) + ((used & 0xcccc) >> 2);
02546  used = (used & 0x0f0f) + ((used & 0xf0f0) >> 4);
02547  used = (used & 0x00ff) + (used >> 8);
02548  c = gb2312_2charset[summary->indx + used];
02549  r[0] = (c >> 8); r[1] = (c & 0xff);
02550  return 2;
02551  }
02552  }
02553  return RET_ILSEQ;
02554  }
02555  return RET_TOOSMALL;
02556  }
02557  #endif /* NEED_TOMB */

```

13.268 georgian_academy.h

```

00001  /* $XFree86: xc/lib/X11/lcUniConv/georgian_academy.h,v 1.3 2000/11/29 17:40:29 dawes Exp $ */
00002
00003  /*
00004  * GEORGIAN-ACADEMY
00005  */
00006
00007  static const unsigned short georgian_academy_2uni[32] = {
00008  /* 0x80 */
00009  0x0080, 0x0081, 0x201a, 0x0192, 0x201e, 0x2026, 0x2020, 0x2021,
00010  0x02c6, 0x2030, 0x0160, 0x2039, 0x0152, 0x008d, 0x008e, 0x008f,
00011  /* 0x90 */
00012  0x0090, 0x2018, 0x2019, 0x201c, 0x201d, 0x2022, 0x2013, 0x2014,
00013  0x02dc, 0x2122, 0x0161, 0x203a, 0x0153, 0x009d, 0x009e, 0x0178,
00014  };
00015
00016  static int
00017  georgian_academy_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00018  {
00019  unsigned char c = *s;
00020  if (c >= 0x80 && c < 0xa0)
00021  *pwc = (ucs4_t) georgian_academy_2uni[c-0x80];
00022  else if (c >= 0xc0 && c < 0xe7)
00023  *pwc = (ucs4_t) c + 0x1010;
00024  else
00025  *pwc = (ucs4_t) c;
00026  return 1;
00027  }
00028
00029  static const unsigned char georgian_academy_page00[32] = {

```

```

00030 0x80, 0x81, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00031 0x00, 0x00, 0x00, 0x00, 0x00, 0x8d, 0x8e, 0x8f, /* 0x88-0x8f */
00032 0x90, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00033 0x00, 0x00, 0x00, 0x00, 0x00, 0x9d, 0x9e, 0x00, /* 0x98-0x9f */
00034 };
00035 static const unsigned char georgian_academy_page01[72] = {
00036 0x00, 0x00, 0x8c, 0x9c, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00037 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00038 0x8a, 0x9a, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00039 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00040 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00041 0x9f, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00042 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00043 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00044 0x00, 0x00, 0x83, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00045 };
00046 static const unsigned char georgian_academy_page02[32] = {
00047 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x88, 0x00, /* 0xc0-0xc7 */
00048 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00049 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00050 0x00, 0x00, 0x00, 0x00, 0x98, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00051 };
00052 static const unsigned char georgian_academy_page20[48] = {
00053 0x00, 0x00, 0x00, 0x96, 0x97, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00054 0x91, 0x92, 0x82, 0x00, 0x93, 0x94, 0x84, 0x00, /* 0x18-0x1f */
00055 0x86, 0x87, 0x95, 0x00, 0x00, 0x00, 0x85, 0x00, /* 0x20-0x27 */
00056 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00057 0x89, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00058 0x00, 0x8b, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00059 };
00060
00061 static int
00062 georgian_academy_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00063 {
00064     unsigned char c = 0;
00065     if (wc < 0x0080) {
00066         *r = wc;
00067         return 1;
00068     }
00069     else if (wc >= 0x0080 && wc < 0x00a0)
00070         c = georgian_academy_page00[wc-0x0080];
00071     else if ((wc >= 0x00a0 && wc < 0x00c0) || (wc >= 0x00e7 && wc < 0x0100))
00072         c = wc;
00073     else if (wc >= 0x0150 && wc < 0x0198)
00074         c = georgian_academy_page01[wc-0x0150];
00075     else if (wc >= 0x02c0 && wc < 0x02e0)
00076         c = georgian_academy_page02[wc-0x02c0];
00077     else if (wc >= 0x10d0 && wc < 0x10f7)
00078         c = wc-0x1010;
00079     else if (wc >= 0x2010 && wc < 0x2040)
00080         c = georgian_academy_page20[wc-0x2010];
00081     else if (wc == 0x2122)
00082         c = 0x99;
00083     if (c != 0) {
00084         *r = c;
00085         return 1;
00086     }
00087     return RET_ILSEQ;
00088 }

```

13.269 georgian_ps.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/georgian_ps.h,v 1.3 2000/11/29 17:40:29 dawes Exp $ */
00002
00003 /*
00004  * GEORGIAN-PS
00005  */
00006
00007 static const unsigned short georgian_ps_2uni_1[32] = {
00008     /* 0x80 */
00009     0x0080, 0x0081, 0x201a, 0x0192, 0x201e, 0x2026, 0x2020, 0x2021,
00010     0x02c6, 0x2030, 0x0160, 0x2039, 0x0152, 0x008d, 0x008e, 0x008f,
00011     /* 0x90 */
00012     0x0090, 0x2018, 0x2019, 0x201c, 0x201d, 0x2022, 0x2013, 0x2014,
00013     0x02dc, 0x2122, 0x0161, 0x203a, 0x0153, 0x009d, 0x009e, 0x0178,
00014 };
00015 static const unsigned short georgian_ps_2uni_2[39] = {
00016     /* 0xc0 */
00017     0x10d0, 0x10d1, 0x10d2, 0x10d3, 0x10d4, 0x10d5, 0x10d6, 0x10f1,
00018     0x10d7, 0x10d8, 0x10d9, 0x10da, 0x10db, 0x10dc, 0x10f2, 0x10dd,
00019     /* 0xd0 */
00020     0x10de, 0x10df, 0x10e0, 0x10e1, 0x10e2, 0x10f3, 0x10e3, 0x10e4,
00021     0x10e5, 0x10e6, 0x10e7, 0x10e8, 0x10e9, 0x10ea, 0x10eb, 0x10ec,
00022     /* 0xe0 */
00023     0x10ed, 0x10ee, 0x10f4, 0x10ef, 0x10f0, 0x10f5,

```

```

00024 };
00025
00026 static int
00027 georgian_ps_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00028 {
00029     unsigned char c = *s;
00030     if (c >= 0x80 && c < 0xa0)
00031         *pwc = (ucs4_t) georgian_ps_2uni_1[c-0x80];
00032     else if (c >= 0xc0 && c < 0xe6)
00033         *pwc = (ucs4_t) georgian_ps_2uni_2[c-0xc0];
00034     else
00035         *pwc = (ucs4_t) c;
00036     return 1;
00037 }
00038
00039 static const unsigned char georgian_ps_page00[32] = {
00040     0x80, 0x81, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00041     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x8d, 0x8e, 0x8f, /* 0x88-0x8f */
00042     0x90, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00043     0x00, 0x00, 0x00, 0x00, 0x00, 0x9d, 0x9e, 0x00, /* 0x98-0x9f */
00044 };
00045 static const unsigned char georgian_ps_page01[72] = {
00046     0x00, 0x00, 0x8c, 0x9c, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00047     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00048     0x8a, 0x9a, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00049     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00050     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00051     0x9f, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00052     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00053     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00054     0x00, 0x00, 0x83, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00055 };
00056 static const unsigned char georgian_ps_page02[32] = {
00057     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x88, 0x00, /* 0xc0-0xc7 */
00058     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00059     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00060     0x00, 0x00, 0x00, 0x00, 0x98, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00061 };
00062 static const unsigned char georgian_ps_page10[40] = {
00063     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc8, /* 0xd0-0xd7 */
00064     0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xd0, 0xd1, /* 0xd8-0xdf */
00065     0xd2, 0xd3, 0xd4, 0xd6, 0xd7, 0xd8, 0xd9, 0xda, /* 0xe0-0xe7 */
00066     0xdb, 0xdc, 0xdd, 0xde, 0xdf, 0xe0, 0xe1, 0xe3, /* 0xe8-0xef */
00067     0xe4, 0xc7, 0xce, 0xd5, 0xe2, 0xe5, 0x00, 0x00, /* 0xf0-0xf7 */
00068 };
00069 static const unsigned char georgian_ps_page20[48] = {
00070     0x00, 0x00, 0x00, 0x96, 0x97, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00071     0x91, 0x92, 0x82, 0x00, 0x93, 0x94, 0x84, 0x00, /* 0x18-0x1f */
00072     0x86, 0x87, 0x95, 0x00, 0x00, 0x00, 0x85, 0x00, /* 0x20-0x27 */
00073     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00074     0x89, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00075     0x00, 0x8b, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00076 };
00077
00078 static int
00079 georgian_ps_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00080 {
00081     unsigned char c = 0;
00082     if (wc < 0x0080) {
00083         *r = wc;
00084         return 1;
00085     }
00086     else if (wc >= 0x0080 && wc < 0x00a0)
00087         c = georgian_ps_page00[wc-0x0080];
00088     else if ((wc >= 0x00a0 && wc < 0x00c0) || (wc >= 0x00e6 && wc < 0x0100))
00089         c = wc;
00090     else if (wc >= 0x0150 && wc < 0x0198)
00091         c = georgian_ps_page01[wc-0x0150];
00092     else if (wc >= 0x02c0 && wc < 0x02e0)
00093         c = georgian_ps_page02[wc-0x02c0];
00094     else if (wc >= 0x10d0 && wc < 0x10f8)
00095         c = georgian_ps_page10[wc-0x10d0];
00096     else if (wc >= 0x2010 && wc < 0x2040)
00097         c = georgian_ps_page20[wc-0x2010];
00098     else if (wc == 0x2122)
00099         c = 0x99;
00100     if (c != 0) {
00101         *r = c;
00102         return 1;
00103     }
00104     return RET_ILSEQ;
00105 }

```

13.270 iso8859_1.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_1.h,v 1.3 2000/11/29 17:40:30 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-1
00005  */
00006
00007 static int
00008 iso8859_1_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00009 {
00010     unsigned char c = *s;
00011     *pwc = (ucs4_t) c;
00012     return 1;
00013 }
00014
00015 static int
00016 iso8859_1_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00017 {
00018     if (wc < 0x0100) {
00019         *r = wc;
00020         return 1;
00021     }
00022     return RET_ILSEQ;
00023 }

```

13.271 iso8859_10.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_10.h,v 1.3 2000/11/29 17:40:30 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-10
00005  */
00006
00007 #ifdef NEED_TOWC
00008 static const unsigned short iso8859_10_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x0104, 0x0112, 0x0122, 0x012a, 0x0128, 0x0136, 0x00a7,
00011     0x013b, 0x0110, 0x0160, 0x0166, 0x017d, 0x00ad, 0x016a, 0x014a,
00012     /* 0xb0 */
00013     0x00b0, 0x0105, 0x0113, 0x0123, 0x012b, 0x0129, 0x0137, 0x00b7,
00014     0x013c, 0x0111, 0x0161, 0x0167, 0x017e, 0x2015, 0x016b, 0x014b,
00015     /* 0xc0 */
00016     0x0100, 0x00c1, 0x00c2, 0x00c3, 0x00c4, 0x00c5, 0x00c6, 0x012e,
00017     0x010c, 0x00c9, 0x0118, 0x00cb, 0x0116, 0x00cd, 0x00ce, 0x00cf,
00018     /* 0xd0 */
00019     0x00d0, 0x0145, 0x014c, 0x00d3, 0x00d4, 0x00d5, 0x00d6, 0x0168,
00020     0x00d8, 0x0172, 0x00da, 0x00db, 0x00dc, 0x00dd, 0x00de, 0x00df,
00021     /* 0xe0 */
00022     0x0101, 0x00e1, 0x00e2, 0x00e3, 0x00e4, 0x00e5, 0x00e6, 0x012f,
00023     0x010d, 0x00e9, 0x0119, 0x00eb, 0x0117, 0x00ed, 0x00ee, 0x00ef,
00024     /* 0xf0 */
00025     0x00f0, 0x0146, 0x014d, 0x00f3, 0x00f4, 0x00f5, 0x00f6, 0x0169,
00026     0x00f8, 0x0173, 0x00fa, 0x00fb, 0x00fc, 0x00fd, 0x00fe, 0x0138,
00027 };
00028
00029 static int
00030 iso8859_10_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0)
00034         *pwc = (ucs4_t) c;
00035     else
00036         *pwc = (ucs4_t) iso8859_10_2uni[c-0xa0];
00037     return 1;
00038 }
00039 #endif /* NEED_TOWC */
00040
00041 #ifdef NEED_TOMB
00042 static const unsigned char iso8859_10_page00[224] = {
00043     0xa0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xa7, /* 0xa0-0xa7 */
00044     0x00, 0x00, 0x00, 0x00, 0x00, 0xad, 0x00, 0x00, /* 0xa8-0xaf */
00045     0xb0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xb7, /* 0xb0-0xb7 */
00046     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00047     0x00, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0x00, /* 0xc0-0xc7 */
00048     0x00, 0xc9, 0x00, 0xcb, 0x00, 0xcd, 0xce, 0xcf, /* 0xc8-0xcf */
00049     0xd0, 0x00, 0x00, 0xd3, 0xd4, 0xd5, 0xd6, 0x00, /* 0xd0-0xd7 */
00050     0xd8, 0x00, 0xda, 0xdb, 0xdc, 0xdd, 0xde, 0xdf, /* 0xd8-0xdf */
00051     0x00, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0x00, /* 0xe0-0xe7 */
00052     0x00, 0xe9, 0x00, 0xeb, 0x00, 0xed, 0xee, 0xef, /* 0xe8-0xef */
00053     0xf0, 0x00, 0x00, 0xf3, 0xf4, 0xf5, 0xf6, 0x00, /* 0xf0-0xf7 */
00054     0xf8, 0x00, 0xfa, 0xfb, 0xfc, 0xfd, 0xfe, 0x00, /* 0xf8-0xff */
00055     /* 0x0100 */
00056     0xc0, 0xe0, 0x00, 0x00, 0xa1, 0xb1, 0x00, 0x00, /* 0x00-0x07 */

```



```

00057 0x00, 0x00, 0x00, 0x00, 0xc8, 0xe8, 0x00, 0x00, /* 0x08-0x0f */
00058 0xa9, 0xb9, 0xa2, 0xb2, 0x00, 0x00, 0xcc, 0xec, /* 0x10-0x17 */
00059 0xca, 0xea, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00060 0x00, 0x00, 0xa3, 0xb3, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00061 0xa5, 0xb5, 0xa4, 0xb4, 0x00, 0x00, 0xc7, 0xe7, /* 0x28-0x2f */
00062 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00063 0xff, 0x00, 0x00, 0xa8, 0xb8, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00064 0x00, 0x00, 0x00, 0x00, 0x00, 0xd1, 0xf1, 0x00, /* 0x40-0x47 */
00065 0x00, 0x00, 0xaf, 0xbf, 0xd2, 0xf2, 0x00, 0x00, /* 0x48-0x4f */
00066 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00067 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00068 0xaa, 0xba, 0x00, 0x00, 0x00, 0x00, 0xab, 0xbb, /* 0x60-0x67 */
00069 0xd7, 0xf7, 0xae, 0xbe, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00070 0x00, 0x00, 0xd9, 0xf9, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00071 0x00, 0x00, 0x00, 0x00, 0x00, 0xac, 0xbc, 0x00, /* 0x78-0x7f */
00072 };
00073
00074 static int
00075 iso8859_10_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00076 {
00077     (void)conv; (void)n;
00078     unsigned char c = 0;
00079     if (wc < 0x00a0) {
00080         *r = wc;
00081         return 1;
00082     }
00083     else if (wc >= 0x00a0 && wc < 0x0180)
00084         c = iso8859_10_page00[wc-0x00a0];
00085     else if (wc == 0x2015)
00086         c = 0xbd;
00087     if (c != 0) {
00088         *r = c;
00089         return 1;
00090     }
00091     return RET_ILSEQ;
00092 }
00093 #endif /* NEED_TOMB */

```

13.272 iso8859_11.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_11.h,v 1.2 2002/10/09 16:38:19 tsi Exp $ */
00002
00003 /*
00004  * ISO8859-11
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_11_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x0e01, 0x0e02, 0x0e03, 0x0e04, 0x0e05, 0x0e06, 0x0e07,
00011     0x0e08, 0x0e09, 0x0e0a, 0x0e0b, 0x0e0c, 0x0e0d, 0x0e0e, 0x0e0f,
00012     /* 0xb0 */
00013     0x0e10, 0x0e11, 0x0e12, 0x0e13, 0x0e14, 0x0e15, 0x0e16, 0x0e17,
00014     0x0e18, 0x0e19, 0x0e1a, 0x0e1b, 0x0e1c, 0x0e1d, 0x0e1e, 0x0e1f,
00015     /* 0xc0 */
00016     0x0e20, 0x0e21, 0x0e22, 0x0e23, 0x0e24, 0x0e25, 0x0e26, 0x0e27,
00017     0x0e28, 0x0e29, 0x0e2a, 0x0e2b, 0x0e2c, 0x0e2d, 0x0e2e, 0x0e2f,
00018     /* 0xd0 */
00019     0x0e30, 0x0e31, 0x0e32, 0x0e33, 0x0e34, 0x0e35, 0x0e36, 0x0e37,
00020     0x0e38, 0x0e39, 0x0e3a, 0xffff, 0xffff, 0xffff, 0xffff, 0x0e3f,
00021     /* 0xe0 */
00022     0x0e40, 0x0e41, 0x0e42, 0x0e43, 0x0e44, 0x0e45, 0x0e46, 0x0e47,
00023     0x0e48, 0x0e49, 0x0e4a, 0x0e4b, 0x0e4c, 0x0e4d, 0x0e4e, 0x0e4f,
00024     /* 0xf0 */
00025     0x0e50, 0x0e51, 0x0e52, 0x0e53, 0x0e54, 0x0e55, 0x0e56, 0x0e57,
00026     0x0e58, 0x0e59, 0x0e5a, 0x0e5b, 0xffff, 0xffff, 0xffff, 0xffff,
00027 };
00028
00029 static int
00030 iso8859_11_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0x80) {
00034         *pwc = (ucs4_t) c;
00035         return 1;
00036     }
00037     else if (c < 0xa0) {
00038     }
00039     else {
00040         unsigned short wc = iso8859_11_2uni[c-0xa0];
00041         if (wc != 0xffff) {
00042             *pwc = (ucs4_t) wc;
00043             return 1;
00044         }
00045     }

```

```

00046     return RET_ILSEQ;
00047 }
00048 #endif /* NEED_TOWC */
00049
00050 #ifdef NEED_TOMB
00051 static const unsigned char iso8859_11_page0e[96] = {
00052     0x00, 0xa1, 0xa2, 0xa3, 0xa4, 0xa5, 0xa6, 0xa7, /* 0x00-0x07 */
00053     0xa8, 0xa9, 0xaa, 0xab, 0xac, 0xad, 0xae, 0xaf, /* 0x08-0x0f */
00054     0xb0, 0xb1, 0xb2, 0xb3, 0xb4, 0xb5, 0xb6, 0xb7, /* 0x10-0x17 */
00055     0xb8, 0xb9, 0xba, 0xbb, 0xbc, 0xbd, 0xbe, 0xbf, /* 0x18-0x1f */
00056     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x20-0x27 */
00057     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x28-0x2f */
00058     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0x30-0x37 */
00059     0xd8, 0xd9, 0xda, 0x00, 0x00, 0x00, 0x00, 0xdf, /* 0x38-0x3f */
00060     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0x40-0x47 */
00061     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0x48-0x4f */
00062     0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0x50-0x57 */
00063     0xf8, 0xf9, 0xfa, 0xfb, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00064 };
00065
00066 static int
00067 iso8859_11_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00068 {
00069     (void)conv; (void)n;
00070     unsigned char c = 0;
00071     if (wc < 0x0080 || wc == 0x00a0) {
00072         *r = wc;
00073         return 1;
00074     }
00075     else if (wc >= 0x0e00 && wc < 0x0e60)
00076         c = iso8859_11_page0e[wc-0x0e00];
00077     if (c != 0) {
00078         *r = c;
00079         return 1;
00080     }
00081     return RET_ILSEQ;
00082 }
00083 #endif /* NEED_TOMB */

```

13.273 iso8859_13.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_13.h,v 1.2 2000/11/28 16:10:26 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-13
00005  */
00006
00007 #ifdef NEED_TOWC
00008 static const unsigned short iso8859_13_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x201d, 0x00a2, 0x00a3, 0x00a4, 0x201e, 0x00a6, 0x00a7,
00011     0x00d8, 0x00a9, 0x0156, 0x00ab, 0x00ac, 0x00ad, 0x00ae, 0x00c6,
00012     /* 0xb0 */
00013     0x00b0, 0x00b1, 0x00b2, 0x00b3, 0x201c, 0x00b5, 0x00b6, 0x00b7,
00014     0x00f8, 0x00b9, 0x0157, 0x00bb, 0x00bc, 0x00bd, 0x00be, 0x00e6,
00015     /* 0xc0 */
00016     0x0104, 0x012e, 0x0100, 0x0106, 0x00c4, 0x00c5, 0x0118, 0x0112,
00017     0x010c, 0x00c9, 0x0179, 0x0116, 0x0122, 0x0136, 0x012a, 0x013b,
00018     /* 0xd0 */
00019     0x0160, 0x0143, 0x0145, 0x00d3, 0x014c, 0x00d5, 0x00d6, 0x00d7,
00020     0x0172, 0x0141, 0x015a, 0x016a, 0x00dc, 0x017b, 0x017d, 0x00df,
00021     /* 0xe0 */
00022     0x0105, 0x012f, 0x0101, 0x0107, 0x00e4, 0x00e5, 0x0119, 0x0113,
00023     0x010d, 0x00e9, 0x017a, 0x0117, 0x0123, 0x0137, 0x012b, 0x013c,
00024     /* 0xf0 */
00025     0x0161, 0x0144, 0x0146, 0x00f3, 0x014d, 0x00f5, 0x00f6, 0x00f7,
00026     0x0173, 0x0142, 0x015b, 0x016b, 0x00fc, 0x017c, 0x017e, 0x2019,
00027 };
00028
00029 static int
00030 iso8859_13_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0)
00034         *pwc = (ucs4_t) c;
00035     else
00036         *pwc = (ucs4_t) iso8859_13_2uni[c-0xa0];
00037     return 1;
00038 }
00039 #endif /* NEED_TOWC */
00040
00041 #ifdef NEED_TOMB
00042 static const unsigned char iso8859_13_page00[224] = {
00043     0xa0, 0x00, 0xa2, 0xa3, 0xa4, 0x00, 0xa6, 0xa7, /* 0xa0-0xa7 */
00044     0x00, 0xa9, 0x00, 0xab, 0xac, 0xad, 0xae, 0x00, /* 0xa8-0xaf */

```

```

00045 0xb0, 0xb1, 0xb2, 0xb3, 0x00, 0xb5, 0xb6, 0xb7, /* 0xb0-0xb7 */
00046 0x00, 0xb9, 0x00, 0xbb, 0xbc, 0xbd, 0xbe, 0x00, /* 0xb8-0xbf */
00047 0x00, 0x00, 0x00, 0x00, 0xc4, 0xc5, 0xaf, 0x00, /* 0xc0-0xc7 */
00048 0x00, 0xc9, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00049 0x00, 0x00, 0x00, 0xd3, 0x00, 0xd5, 0xd6, 0xd7, /* 0xd0-0xd7 */
00050 0xa8, 0x00, 0x00, 0x00, 0x00, 0xdc, 0x00, 0x00, 0xdf, /* 0xd8-0xdf */
00051 0x00, 0x00, 0x00, 0x00, 0xe4, 0xe5, 0xbf, 0x00, /* 0xe0-0xe7 */
00052 0x00, 0xe9, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe8-0xef */
00053 0x00, 0x00, 0x00, 0xf3, 0x00, 0xf5, 0xf6, 0xf7, /* 0xf0-0xf7 */
00054 0xb8, 0x00, 0x00, 0x00, 0xfc, 0x00, 0x00, 0x00, /* 0xf8-0xff */
00055 /* 0x0100 */
00056 0xc2, 0xe2, 0x00, 0x00, 0xc0, 0xe0, 0xc3, 0xe3, /* 0x00-0x07 */
00057 0x00, 0x00, 0x00, 0x00, 0xc8, 0xe8, 0x00, 0x00, /* 0x08-0x0f */
00058 0x00, 0x00, 0xc7, 0xe7, 0x00, 0x00, 0xcb, 0xeb, /* 0x10-0x17 */
00059 0xc6, 0xe6, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00060 0x00, 0x00, 0xcc, 0xec, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00061 0x00, 0x00, 0xce, 0xee, 0x00, 0x00, 0xc1, 0xe1, /* 0x28-0x2f */
00062 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xcd, 0xed, /* 0x30-0x37 */
00063 0x00, 0x00, 0xcf, 0xef, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00064 0x00, 0xd9, 0xf9, 0xd1, 0xf1, 0xd2, 0xf2, 0x00, /* 0x40-0x47 */
00065 0x00, 0x00, 0x00, 0x00, 0xd4, 0xf4, 0x00, 0x00, /* 0x48-0x4f */
00066 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xaa, 0xba, /* 0x50-0x57 */
00067 0x00, 0x00, 0xda, 0xfa, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00068 0xd0, 0xf0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00069 0x00, 0x00, 0xdb, 0xfb, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00070 0x00, 0x00, 0xd8, 0xf8, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00071 0x00, 0xca, 0xea, 0xdd, 0xfd, 0xde, 0xfe, 0x00, /* 0x78-0x7f */
00072 };
00073 static const unsigned char iso8859_13_page20[8] = {
00074 0x00, 0xff, 0x00, 0x00, 0xb4, 0xa1, 0xa5, 0x00, /* 0x18-0x1f */
00075 };
00076
00077 static int
00078 iso8859_13_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00079 {
00080     (void)conv; (void)n;
00081     unsigned char c = 0;
00082     if (wc < 0x00a0) {
00083         *r = wc;
00084         return 1;
00085     }
00086     else if (wc >= 0x00a0 && wc < 0x0180)
00087         c = iso8859_13_page00[wc-0x00a0];
00088     else if (wc >= 0x2018 && wc < 0x2020)
00089         c = iso8859_13_page20[wc-0x2018];
00090     if (c != 0) {
00091         *r = c;
00092         return 1;
00093     }
00094     return RET_ILSEQ;
00095 }
00096 #endif /* NEED_TOWC */

```

13.274 iso8859_14.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_14.h,v 1.3 2000/11/29 17:40:30 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-14
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_14_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x1e02, 0x1e03, 0x00a3, 0x010a, 0x010b, 0x1e0a, 0x00a7,
00011     0x1e80, 0x00a9, 0x1e82, 0x1e0b, 0x1ef2, 0x00ad, 0x00ae, 0x0178,
00012     /* 0xb0 */
00013     0x1e1e, 0x1e1f, 0x0120, 0x0121, 0x1e40, 0x1e41, 0x00b6, 0x1e56,
00014     0x1e81, 0x1e57, 0x1e83, 0x1e60, 0x1ef3, 0x1e84, 0x1e85, 0x1e61,
00015     /* 0xc0 */
00016     0x00c0, 0x00c1, 0x00c2, 0x00c3, 0x00c4, 0x00c5, 0x00c6, 0x00c7,
00017     0x00c8, 0x00c9, 0x00ca, 0x00cb, 0x00cc, 0x00cd, 0x00ce, 0x00cf,
00018     /* 0xd0 */
00019     0x0174, 0x00d1, 0x00d2, 0x00d3, 0x00d4, 0x00d5, 0x00d6, 0x1e6a,
00020     0x00d8, 0x00d9, 0x00da, 0x00db, 0x00dc, 0x00dd, 0x0176, 0x00df,
00021     /* 0xe0 */
00022     0x00e0, 0x00e1, 0x00e2, 0x00e3, 0x00e4, 0x00e5, 0x00e6, 0x00e7,
00023     0x00e8, 0x00e9, 0x00ea, 0x00eb, 0x00ec, 0x00ed, 0x00ee, 0x00ef,
00024     /* 0xf0 */
00025     0x0175, 0x00f1, 0x00f2, 0x00f3, 0x00f4, 0x00f5, 0x00f6, 0x1e6b,
00026     0x00f8, 0x00f9, 0x00fa, 0x00fb, 0x00fc, 0x00fd, 0x0177, 0x00ff,
00027 };
00028
00029 static int
00030 iso8859_14_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)

```

```

00031 {
00032     unsigned char c = *s;
00033     if (c >= 0xa0)
00034         *pwc = (ucs4_t) iso8859_14_2uni[c-0xa0];
00035     else
00036         *pwc = (ucs4_t) c;
00037     return 1;
00038 }
00039 #endif /* NEED_TOWC */
00040
00041 #ifdef NEED_TOMB
00042 static const unsigned char iso8859_14_page00[96] = {
00043     0xa0, 0x00, 0x00, 0xa3, 0x00, 0x00, 0x00, 0xa7, /* 0xa0-0xa7 */
00044     0x00, 0xa9, 0x00, 0x00, 0x00, 0xad, 0xae, 0x00, /* 0xa8-0xaf */
00045     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xb6, 0x00, /* 0xb0-0xb7 */
00046     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00047     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0xc0-0xc7 */
00048     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0xc8-0xcf */
00049     0x00, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0x00, /* 0xd0-0xd7 */
00050     0xd8, 0xd9, 0xda, 0xdb, 0xdc, 0xdd, 0x00, 0xdf, /* 0xd8-0xdf */
00051     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0xe0-0xe7 */
00052     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xe8-0xef */
00053     0x00, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0x00, /* 0xf0-0xf7 */
00054     0xf8, 0xf9, 0xfa, 0xfb, 0xfc, 0xfd, 0x00, 0xff, /* 0xf8-0xff */
00055 };
00056 static const unsigned char iso8859_14_page01_0[32] = {
00057     0x00, 0x00, 0xa4, 0xa5, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00058     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00059     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00060     0xb2, 0xb3, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00061 };
00062 static const unsigned char iso8859_14_page01_1[16] = {
00063     0x00, 0x00, 0x00, 0x00, 0xd0, 0xf0, 0xde, 0xfe, /* 0x70-0x77 */
00064     0xaf, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00065 };
00066 static const unsigned char iso8859_14_pagele_0[136] = {
00067     0x00, 0x00, 0xa1, 0xa2, 0x00, 0x00, 0x00, 0x00, /* 0x00-0x07 */
00068     0x00, 0x00, 0xa6, 0xab, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00069     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00070     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xb0, 0xb1, /* 0x18-0x1f */
00071     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00072     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00073     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00074     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00075     0xb4, 0xb5, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00076     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00077     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xb7, 0xb9, /* 0x50-0x57 */
00078     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00079     0xbb, 0xbf, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00080     0x00, 0x00, 0xd7, 0xf7, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00081     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00082     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00083     0xa8, 0xb8, 0xaa, 0xba, 0xbd, 0xbe, 0x00, 0x00, /* 0x80-0x87 */
00084 };
00085 static const unsigned char iso8859_14_pagele_1[8] = {
00086     0x00, 0x00, 0xac, 0xbc, 0x00, 0x00, 0x00, 0x00, /* 0xf0-0xf7 */
00087 };
00088
00089 static int
00090 iso8859_14_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00091 {
00092     (void)conv; (void)n;
00093     unsigned char c = 0;
00094     if (wc < 0x00a0) {
00095         *r = wc;
00096         return 1;
00097     }
00098     else if (wc >= 0x00a0 && wc < 0x0100)
00099         c = iso8859_14_page00[wc-0x00a0];
00100     else if (wc >= 0x0108 && wc < 0x0128)
00101         c = iso8859_14_page01_0[wc-0x0108];
00102     else if (wc >= 0x0170 && wc < 0x0180)
00103         c = iso8859_14_page01_1[wc-0x0170];
00104     else if (wc >= 0x1e00 && wc < 0x1e88)
00105         c = iso8859_14_pagele_0[wc-0x1e00];
00106     else if (wc >= 0x1ef0 && wc < 0x1ef8)
00107         c = iso8859_14_pagele_1[wc-0x1ef0];
00108     if (c != 0) {
00109         *r = c;
00110         return 1;
00111     }
00112     return RET_ILSEQ;
00113 }
00114 #endif /* NEED_TOMB */

```

13.275 iso8859_15.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_15.h,v 1.3 2000/11/29 17:40:31 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-15
00005  */
00006
00007 #ifdef NEED_TOWC
00008 static const unsigned short iso8859_15_2uni[32] = {
00009     /* 0xa0 */
00010     0x00a0, 0x00a1, 0x00a2, 0x00a3, 0x20ac, 0x00a5, 0x0160, 0x00a7,
00011     0x0161, 0x00a9, 0x00aa, 0x00ab, 0x00ac, 0x00ad, 0x00ae, 0x00af,
00012     /* 0xb0 */
00013     0x00b0, 0x00b1, 0x00b2, 0x00b3, 0x017d, 0x00b5, 0x00b6, 0x00b7,
00014     0x017e, 0x00b9, 0x00ba, 0x00bb, 0x0152, 0x0153, 0x0178, 0x00bf,
00015 };
00016
00017 static int
00018 iso8859_15_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00019 {
00020     unsigned char c = *s;
00021     if (c >= 0xa0 && c < 0xc0)
00022         *pwc = (ucs4_t) iso8859_15_2uni[c-0xa0];
00023     else
00024         *pwc = (ucs4_t) c;
00025     return 1;
00026 }
00027 #endif /* NEED_TOWC */
00028
00029 #ifdef NEED_TOMB
00030 static const unsigned char iso8859_15_page00[32] = {
00031     0xa0, 0xa1, 0xa2, 0xa3, 0x00, 0xa5, 0x00, 0xa7, /* 0xa0-0xa7 */
00032     0x00, 0xa9, 0xaa, 0xab, 0xac, 0xad, 0xae, 0xaf, /* 0xa8-0xaf */
00033     0xb0, 0xb1, 0xb2, 0xb3, 0x00, 0xb5, 0xb6, 0xb7, /* 0xb0-0xb7 */
00034     0x00, 0xb9, 0xba, 0xbb, 0x00, 0x00, 0x00, 0xbf, /* 0xb8-0xbf */
00035 };
00036 static const unsigned char iso8859_15_page01[48] = {
00037     0x00, 0x00, 0xbc, 0xbd, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00038     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00039     0xa6, 0xa8, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00040     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00041     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00042     0xbe, 0x00, 0x00, 0x00, 0x00, 0xb4, 0xb8, 0x00, /* 0x78-0x7f */
00043 };
00044
00045 static int
00046 iso8859_15_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00047 {
00048     (void)conv; (void)n;
00049     unsigned char c = 0;
00050     if (wc < 0x00a0) {
00051         *r = wc;
00052         return 1;
00053     }
00054     else if (wc >= 0x00a0 && wc < 0x00c0)
00055         c = iso8859_15_page00[wc-0x00a0];
00056     else if (wc >= 0x00c0 && wc < 0x0100)
00057         c = wc;
00058     else if (wc >= 0x0150 && wc < 0x0180)
00059         c = iso8859_15_page01[wc-0x0150];
00060     else if (wc == 0x20ac)
00061         c = 0xa4;
00062     if (c != 0) {
00063         *r = c;
00064         return 1;
00065     }
00066     return RET_ILSEQ;
00067 }
00068 #endif /* NEED_TOMB */

```

13.276 iso8859_16.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_16.h,v 1.4 2003/07/15 17:33:45 pascal Exp $ */
00002
00003 /*
00004  * ISO-8859-16
00005  */
00006
00007 static const unsigned short iso8859_16_2uni[96] = {
00008     /* 0xa0 */
00009     0x00a0, 0x0104, 0x0105, 0x0141, 0x20ac, 0x201e, 0x0160, 0x00a7,
00010     0x0161, 0x00a9, 0x0218, 0x00ab, 0x0179, 0x00ad, 0x017a, 0x017b,
00011     /* 0xb0 */

```

```

00012 0x00b0, 0x00b1, 0x010c, 0x0142, 0x017d, 0x201d, 0x00b6, 0x00b7,
00013 0x017e, 0x010d, 0x0219, 0x00bb, 0x0152, 0x0153, 0x0178, 0x017c,
00014 /* 0xc0 */
00015 0x00c0, 0x00c1, 0x00c2, 0x0102, 0x00c4, 0x0106, 0x00c6, 0x00c7,
00016 0x00c8, 0x00c9, 0x00ca, 0x00cb, 0x00cc, 0x00cd, 0x00ce, 0x00cf,
00017 /* 0xd0 */
00018 0x0110, 0x0143, 0x00d2, 0x00d3, 0x00d4, 0x0150, 0x00d6, 0x015a,
00019 0x0170, 0x00d9, 0x00da, 0x00db, 0x00dc, 0x0118, 0x021a, 0x00df,
00020 /* 0xe0 */
00021 0x00e0, 0x00e1, 0x00e2, 0x0103, 0x00e4, 0x0107, 0x00e6, 0x00e7,
00022 0x00e8, 0x00e9, 0x00ea, 0x00eb, 0x00ec, 0x00ed, 0x00ee, 0x00ef,
00023 /* 0xf0 */
00024 0x0111, 0x0144, 0x00f2, 0x00f3, 0x00f4, 0x0151, 0x00f6, 0x015b,
00025 0x0171, 0x00f9, 0x00fa, 0x00fb, 0x00fc, 0x0119, 0x021b, 0x00ff,
00026 };
00027
00028 static int
00029 iso8859_16_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00030 {
00031     unsigned char c = *s;
00032     if (c < 0xa0)
00033         *pwc = (ucs4_t) c;
00034     else
00035         *pwc = (ucs4_t) iso8859_16_2uni[c-0xa0];
00036     return 1;
00037 }
00038
00039 static const unsigned char iso8859_16_page00[224] = {
00040     0xa0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xa7, /* 0xa0-0xa7 */
00041     0x00, 0xa9, 0x00, 0xab, 0x00, 0xad, 0x00, 0x00, /* 0xa8-0xaf */
00042     0xb0, 0xb1, 0x00, 0x00, 0x00, 0x00, 0xb6, 0xb7, /* 0xb0-0xb7 */
00043     0x00, 0x00, 0x00, 0xbb, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00044     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0xc0-0xc7 */
00045     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0xc8-0xcf */
00046     0x00, 0x00, 0xd2, 0xd3, 0xd4, 0x00, 0xd6, 0x00, /* 0xd0-0xd7 */
00047     0x00, 0xd9, 0xda, 0xdb, 0xdc, 0x00, 0x00, 0xdf, /* 0xd8-0xdf */
00048     0xe0, 0xe1, 0xe2, 0x00, 0xe4, 0x00, 0xe6, 0xe7, /* 0xe0-0xe7 */
00049     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xe8-0xef */
00050     0x00, 0x00, 0xf2, 0xf3, 0xf4, 0x00, 0xf6, 0x00, /* 0xf0-0xf7 */
00051     0x00, 0xf9, 0xfa, 0xfb, 0xfc, 0x00, 0x00, 0xff, /* 0xf8-0xff */
00052     /* 0x0100 */
00053     0x00, 0x00, 0xc3, 0xe3, 0xa1, 0xa2, 0xc5, 0xe5, /* 0x00-0x07 */
00054     0x00, 0x00, 0x00, 0x00, 0xb2, 0xb9, 0x00, 0x00, /* 0x08-0x0f */
00055     0xd0, 0xf0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00056     0xdd, 0xfd, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00057     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00058     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00059     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00060     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00061     0x00, 0xa3, 0xb3, 0xd1, 0xf1, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00062     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00063     0xd5, 0xf5, 0xbc, 0xbd, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00064     0x00, 0x00, 0xd7, 0xf7, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00065     0xa6, 0xa8, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00066     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00067     0xd8, 0xf8, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00068     0xbe, 0xac, 0xae, 0xaf, 0xbf, 0xb4, 0xb8, 0x00, /* 0x78-0x7f */
00069 };
00070 static const unsigned char iso8859_16_page02[8] = {
00071     0xaa, 0xba, 0xde, 0xfe, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00072 };
00073 static const unsigned char iso8859_16_page20[8] = {
00074     0x00, 0x00, 0x00, 0x00, 0xb5, 0xa5, 0x00, /* 0x18-0x1f */
00075 };
00076
00077 static int
00078 iso8859_16_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00079 {
00080     unsigned char c = 0;
00081     if (wc < 0x00a0) {
00082         *r = wc;
00083         return 1;
00084     }
00085     else if (wc >= 0x00a0 && wc < 0x0180)
00086         c = iso8859_16_page00[wc-0x00a0];
00087     else if (wc >= 0x0218 && wc < 0x0220)
00088         c = iso8859_16_page02[wc-0x0218];
00089     else if (wc >= 0x2018 && wc < 0x2020)
00090         c = iso8859_16_page20[wc-0x2018];
00091     else if (wc == 0x20ac)
00092         c = 0xa4;
00093     if (c != 0) {
00094         *r = c;
00095         return 1;
00096     }
00097     return RET_ILSEQ;
00098 }

```

13.277 iso8859_2.h

```
00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_2.h,v 1.3 2000/11/29 17:40:31 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-2
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_2_uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x0104, 0x02d8, 0x0141, 0x00a4, 0x013d, 0x015a, 0x00a7,
00011     0x00a8, 0x0160, 0x015e, 0x0164, 0x0179, 0x00ad, 0x017d, 0x017b,
00012     /* 0xb0 */
00013     0x00b0, 0x0105, 0x02db, 0x0142, 0x00b4, 0x013e, 0x015b, 0x02c7,
00014     0x00b8, 0x0161, 0x015f, 0x0165, 0x017a, 0x02dd, 0x017e, 0x017c,
00015     /* 0xc0 */
00016     0x0154, 0x00c1, 0x00c2, 0x0102, 0x00c4, 0x0139, 0x0106, 0x00c7,
00017     0x010c, 0x00c9, 0x0118, 0x00cb, 0x011a, 0x00cd, 0x00ce, 0x010e,
00018     /* 0xd0 */
00019     0x0110, 0x0143, 0x0147, 0x00d3, 0x00d4, 0x0150, 0x00d6, 0x00d7,
00020     0x0158, 0x016e, 0x00da, 0x0170, 0x00dc, 0x00dd, 0x0162, 0x00df,
00021     /* 0xe0 */
00022     0x0155, 0x00e1, 0x00e2, 0x0103, 0x00e4, 0x013a, 0x0107, 0x00e7,
00023     0x010d, 0x00e9, 0x0119, 0x00eb, 0x011b, 0x00ed, 0x00ee, 0x010f,
00024     /* 0xf0 */
00025     0x0111, 0x0144, 0x0148, 0x00f3, 0x00f4, 0x0151, 0x00f6, 0x00f7,
00026     0x0159, 0x016f, 0x00fa, 0x0171, 0x00fc, 0x00fd, 0x0163, 0x02d9,
00027 };
00028
00029 static int
00030 iso8859_2_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0)
00034         *pwc = (ucs4_t) c;
00035     else
00036         *pwc = (ucs4_t) iso8859_2_uni[c-0xa0];
00037     return 1;
00038 }
00039 #endif /* NEED_TOWC */
00040
00041 #ifndef NEED_TOMB
00042 static const unsigned char iso8859_2_page00[224] = {
00043     0xa0, 0x00, 0x00, 0x00, 0xa4, 0x00, 0x00, 0xa7, /* 0xa0-0xa7 */
00044     0xa8, 0x00, 0x00, 0x00, 0xad, 0x00, 0x00, /* 0xa8-0xaf */
00045     0xb0, 0x00, 0x00, 0xb4, 0x00, 0x00, /* 0xb0-0xb7 */
00046     0xb8, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00047     0xc0, 0xc1, 0xc2, 0xc4, 0xc0, 0xc7, /* 0xc0-0xc7 */
00048     0xc0, 0xc9, 0xc0, 0xcb, 0xc0, 0xcd, 0xc0, /* 0xc8-0xcf */
00049     0x00, 0x00, 0x00, 0xd3, 0xd4, 0x00, 0xd6, 0xd7, /* 0xd0-0xd7 */
00050     0x00, 0x00, 0xda, 0x00, 0xdc, 0xdd, 0x00, 0xdf, /* 0xd8-0xdf */
00051     0x00, 0xe1, 0xe2, 0x00, 0xe4, 0x00, 0x00, 0xe7, /* 0xe0-0xe7 */
00052     0x00, 0xe9, 0x00, 0xeb, 0x00, 0xed, 0xee, 0x00, /* 0xe8-0xef */
00053     0x00, 0x00, 0x00, 0xf3, 0xf4, 0x00, 0xf6, 0xf7, /* 0xf0-0xf7 */
00054     0x00, 0x00, 0xfa, 0x00, 0xfc, 0xfd, 0x00, 0x00, /* 0xf8-0xff */
00055     /* 0x0100 */
00056     0x00, 0x00, 0xc3, 0xe3, 0xa1, 0xb1, 0xc6, 0xe6, /* 0x00-0x07 */
00057     0x00, 0x00, 0x00, 0x00, 0xc8, 0xe8, 0xcf, 0xef, /* 0x08-0x0f */
00058     0xd0, 0xf0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00059     0xca, 0xea, 0xcc, 0xec, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00060     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00061     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00062     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00063     0x00, 0xc5, 0xe5, 0x00, 0x00, 0xa5, 0xb5, 0x00, /* 0x38-0x3f */
00064     0x00, 0xa3, 0xb3, 0xd1, 0xf1, 0x00, 0x00, 0xd2, /* 0x40-0x47 */
00065     0xf2, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00066     0xd5, 0xf5, 0x00, 0x00, 0xc0, 0xe0, 0x00, 0x00, /* 0x50-0x57 */
00067     0xd8, 0xf8, 0xa6, 0xb6, 0x00, 0x00, 0xaa, 0xba, /* 0x58-0x5f */
00068     0xa9, 0xb9, 0xde, 0xfe, 0xab, 0xbb, 0x00, 0x00, /* 0x60-0x67 */
00069     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xd9, 0xf9, /* 0x68-0x6f */
00070     0xdb, 0xfb, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00071     0x00, 0xac, 0xbc, 0xaf, 0xbf, 0xae, 0xbe, 0x00, /* 0x78-0x7f */
00072 };
00073 static const unsigned char iso8859_2_page02[32] = {
00074     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xb7, /* 0xc0-0xc7 */
00075     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xc7, /* 0xc8-0xcf */
00076     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xd7, /* 0xd0-0xd7 */
00077     0xa2, 0xff, 0x00, 0xb2, 0x00, 0xbd, 0x00, 0x00, /* 0xd8-0xdf */
00078 };
00079
00080 /*
00081 static int
00082 iso8859_2_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00083 {
00084     unsigned char c = 0;
00085     if (wc < 0x00a0) {
```

```

00086     *r = wc;
00087     return 1;
00088 }
00089 else if (wc >= 0x00a0 && wc < 0x0180)
00090     c = iso8859_2_page00[wc-0x00a0];
00091 else if (wc >= 0x02c0 && wc < 0x02e0)
00092     c = iso8859_2_page02[wc-0x02c0];
00093 if (c != 0) {
00094     *r = c;
00095     return 1;
00096 }
00097 return RET_ILSEQ;
00098 }
00099 */
00100 #endif /* NEED_TOMB */

```

13.278 iso8859_3.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_3.h,v 1.3 2000/11/29 17:40:31 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-3
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_3_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x0126, 0x02d8, 0x00a3, 0x00a4, 0xffff, 0x0124, 0x00a7,
00011     0x00a8, 0x0130, 0x015e, 0x011e, 0x0134, 0x00ad, 0xffff, 0x017b,
00012     /* 0xb0 */
00013     0x00b0, 0x0127, 0x00b2, 0x00b3, 0x00b4, 0x00b5, 0x0125, 0x00b7,
00014     0x00b8, 0x0131, 0x015f, 0x011f, 0x0135, 0x00bd, 0xffff, 0x017c,
00015     /* 0xc0 */
00016     0x00c0, 0x00c1, 0x00c2, 0xffff, 0x00c4, 0x010a, 0x0108, 0x00c7,
00017     0x00c8, 0x00c9, 0x00ca, 0x00cb, 0x00cc, 0x00cd, 0x00ce, 0x00cf,
00018     /* 0xd0 */
00019     0xffff, 0x00d1, 0x00d2, 0x00d3, 0x00d4, 0x0120, 0x00d6, 0x00d7,
00020     0x011c, 0x00d9, 0x00da, 0x00db, 0x00dc, 0x016c, 0x015c, 0x00df,
00021     /* 0xe0 */
00022     0x00e0, 0x00e1, 0x00e2, 0xffff, 0x00e4, 0x010b, 0x0109, 0x00e7,
00023     0x00e8, 0x00e9, 0x00ea, 0x00eb, 0x00ec, 0x00ed, 0x00ee, 0x00ef,
00024     /* 0xf0 */
00025     0xffff, 0x00f1, 0x00f2, 0x00f3, 0x00f4, 0x0121, 0x00f6, 0x00f7,
00026     0x011d, 0x00f9, 0x00fa, 0x00fb, 0x00fc, 0x016d, 0x015d, 0x02d9,
00027 };
00028
00029 static int
00030 iso8859_3_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0) {
00034         *pwc = (ucs4_t) c;
00035         return 1;
00036     }
00037     else {
00038         unsigned short wc = iso8859_3_2uni[c-0xa0];
00039         if (wc != 0xffff) {
00040             *pwc = (ucs4_t) wc;
00041             return 1;
00042         }
00043     }
00044     return RET_ILSEQ;
00045 }
00046 #endif /* NEED_TOWC */
00047
00048 #ifndef NEED_TOMB
00049 static const unsigned char iso8859_3_page00[96] = {
00050     0xa0, 0x00, 0x00, 0xa3, 0xa4, 0x00, 0x00, 0xa7, /* 0xa0-0xa7 */
00051     0xa8, 0x00, 0x00, 0x00, 0x00, 0xad, 0x00, 0x00, /* 0xa8-0xaf */
00052     0xb0, 0x00, 0xb2, 0xb3, 0xb4, 0xb5, 0x00, 0xb7, /* 0xb0-0xb7 */
00053     0xb8, 0x00, 0x00, 0x00, 0x00, 0xbd, 0x00, 0x00, /* 0xb8-0xbf */
00054     0xc0, 0xc1, 0xc2, 0x00, 0xc4, 0x00, 0x00, 0xc7, /* 0xc0-0xc7 */
00055     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0xc8-0xcf */
00056     0x00, 0xd1, 0xd2, 0xd3, 0xd4, 0x00, 0xd6, 0xd7, /* 0xd0-0xd7 */
00057     0x00, 0xd9, 0xda, 0xdb, 0xdc, 0x00, 0x00, 0xdf, /* 0xd8-0xdf */
00058     0xe0, 0xe1, 0xe2, 0x00, 0xe4, 0x00, 0x00, 0xe7, /* 0xe0-0xe7 */
00059     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xe8-0xef */
00060     0x00, 0xf1, 0xf2, 0xf3, 0xf4, 0x00, 0xf6, 0xf7, /* 0xf0-0xf7 */
00061     0x00, 0xf9, 0xfa, 0xfb, 0xfc, 0x00, 0x00, 0x00, /* 0xf8-0xff */
00062 };
00063 static const unsigned char iso8859_3_page01[120] = {
00064     0xc6, 0xe6, 0xc5, 0xe5, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00065     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00066     0x00, 0x00, 0x00, 0x00, 0xd8, 0xf8, 0xab, 0xbb, /* 0x18-0x1f */
00067     0xd5, 0xf5, 0x00, 0x00, 0xa6, 0xb6, 0xa1, 0xb1, /* 0x20-0x27 */

```



```

00068 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00069 0xa9, 0xb9, 0x00, 0x00, 0xac, 0xbc, 0x00, 0x00, /* 0x30-0x37 */
00070 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00071 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00072 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00073 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00074 0x00, 0x00, 0x00, 0x00, 0xde, 0xfe, 0xaa, 0xba, /* 0x58-0x5f */
00075 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00076 0x00, 0x00, 0x00, 0x00, 0xdd, 0xfd, 0x00, 0x00, /* 0x68-0x6f */
00077 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00078 0x00, 0x00, 0x00, 0xaf, 0xbf, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00079 };
00080 static const unsigned char iso8859_3_page02[8] = {
00081 0xa2, 0xff, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00082 };
00083
00084 static int
00085 iso8859_3_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00086 {
00087     (void)conv; (void)n;
00088     unsigned char c = 0;
00089     if (wc < 0x00a0) {
00090         *r = wc;
00091         return 1;
00092     }
00093     else if (wc >= 0x00a0 && wc < 0x0100)
00094         c = iso8859_3_page00[wc-0x00a0];
00095     else if (wc >= 0x0108 && wc < 0x0180)
00096         c = iso8859_3_page01[wc-0x0108];
00097     else if (wc >= 0x02d8 && wc < 0x02e0)
00098         c = iso8859_3_page02[wc-0x02d8];
00099     if (c != 0) {
00100         *r = c;
00101         return 1;
00102     }
00103     return RET_ILSEQ;
00104 }
00105 #endif /* NEED_TOMB */

```

13.279 iso8859_4.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_4.h,v 1.3 2000/11/29 17:40:31 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-4
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_4_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x0104, 0x0138, 0x0156, 0x00a4, 0x0128, 0x013b, 0x00a7,
00011     0x00a8, 0x0160, 0x0112, 0x0122, 0x0166, 0x00ad, 0x017d, 0x00af,
00012     /* 0xb0 */
00013     0x00b0, 0x0105, 0x02db, 0x0157, 0x00b4, 0x0129, 0x013c, 0x02c7,
00014     0x00b8, 0x0161, 0x0113, 0x0123, 0x0167, 0x014a, 0x017e, 0x014b,
00015     /* 0xc0 */
00016     0x0100, 0x00c1, 0x00c2, 0x00c3, 0x00c4, 0x00c5, 0x00c6, 0x012e,
00017     0x010c, 0x00c9, 0x0118, 0x00cb, 0x0116, 0x00cd, 0x00ce, 0x012a,
00018     /* 0xd0 */
00019     0x0110, 0x0145, 0x014c, 0x0136, 0x00d4, 0x00d5, 0x00d6, 0x00d7,
00020     0x00d8, 0x0172, 0x00da, 0x00db, 0x00dc, 0x0168, 0x016a, 0x00df,
00021     /* 0xe0 */
00022     0x0101, 0x00e1, 0x00e2, 0x00e3, 0x00e4, 0x00e5, 0x00e6, 0x012f,
00023     0x010d, 0x00e9, 0x0119, 0x00eb, 0x0117, 0x00ed, 0x00ee, 0x012b,
00024     /* 0xf0 */
00025     0x0111, 0x0146, 0x014d, 0x0137, 0x00f4, 0x00f5, 0x00f6, 0x00f7,
00026     0x00f8, 0x0173, 0x00fa, 0x00fb, 0x00fc, 0x0169, 0x016b, 0x02d9,
00027 };
00028
00029 static int
00030 iso8859_4_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0)
00034         *pwc = (ucs4_t) c;
00035     else
00036         *pwc = (ucs4_t) iso8859_4_2uni[c-0xa0];
00037     return 1;
00038 }
00039 #endif /* NEED_TOWC */
00040
00041 #ifndef NEED_TOMB
00042 static const unsigned char iso8859_4_page00[224] = {
00043     0xa0, 0x00, 0x00, 0x00, 0xa4, 0x00, 0x00, 0xa7, /* 0xa0-0xa7 */
00044     0xa8, 0x00, 0x00, 0x00, 0xad, 0x00, 0xaf, /* 0xa8-0xaf */

```

```

00045 0xb0, 0x00, 0x00, 0x00, 0xb4, 0x00, 0x00, 0x00, /* 0xb0-0xb7 */
00046 0xb8, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00047 0x00, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0x00, /* 0xc0-0xc7 */
00048 0x00, 0xc9, 0x00, 0xcb, 0x00, 0xcd, 0xce, 0x00, /* 0xc8-0xcf */
00049 0x00, 0x00, 0x00, 0x00, 0xd4, 0xd5, 0xd6, 0xd7, /* 0xd0-0xd7 */
00050 0xd8, 0x00, 0xda, 0xdb, 0xdc, 0x00, 0x00, 0xdf, /* 0xd8-0xdf */
00051 0x00, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0x00, /* 0xe0-0xe7 */
00052 0x00, 0xe9, 0x00, 0xeb, 0x00, 0xed, 0xee, 0x00, /* 0xe8-0xef */
00053 0x00, 0x00, 0x00, 0x00, 0xf4, 0xf5, 0xf6, 0xf7, /* 0xf0-0xf7 */
00054 0xf8, 0x00, 0xfa, 0xfb, 0xfc, 0x00, 0x00, 0x00, /* 0xf8-0xff */
00055 /* 0x0100 */
00056 0xc0, 0xe0, 0x00, 0x00, 0xa1, 0xb1, 0x00, 0x00, /* 0x00-0x07 */
00057 0x00, 0x00, 0x00, 0x00, 0xc8, 0xe8, 0x00, 0x00, /* 0x08-0x0f */
00058 0xd0, 0xf0, 0xaa, 0xba, 0x00, 0x00, 0xcc, 0xec, /* 0x10-0x17 */
00059 0xca, 0xea, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00060 0x00, 0x00, 0xab, 0xbb, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00061 0xa5, 0xb5, 0xcf, 0xef, 0x00, 0x00, 0xc7, 0xe7, /* 0x28-0x2f */
00062 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xd3, 0xf3, /* 0x30-0x37 */
00063 0xa2, 0x00, 0x00, 0xa6, 0xb6, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00064 0x00, 0x00, 0x00, 0x00, 0x00, 0xd1, 0xf1, 0x00, /* 0x40-0x47 */
00065 0x00, 0x00, 0xbd, 0xbf, 0xd2, 0xf2, 0x00, 0x00, /* 0x48-0x4f */
00066 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xa3, 0xb3, /* 0x50-0x57 */
00067 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00068 0xa9, 0xb9, 0x00, 0x00, 0x00, 0x00, 0xac, 0xbc, /* 0x60-0x67 */
00069 0xdd, 0xfd, 0xde, 0xfe, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00070 0x00, 0x00, 0xd9, 0xf9, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00071 0x00, 0x00, 0x00, 0x00, 0xae, 0xbe, 0x00, /* 0x78-0x7f */
00072 };
00073 static const unsigned char iso8859_4_page02[32] = {
00074 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xb7, /* 0xc0-0xc7 */
00075 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00076 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00077 0x00, 0xff, 0x00, 0xb2, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00078 };
00079
00080 static int
00081 iso8859_4_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00082 {
00083     (void)conv; (void)n;
00084     unsigned char c = 0;
00085     if (wc < 0x00a0) {
00086         *r = wc;
00087         return 1;
00088     }
00089     else if (wc >= 0x00a0 && wc < 0x0180)
00090         c = iso8859_4_page00[wc-0x00a0];
00091     else if (wc >= 0x02c0 && wc < 0x02e0)
00092         c = iso8859_4_page02[wc-0x02c0];
00093     if (c != 0) {
00094         *r = c;
00095         return 1;
00096     }
00097     return RET_ILSEQ;
00098 }
00099 #endif /* NEED_TOMB */

```

13.280 iso8859_5.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_5.h,v 1.3 2000/11/29 17:40:32 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-5
00005  */
00006
00007 #ifdef NEED_TOWC
00008 static const unsigned short iso8859_5_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x0401, 0x0402, 0x0403, 0x0404, 0x0405, 0x0406, 0x0407,
00011     0x0408, 0x0409, 0x040a, 0x040b, 0x040c, 0x00ad, 0x040e, 0x040f,
00012     /* 0xb0 */
00013     0x0410, 0x0411, 0x0412, 0x0413, 0x0414, 0x0415, 0x0416, 0x0417,
00014     0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e, 0x041f,
00015     /* 0xc0 */
00016     0x0420, 0x0421, 0x0422, 0x0423, 0x0424, 0x0425, 0x0426, 0x0427,
00017     0x0428, 0x0429, 0x042a, 0x042b, 0x042c, 0x042d, 0x042e, 0x042f,
00018     /* 0xd0 */
00019     0x0430, 0x0431, 0x0432, 0x0433, 0x0434, 0x0435, 0x0436, 0x0437,
00020     0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e, 0x043f,
00021     /* 0xe0 */
00022     0x0440, 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446, 0x0447,
00023     0x0448, 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e, 0x044f,
00024     /* 0xf0 */
00025     0x2116, 0x0451, 0x0452, 0x0453, 0x0454, 0x0455, 0x0456, 0x0457,
00026     0x0458, 0x0459, 0x045a, 0x045b, 0x045c, 0x00a7, 0x045e, 0x045f,
00027 };

```

```

00028
00029 static int
00030 iso8859_5_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0)
00034         *pwc = (ucs4_t) c;
00035     else
00036         *pwc = (ucs4_t) iso8859_5_2uni[c-0xa0];
00037     return 1;
00038 }
00039 #endif /* NEED_TOWC */
00040
00041 #ifndef NEED_TOMB
00042 static const unsigned char iso8859_5_page00[16] = {
00043     0xa0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xfd, /* 0xa0-0xa7 */
00044     0x00, 0x00, 0x00, 0x00, 0x00, 0xad, 0x00, 0x00, /* 0xa8-0xaf */
00045 };
00046 static const unsigned char iso8859_5_page04[96] = {
00047     0x00, 0xa1, 0xa2, 0xa3, 0xa4, 0xa5, 0xa6, 0xa7, /* 0x00-0x07 */
00048     0xa8, 0xa9, 0xaa, 0xab, 0xac, 0xad, 0xae, 0xaf, /* 0x08-0x0f */
00049     0xb0, 0xb1, 0xb2, 0xb3, 0xb4, 0xb5, 0xb6, 0xb7, /* 0x10-0x17 */
00050     0xb8, 0xb9, 0xba, 0xbb, 0xbc, 0xbd, 0xbe, 0xbf, /* 0x18-0x1f */
00051     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x20-0x27 */
00052     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x28-0x2f */
00053     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0x30-0x37 */
00054     0xd8, 0xd9, 0xda, 0xdb, 0xdc, 0xdd, 0xde, 0xdf, /* 0x38-0x3f */
00055     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0x40-0x47 */
00056     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0x48-0x4f */
00057     0x00, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0x50-0x57 */
00058     0xf8, 0xf9, 0xfa, 0xfb, 0xfc, 0x00, 0xfe, 0xff, /* 0x58-0x5f */
00059 };
00060
00061 static int
00062 iso8859_5_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00063 {
00064     (void)conv; (void)n;
00065     unsigned char c = 0;
00066     if (wc < 0x00a0) {
00067         *r = wc;
00068         return 1;
00069     }
00070     else if (wc >= 0x00a0 && wc < 0x00b0)
00071         c = iso8859_5_page00[wc-0x00a0];
00072     else if (wc >= 0x0400 && wc < 0x0460)
00073         c = iso8859_5_page04[wc-0x0400];
00074     else if (wc == 0x2116)
00075         c = 0xf0;
00076     if (c != 0) {
00077         *r = c;
00078         return 1;
00079     }
00080     return RET_ILSEQ;
00081 }
00082 #endif /* NEED_TOMB */

```

13.281 iso8859_6.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_6.h,v 1.3 2000/11/29 17:40:32 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-6
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_6_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0xffffd, 0xffffd, 0xffffd, 0x00a4, 0xffffd, 0xffffd, 0xffffd,
00011     0xffffd, 0xffffd, 0xffffd, 0xffffd, 0x060c, 0x00ad, 0xffffd, 0xffffd,
00012     /* 0xb0 */
00013     0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
00014     0xffffd, 0xffffd, 0xffffd, 0x061b, 0xffffd, 0xffffd, 0xffffd, 0x061f,
00015     /* 0xc0 */
00016     0xffffd, 0x0621, 0x0622, 0x0623, 0x0624, 0x0625, 0x0626, 0x0627,
00017     0x0628, 0x0629, 0x062a, 0x062b, 0x062c, 0x062d, 0x062e, 0x062f,
00018     /* 0xd0 */
00019     0x0630, 0x0631, 0x0632, 0x0633, 0x0634, 0x0635, 0x0636, 0x0637,
00020     0x0638, 0x0639, 0x063a, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
00021     /* 0xe0 */
00022     0x0640, 0x0641, 0x0642, 0x0643, 0x0644, 0x0645, 0x0646, 0x0647,
00023     0x0648, 0x0649, 0x064a, 0x064b, 0x064c, 0x064d, 0x064e, 0x064f,
00024     /* 0xf0 */
00025     0x0650, 0x0651, 0x0652, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
00026     0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd, 0xffffd,
00027 };

```

```

00028
00029 static int
00030 iso8859_6_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0) {
00034         *pwc = (ucs4_t) c;
00035         return 1;
00036     }
00037     else {
00038         unsigned short wc = iso8859_6_2uni[c-0xa0];
00039         if (wc != 0xffffd) {
00040             *pwc = (ucs4_t) wc;
00041             return 1;
00042         }
00043     }
00044     return RET_ILSEQ;
00045 }
00046 #endif /* NEED_TOWC */
00047
00048 #ifndef NEED_TOMB
00049 static const unsigned char iso8859_6_page00[16] = {
00050     0xa0, 0x00, 0x00, 0x00, 0xa4, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00051     0x00, 0x00, 0x00, 0x00, 0x00, 0xad, 0x00, 0x00, /* 0xa8-0xaf */
00052 };
00053 static const unsigned char iso8859_6_page06[80] = {
00054     0x00, 0x00, 0x00, 0x00, 0xac, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00055     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00056     0x00, 0x00, 0x00, 0xbb, 0x00, 0x00, 0x00, 0xbf, /* 0x18-0x1f */
00057     0x00, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x20-0x27 */
00058     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x28-0x2f */
00059     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0x30-0x37 */
00060     0xd8, 0xd9, 0xda, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00061     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0x40-0x47 */
00062     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0x48-0x4f */
00063     0xf0, 0xf1, 0xf2, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00064 };
00065
00066 static int
00067 iso8859_6_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00068 {
00069     (void)conv; (void)n;
00070     unsigned char c = 0;
00071     if (wc < 0x00a0) {
00072         *r = wc;
00073         return 1;
00074     }
00075     else if (wc >= 0x00a0 && wc < 0x00b0)
00076         c = iso8859_6_page00[wc-0x00a0];
00077     else if (wc >= 0x0608 && wc < 0x0658)
00078         c = iso8859_6_page06[wc-0x0608];
00079     if (c != 0) {
00080         *r = c;
00081         return 1;
00082     }
00083     return RET_ILSEQ;
00084 }
00085 #endif /* NEED_TOMB */

```

13.282 iso8859_7.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_7.h,v 1.3 2000/11/29 17:40:32 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-7
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_7_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0x2018, 0x2019, 0x00a3, 0xffffd, 0xffffd, 0x00a6, 0x00a7,
00011     0x00a8, 0x00a9, 0xffffd, 0x00ab, 0x00ac, 0x00ad, 0xffffd, 0x2015,
00012     /* 0xb0 */
00013     0x00b0, 0x00b1, 0x00b2, 0x00b3, 0x0384, 0x0385, 0x0386, 0x00b7,
00014     0x0388, 0x0389, 0x038a, 0x00bb, 0x038c, 0x00bd, 0x038e, 0x038f,
00015     /* 0xc0 */
00016     0x0390, 0x0391, 0x0392, 0x0393, 0x0394, 0x0395, 0x0396, 0x0397,
00017     0x0398, 0x0399, 0x039a, 0x039b, 0x039c, 0x039d, 0x039e, 0x039f,
00018     /* 0xd0 */
00019     0x03a0, 0x03a1, 0xffffd, 0x03a3, 0x03a4, 0x03a5, 0x03a6, 0x03a7,
00020     0x03a8, 0x03a9, 0x03aa, 0x03ab, 0x03ac, 0x03ad, 0x03ae, 0x03af,
00021     /* 0xe0 */
00022     0x03b0, 0x03b1, 0x03b2, 0x03b3, 0x03b4, 0x03b5, 0x03b6, 0x03b7,
00023     0x03b8, 0x03b9, 0x03ba, 0x03bb, 0x03bc, 0x03bd, 0x03be, 0x03bf,
00024     /* 0xf0 */

```

```

00025 0x03c0, 0x03c1, 0x03c2, 0x03c3, 0x03c4, 0x03c5, 0x03c6, 0x03c7,
00026 0x03c8, 0x03c9, 0x03ca, 0x03cb, 0x03cc, 0x03cd, 0x03ce, 0xffff,
00027 };
00028
00029 static int
00030 iso8859_7_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c < 0xa0) {
00034         *pwc = (ucs4_t) c;
00035         return 1;
00036     }
00037     else {
00038         unsigned short wc = iso8859_7_2uni[c-0xa0];
00039         if (wc != 0xffffd) {
00040             *pwc = (ucs4_t) wc;
00041             return 1;
00042         }
00043     }
00044     return RET_ILSEQ;
00045 }
00046 #endif /* NEED_TOWC */
00047
00048 #ifndef NEED_TOMB
00049 static const unsigned char iso8859_7_page00[32] = {
00050     0xa0, 0x00, 0x00, 0xa3, 0x00, 0x00, 0xa6, 0xa7, /* 0xa0-0xa7 */
00051     0xa8, 0xa9, 0x00, 0xab, 0xac, 0xad, 0x00, 0x00, /* 0xa8-0xaf */
00052     0xb0, 0xb1, 0xb2, 0xb3, 0x00, 0x00, 0x00, 0xb7, /* 0xb0-0xb7 */
00053     0x00, 0x00, 0x00, 0xbb, 0x00, 0xbd, 0x00, 0x00, /* 0xb8-0xbf */
00054 };
00055 static const unsigned char iso8859_7_page03[80] = {
00056     0x00, 0x00, 0x00, 0x00, 0xb4, 0xb5, 0xb6, 0x00, /* 0x80-0x87 */
00057     0xb8, 0xb9, 0xba, 0x00, 0xbc, 0x00, 0xbe, 0xbf, /* 0x88-0x8f */
00058     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x90-0x97 */
00059     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x98-0x9f */
00060     0xd0, 0xd1, 0x00, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0xa0-0xa7 */
00061     0xd8, 0xd9, 0xda, 0xdb, 0xdc, 0xdd, 0xde, 0xdf, /* 0xa8-0xaf */
00062     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0xb0-0xb7 */
00063     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xb8-0xbf */
00064     0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0xc0-0xc7 */
00065     0xf8, 0xf9, 0xfa, 0xfb, 0xfc, 0xfd, 0xfe, 0x00, /* 0xc8-0xcf */
00066 };
00067 static const unsigned char iso8859_7_page20[16] = {
00068     0x00, 0x00, 0x00, 0x00, 0x00, 0xaf, 0x00, 0x00, /* 0x10-0x17 */
00069     0xa1, 0xa2, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00070 };
00071
00072 static int
00073 iso8859_7_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00074 {
00075     (void)conv; (void)n;
00076     unsigned char c = 0;
00077     if (wc < 0x00a0) {
00078         *r = wc;
00079         return 1;
00080     }
00081     else if (wc >= 0x00a0 && wc < 0x00c0)
00082         c = iso8859_7_page00[wc-0x00a0];
00083     else if (wc >= 0x0380 && wc < 0x03d0)
00084         c = iso8859_7_page03[wc-0x0380];
00085     else if (wc >= 0x2010 && wc < 0x2020)
00086         c = iso8859_7_page20[wc-0x2010];
00087     if (c != 0) {
00088         *r = c;
00089         return 1;
00090     }
00091     return RET_ILSEQ;
00092 }
00093 #endif /* NEED_TOMB */

```

13.283 iso8859_8.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_8.h,v 1.3 2000/11/29 17:40:32 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-8
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_8_2uni[96] = {
00009     /* 0xa0 */
00010     0x00a0, 0xffffd, 0x00a2, 0x00a3, 0x00a4, 0x00a5, 0x00a6, 0x00a7,
00011     0x00a8, 0x00a9, 0x00ad, 0x00ab, 0x00ac, 0x00ad, 0x00ae, 0x00af,
00012     /* 0xb0 */
00013     0x00b0, 0x00b1, 0x00b2, 0x00b3, 0x00b4, 0x00b5, 0x00b6, 0x00b7,

```

```

00014 0x00b8, 0x00b9, 0x00f7, 0x00bb, 0x00bc, 0x00bd, 0x00be, 0xffff,
00015 /* 0xc0 */
00016 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00017 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00018 /* 0xd0 */
00019 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00020 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0x2017,
00021 /* 0xe0 */
00022 0x05d0, 0x05d1, 0x05d2, 0x05d3, 0x05d4, 0x05d5, 0x05d6, 0x05d7,
00023 0x05d8, 0x05d9, 0x05da, 0x05db, 0x05dc, 0x05dd, 0x05de, 0x05df,
00024 /* 0xf0 */
00025 0x05e0, 0x05e1, 0x05e2, 0x05e3, 0x05e4, 0x05e5, 0x05e6, 0x05e7,
00026 0x05e8, 0x05e9, 0x05ea, 0xffff, 0xffff, 0x200e, 0x200f, 0xffff,
00027 };
00028
00029 static int
00030 iso8859_8_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00031 {
00032     unsigned char c = *s;
00033     if (c >= 0xa0) {
00034         unsigned short wc = iso8859_8_2uni[c-0xa0];
00035         if (wc != 0xffff) {
00036             *pwc = (ucs4_t) wc;
00037             return 1;
00038         }
00039     }
00040     else {
00041         *pwc = (ucs4_t) c;
00042         return 1;
00043     }
00044     return RET_ILSEQ;
00045 }
00046 #endif /* NEED_TOWC */
00047
00048 #ifdef NEED_TOMB
00049 static const unsigned char iso8859_8_page00[88] = {
00050     0xa0, 0x00, 0xa2, 0xa3, 0xa4, 0xa5, 0xa6, 0xa7, /* 0xa0-0xa7 */
00051     0xa8, 0xa9, 0x00, 0xab, 0xac, 0xad, 0xae, 0xaf, /* 0xa8-0xaf */
00052     0xb0, 0xb1, 0xb2, 0xb3, 0xb4, 0xb5, 0xb6, 0xb7, /* 0xb0-0xb7 */
00053     0xb8, 0xb9, 0x00, 0xbb, 0xbc, 0xbd, 0xbe, 0x00, /* 0xb8-0xbf */
00054     0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, /* 0xc0-0xc7 */
00055     0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, /* 0xc8-0xcf */
00056     0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, /* 0xd0-0xd7 */
00057     0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, /* 0xd8-0xdf */
00058     0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, /* 0xe0-0xe7 */
00059     0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, /* 0xe8-0xef */
00060     0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xc0, 0xba, /* 0xf0-0xf7 */
00061 };
00062 static const unsigned char iso8859_8_page05[32] = {
00063     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0xd0-0xd7 */
00064     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xd8-0xdf */
00065     0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0xe0-0xe7 */
00066     0xf8, 0xf9, 0xfa, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe8-0xef */
00067 };
00068 static const unsigned char iso8859_8_page20[16] = {
00069     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xfd, 0xfe, /* 0x08-0x0f */
00070     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xdf, /* 0x10-0x17 */
00071 };
00072
00073 static int
00074 iso8859_8_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00075 {
00076     (void)conv; (void)n;
00077     unsigned char c = 0;
00078     if (wc < 0x00a0) {
00079         *r = wc;
00080         return 1;
00081     }
00082     else if (wc >= 0x00a0 && wc < 0x00f8)
00083         c = iso8859_8_page00[wc-0x00a0];
00084     else if (wc >= 0x05d0 && wc < 0x05f0)
00085         c = iso8859_8_page05[wc-0x05d0];
00086     else if (wc >= 0x2008 && wc < 0x2018)
00087         c = iso8859_8_page20[wc-0x2008];
00088     if (c != 0) {
00089         *r = c;
00090         return 1;
00091     }
00092     return RET_ILSEQ;
00093 }
00094 #endif /* NEED_TOMB */

```

13.284 iso8859_9.h

```
00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_9.h,v 1.3 2000/11/29 17:40:32 dawes Exp $ */
```

```

00002
00003 /*
00004  * ISO-8859-9
00005  */
00006
00007 #ifndef NEED_TOWC
00008 static const unsigned short iso8859_9_2uni[48] = {
00009     /* 0xd0 */
00010     0x011e, 0x00d1, 0x00d2, 0x00d3, 0x00d4, 0x00d5, 0x00d6, 0x00d7,
00011     0x00d8, 0x00d9, 0x00da, 0x00db, 0x00dc, 0x0130, 0x015e, 0x00df,
00012     /* 0xe0 */
00013     0x00e0, 0x00e1, 0x00e2, 0x00e3, 0x00e4, 0x00e5, 0x00e6, 0x00e7,
00014     0x00e8, 0x00e9, 0x00ea, 0x00eb, 0x00ec, 0x00ed, 0x00ee, 0x00ef,
00015     /* 0xf0 */
00016     0x011f, 0x00f1, 0x00f2, 0x00f3, 0x00f4, 0x00f5, 0x00f6, 0x00f7,
00017     0x00f8, 0x00f9, 0x00fa, 0x00fb, 0x00fc, 0x0131, 0x015f, 0x00ff,
00018 };
00019
00020 static int
00021 iso8859_9_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00022 {
00023     unsigned char c = *s;
00024     if (c >= 0xd0)
00025         *pwc = (ucs4_t) iso8859_9_2uni[c-0xd0];
00026     else
00027         *pwc = (ucs4_t) c;
00028     return 1;
00029 }
00030 #endif /* NEED_TOWC */
00031
00032 #ifndef NEED_TOMB
00033 static const unsigned char iso8859_9_page00[48] = {
00034     0x00, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0xd0-0xd7 */
00035     0xd8, 0xd9, 0xda, 0xdb, 0xdc, 0x00, 0x00, 0xdf, /* 0xd8-0xdf */
00036     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0xe0-0xe7 */
00037     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xe8-0xef */
00038     0x00, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0xf0-0xf7 */
00039     0xf8, 0xf9, 0xfa, 0xfb, 0xfc, 0x00, 0x00, 0xff, /* 0xf8-0xff */
00040 };
00041 static const unsigned char iso8859_9_page01[72] = {
00042     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xd0, 0xf0, /* 0x18-0x1f */
00043     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00044     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00045     0xd0, 0xd1, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00046     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00047     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00048     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00049     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00050     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00051 };
00052
00053 static int
00054 iso8859_9_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00055 {
00056     (void)conv; (void)n;
00057     unsigned char c = 0;
00058     if (wc < 0x00d0) {
00059         *r = wc;
00060         return 1;
00061     }
00062     else if (wc >= 0x00d0 && wc < 0x0100)
00063         c = iso8859_9_page00[wc-0x00d0];
00064     else if (wc >= 0x0118 && wc < 0x0160)
00065         c = iso8859_9_page01[wc-0x0118];
00066     if (c != 0) {
00067         *r = c;
00068         return 1;
00069     }
00070     return RET_ILSEQ;
00071 }
00072 #endif /* NEED_TOMB */

```

13.285 iso8859_9e.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/iso8859_9e.h,v 1.3 2000/11/28 16:10:28 dawes Exp $ */
00002
00003 /*
00004  * ISO-8859-9E
00005  */
00006
00007 static const unsigned short iso8859_9e_2uni[96] = {
00008     /* 0xa0 */
00009     0x00a0, 0x017d, 0x00a2, 0x00a3, 0x20ac, 0x00a5, 0x012c, 0x00a7,
00010     0x016c, 0x00a9, 0x01e6, 0x00ab, 0x014a, 0x00ad, 0x00ae, 0x01d1,
00011     /* 0xb0 */

```

```

00012 0x00b0, 0x017e, 0x00b2, 0x00b3, 0x00b4, 0x00b5, 0x012d, 0x00b7,
00013 0x016d, 0x00b9, 0x01e7, 0x00bb, 0x014b, 0x00bd, 0x0178, 0x01d2,
00014 /* 0xc0 */
00015 0x00c0, 0x00c1, 0x00c2, 0x00c3, 0x00c4, 0x00c5, 0x018f, 0x00c7,
00016 0x00c8, 0x00c9, 0x00ca, 0x00cb, 0x00cc, 0x00cd, 0x00ce, 0x00cf,
00017 /* 0xd0 */
00018 0x011e, 0x00d1, 0x00d2, 0x00d3, 0x00d4, 0x00d5, 0x00d6, 0x00dd,
00019 0x019f, 0x00d9, 0x00da, 0x00db, 0x00dc, 0x0130, 0x015e, 0x00df,
00020 /* 0xe0 */
00021 0x00e0, 0x00e1, 0x00e2, 0x00e3, 0x00e4, 0x00e5, 0x0259, 0x00e7,
00022 0x00e8, 0x00e9, 0x00ea, 0x00eb, 0x00ec, 0x00ed, 0x00ee, 0x00ef,
00023 /* 0xf0 */
00024 0x011f, 0x00f1, 0x00f2, 0x00f3, 0x00f4, 0x00f5, 0x00f6, 0x00fd,
00025 0x0275, 0x00f9, 0x00fa, 0x00fb, 0x00fc, 0x0131, 0x015f, 0x00ff,
00026 };
00027
00028 static int
00029 iso8859_9e_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00030 {
00031     unsigned char c = *s;
00032     if (c >= 0xa0)
00033         *pwc = (ucs4_t) iso8859_9e_2uni[c-0xa0];
00034     else
00035         *pwc = (ucs4_t) c;
00036     return 1;
00037 }
00038
00039 static const unsigned char iso8859_9e_page00[96] = {
00040     0xa0, 0x00, 0xa2, 0xa3, 0x00, 0xa5, 0x00, 0xa7, /* 0xa0-0xa7 */
00041     0x00, 0xa9, 0x00, 0xab, 0x00, 0xad, 0xae, 0x00, /* 0xa8-0xaf */
00042     0xb0, 0x00, 0xb2, 0xb3, 0xb4, 0xb5, 0x00, 0xb7, /* 0xb0-0xb7 */
00043     0x00, 0xb9, 0x00, 0xbb, 0x00, 0xbd, 0x00, 0x00, /* 0xb8-0xbf */
00044     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0x00, 0xc7, /* 0xc0-0xc7 */
00045     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0xc8-0xcf */
00046     0x00, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0x00, /* 0xd0-0xd7 */
00047     0x00, 0xd9, 0xda, 0xdb, 0xdc, 0xdd, 0x00, 0xdf, /* 0xd8-0xdf */
00048     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0x00, 0xe7, /* 0xe0-0xe7 */
00049     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0xe8-0xef */
00050     0x00, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0x00, /* 0xf0-0xf7 */
00051     0x00, 0xf9, 0xfa, 0xfb, 0xfc, 0xf7, 0x00, 0xff, /* 0xf8-0xff */
00052 };
00053 static const unsigned char iso8859_9e_page01[136] = {
00054     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xd0, 0xf0, /* 0x18-0x1f */
00055     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00056     0x00, 0x00, 0x00, 0x00, 0xa6, 0xb6, 0x00, 0x00, /* 0x28-0x2f */
00057     0xdd, 0xfd, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00058     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00059     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00060     0x00, 0x00, 0xac, 0xbc, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00061     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00062     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xde, 0xfe, /* 0x58-0x5f */
00063     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00064     0x00, 0x00, 0x00, 0x00, 0xa8, 0xb8, 0x00, 0x00, /* 0x68-0x6f */
00065     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00066     0xbe, 0x00, 0x00, 0x00, 0x00, 0xa1, 0xb1, 0x00, /* 0x78-0x7f */
00067     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00068     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xc6, /* 0x88-0x8f */
00069     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00070     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xd8, /* 0x98-0x9f */
00071 };
00072 static const unsigned char iso8859_9e_page01_d[24] = {
00073     0x00, 0xaf, 0xbf, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00074     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00075     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xaa, 0xba, /* 0xe0-0xe7 */
00076 };
00077
00078 static int
00079 iso8859_9e_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00080 {
00081     unsigned char c = 0;
00082     if (wc < 0x00a0) {
00083         *r = wc;
00084         return 1;
00085     }
00086     else if (wc >= 0x00a0 && wc < 0x0100)
00087         c = iso8859_9e_page00[wc-0x00a0];
00088     else if (wc >= 0x0118 && wc < 0x01a0)
00089         c = iso8859_9e_page01[wc-0x0118];
00090     else if (wc >= 0x01d0 && wc < 0x01e8)
00091         c = iso8859_9e_page01_d[wc-0x01d0];
00092     else if (wc == 0x0259)
00093         c = 0xe6;
00094     else if (wc == 0x0275)
00095         c = 0xf8;
00096     else if (wc == 0x20ac)
00097         c = 0xa4;
00098     if (c != 0) {

```



```

00099     *r = c;
00100     return 1;
00101 }
00102 return RET_ILSEQ;
00103 }

```

13.286 jisx0201.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/jisx0201.h,v 1.3 2000/11/29 17:40:33 dawes Exp $ */
00002
00003 /*
00004  * JISX0201.1976-0
00005  */
00006 #ifdef NEED_TOWC
00007
00008 static int
00009 jisx0201_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00010 {
00011     unsigned char c = *s;
00012     if (c < 0x80) {
00013         if (c == 0x5c)
00014             *pwc = (ucs4_t) 0x00a5;
00015         else if (c == 0x7e)
00016             *pwc = (ucs4_t) 0x203e;
00017         else
00018             *pwc = (ucs4_t) c;
00019         return 1;
00020     } else {
00021         if (c >= 0xa1 && c < 0xe0) {
00022             *pwc = (ucs4_t) c + 0xfec0;
00023             return 1;
00024         }
00025     }
00026     return RET_ILSEQ;
00027 }
00028 #endif /* NEED_TOWC */
00029
00030 #ifdef NEED_TOMB
00031
00032 static int
00033 jisx0201_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00034 {
00035     (void)conv; (void)n;
00036     if (wc < 0x0080 && !(wc == 0x005c || wc == 0x007e)) {
00037         *r = wc;
00038         return 1;
00039     }
00040     if (wc == 0x00a5) {
00041         *r = 0x5c;
00042         return 1;
00043     }
00044     if (wc == 0x203e) {
00045         *r = 0x7e;
00046         return 1;
00047     }
00048     if (wc >= 0xff61 && wc < 0xffa0) {
00049         *r = wc - 0xfec0;
00050         return 1;
00051     }
00052     return RET_ILSEQ;
00053 }
00054 #endif /* NEED_TOMB */

```

13.287 jisx0208.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/jisx0208.h,v 1.6 2003/05/27 22:26:31 tsi Exp $ */
00002
00003 /*
00004  * JISX0208.1990-0
00005  */
00006 #ifdef NEED_TOWC
00007
00008 static const unsigned short jisx0208_2uni_page21[690] = {
00009     /* 0x21 */
00010     0x3000, 0x3001, 0x3002, 0xff0c, 0xff0e, 0x30fb, 0xff1a, 0xff1b,
00011     0xff1f, 0xff01, 0x309b, 0x309c, 0x00b4, 0xff40, 0x00a8, 0xff3e,
00012     0xffe3, 0xff3f, 0x30fd, 0x30fe, 0x309d, 0x309e, 0x3003, 0x4edd,
00013     0x3005, 0x3006, 0x3007, 0x30fc, 0x2015, 0x2010, 0xff0f, 0xff3c,
00014     0x301c, 0x2016, 0xff5c, 0x2026, 0x2025, 0x2018, 0x2019, 0x201c,
00015     0x201d, 0xff08, 0xff09, 0x3014, 0x3015, 0xff3b, 0xff3d, 0xff5b,
00016     0xff5d, 0x3008, 0x3009, 0x300a, 0x300b, 0x300c, 0x300d, 0x300e,
00017     0x300f, 0x3010, 0x3011, 0xff0b, 0x2212, 0x00b1, 0x00d7, 0x00f7,

```

```
00018 0xff1d, 0x2260, 0xff1c, 0xff1e, 0x2266, 0x2267, 0x221e, 0x2234,
00019 0x2642, 0x2640, 0x00b0, 0x2032, 0x2033, 0x2103, 0xffe5, 0xff04,
00020 0x00a2, 0x00a3, 0xff05, 0xff03, 0xff06, 0xff0a, 0xff20, 0x00a7,
00021 0x2606, 0x2605, 0x25cb, 0x25cf, 0x25ce, 0x25c7,
00022 /* 0x22 */
00023 0x25c6, 0x25a1, 0x25a0, 0x25b3, 0x25b2, 0x25bd, 0x25bc, 0x203b,
00024 0x3012, 0x2192, 0x2190, 0x2191, 0x2193, 0x3013, 0xffff, 0xffff,
00025 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00026 0xffff, 0x2208, 0x220b, 0x2286, 0x2287, 0x2282, 0x2283, 0x222a,
00027 0x2229, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00028 0xffff, 0x2227, 0x2228, 0x00ac, 0x21d2, 0x21d4, 0x2200, 0x2203,
00029 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00030 0xffff, 0xffff, 0xffff, 0x2220, 0x22a5, 0x2312, 0x2202, 0x2207,
00031 0x2261, 0x2252, 0x226a, 0x226b, 0x221a, 0x223d, 0x221d, 0x2235,
00032 0x222b, 0x222c, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00033 0xffff, 0x212b, 0x2030, 0x266f, 0x266d, 0x266a, 0x2020, 0x2021,
00034 0x00b6, 0xffff, 0xffff, 0xffff, 0xffff, 0x25ef,
00035 /* 0x23 */
00036 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00037 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00038 0xff11, 0xff12, 0xff13, 0xff14, 0xff15, 0xff16, 0xff17, 0xff18,
00039 0xff19, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00040 0xff21, 0xff22, 0xff23, 0xff24, 0xff25, 0xff26, 0xff27, 0xff28,
00041 0xff29, 0xff2a, 0xff2b, 0xff2c, 0xff2d, 0xff2e, 0xff2f, 0xff30,
00042 0xff31, 0xff32, 0xff33, 0xff34, 0xff35, 0xff36, 0xff37, 0xff38,
00043 0xff39, 0xff3a, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00044 0xff41, 0xff42, 0xff43, 0xff44, 0xff45, 0xff46, 0xff47, 0xff48,
00045 0xff49, 0xff4a, 0xff4b, 0xff4c, 0xff4d, 0xff4e, 0xff4f, 0xff50,
00046 0xff51, 0xff52, 0xff53, 0xff54, 0xff55, 0xff56, 0xff57, 0xff58,
00047 0xff59, 0xff5a, 0xffff, 0xffff, 0xffff, 0xffff,
00048 /* 0x24 */
00049 0x3041, 0x3042, 0x3043, 0x3044, 0x3045, 0x3046, 0x3047, 0x3048,
00050 0x3049, 0x304a, 0x304b, 0x304c, 0x304d, 0x304e, 0x304f, 0x3050,
00051 0x3051, 0x3052, 0x3053, 0x3054, 0x3055, 0x3056, 0x3057, 0x3058,
00052 0x3059, 0x305a, 0x305b, 0x305c, 0x305d, 0x305e, 0x305f, 0x3060,
00053 0x3061, 0x3062, 0x3063, 0x3064, 0x3065, 0x3066, 0x3067, 0x3068,
00054 0x3069, 0x306a, 0x306b, 0x306c, 0x306d, 0x306e, 0x306f, 0x3070,
00055 0x3071, 0x3072, 0x3073, 0x3074, 0x3075, 0x3076, 0x3077, 0x3078,
00056 0x3079, 0x307a, 0x307b, 0x307c, 0x307d, 0x307e, 0x307f, 0x3080,
00057 0x3081, 0x3082, 0x3083, 0x3084, 0x3085, 0x3086, 0x3087, 0x3088,
00058 0x3089, 0x308a, 0x308b, 0x308c, 0x308d, 0x308e, 0x308f, 0x3090,
00059 0x3091, 0x3092, 0x3093, 0xffff, 0xffff, 0xffff, 0xffff,
00060 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00061 /* 0x25 */
00062 0x30a1, 0x30a2, 0x30a3, 0x30a4, 0x30a5, 0x30a6, 0x30a7, 0x30a8,
00063 0x30a9, 0x30aa, 0x30ab, 0x30ac, 0x30ad, 0x30ae, 0x30af, 0x30b0,
00064 0x30b1, 0x30b2, 0x30b3, 0x30b4, 0x30b5, 0x30b6, 0x30b7, 0x30b8,
00065 0x30b9, 0x30ba, 0x30bb, 0x30bc, 0x30bd, 0x30be, 0x30bf, 0x30c0,
00066 0x30c1, 0x30c2, 0x30c3, 0x30c4, 0x30c5, 0x30c6, 0x30c7, 0x30c8,
00067 0x30c9, 0x30ca, 0x30cb, 0x30cc, 0x30cd, 0x30ce, 0x30cf, 0x30d0,
00068 0x30d1, 0x30d2, 0x30d3, 0x30d4, 0x30d5, 0x30d6, 0x30d7, 0x30d8,
00069 0x30d9, 0x30da, 0x30db, 0x30dc, 0x30dd, 0x30de, 0x30df, 0x30e0,
00070 0x30e1, 0x30e2, 0x30e3, 0x30e4, 0x30e5, 0x30e6, 0x30e7, 0x30e8,
00071 0x30e9, 0x30ea, 0x30eb, 0x30ec, 0x30ed, 0x30ee, 0x30ef, 0x30f0,
00072 0x30f1, 0x30f2, 0x30f3, 0x30f4, 0x30f5, 0x30f6, 0xffff, 0xffff,
00073 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00074 /* 0x26 */
00075 0x0391, 0x0392, 0x0393, 0x0394, 0x0395, 0x0396, 0x0397, 0x0398,
00076 0x0399, 0x039a, 0x039b, 0x039c, 0x039d, 0x039e, 0x039f, 0x03a0,
00077 0x03a1, 0x03a3, 0x03a4, 0x03a5, 0x03a6, 0x03a7, 0x03a8, 0x03a9,
00078 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00079 0x03b1, 0x03b2, 0x03b3, 0x03b4, 0x03b5, 0x03b6, 0x03b7, 0x03b8,
00080 0x03b9, 0x03ba, 0x03bb, 0x03bc, 0x03bd, 0x03be, 0x03bf, 0x03c0,
00081 0x03c1, 0x03c3, 0x03c4, 0x03c5, 0x03c6, 0x03c7, 0x03c8, 0x03c9,
00082 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00083 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00084 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00085 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00086 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00087 /* 0x27 */
00088 0x0410, 0x0411, 0x0412, 0x0413, 0x0414, 0x0415, 0x0401, 0x0416,
00089 0x0417, 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e,
00090 0x041f, 0x0420, 0x0421, 0x0422, 0x0423, 0x0424, 0x0425, 0x0426,
00091 0x0427, 0x0428, 0x0429, 0x042a, 0x042b, 0x042c, 0x042d, 0x042e,
00092 0x042f, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00093 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00094 0x0430, 0x0431, 0x0432, 0x0433, 0x0434, 0x0435, 0x0451, 0x0436,
00095 0x0437, 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e,
00096 0x043f, 0x0440, 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446,
00097 0x0447, 0x0448, 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e,
00098 0x044f, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00099 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00100 /* 0x28 */
00101 0x2500, 0x2502, 0x250c, 0x2510, 0x2518, 0x2514, 0x251c, 0x252c,
00102 0x2524, 0x2534, 0x253c, 0x2501, 0x2503, 0x250f, 0x2513, 0x251b,
00103 0x2517, 0x2523, 0x2533, 0x252b, 0x253b, 0x254b, 0x2520, 0x252f,
00104 0x2528, 0x2537, 0x253f, 0x251d, 0x2530, 0x2525, 0x2538, 0x2542,
```

```
00105 };
00106 static const unsigned short jisx0208_2uni_page30[6398] = {
00107     /* 0x30 */
00108     0x4e9c, 0x5516, 0x5a03, 0x963f, 0x54c0, 0x611b, 0x6328, 0x59f6,
00109     0x9022, 0x8475, 0x831c, 0x7a50, 0x60aa, 0x63e1, 0x6e25, 0x65ed,
00110     0x8466, 0x82a6, 0x9bf5, 0x6893, 0x5727, 0x65a1, 0x6271, 0x5b9b,
00111     0x59d0, 0x867b, 0x98f4, 0x7d62, 0x7dbe, 0x9b8e, 0x6216, 0x7c9f,
00112     0x88b7, 0x5b89, 0x5eb5, 0x6309, 0x6697, 0x6848, 0x95c7, 0x978d,
00113     0x674f, 0x4ee5, 0x4f0a, 0x4f4d, 0x4f9d, 0x5049, 0x56f2, 0x5937,
00114     0x59d4, 0x5a01, 0x5c09, 0x60df, 0x610f, 0x6170, 0x6613, 0x6905,
00115     0x70ba, 0x754f, 0x7570, 0x79fb, 0x7dad, 0x7def, 0x80c3, 0x840e,
00116     0x8863, 0x8b02, 0x9055, 0x907a, 0x533b, 0x4e95, 0x4ea5, 0x57df,
00117     0x80b2, 0x90c1, 0x78ef, 0x4e00, 0x58f1, 0x6ea2, 0x9038, 0x7a32,
00118     0x8328, 0x828b, 0x9c2f, 0x5141, 0x5370, 0x54bd, 0x54e1, 0x56e0,
00119     0x59fb, 0x5f15, 0x98f2, 0x6deb, 0x80e4, 0x852d,
00120     /* 0x31 */
00121     0x9662, 0x9670, 0x96a0, 0x97fb, 0x540b, 0x53f3, 0x5b87, 0x70cf,
00122     0x7fbd, 0x8fc2, 0x96e8, 0x536f, 0x9d5c, 0x7aba, 0x4e11, 0x7893,
00123     0x81fc, 0x6e26, 0x5618, 0x5504, 0x6b1d, 0x851a, 0x9c3b, 0x59e5,
00124     0x53a9, 0x6d66, 0x74dc, 0x958f, 0x5642, 0x4e91, 0x904b, 0x96f2,
00125     0x834f, 0x990c, 0x53e1, 0x55b6, 0x5b30, 0x5f71, 0x6620, 0x66f3,
00126     0x6804, 0x6c38, 0x6cf3, 0x6d29, 0x745b, 0x76c8, 0x7a4e, 0x9834,
00127     0x82f1, 0x885b, 0x8a60, 0x92ed, 0x6db2, 0x75ab, 0x76ca, 0x99c5,
00128     0x60a6, 0x8b01, 0x8d8a, 0x95b2, 0x698e, 0x53ad, 0x5186, 0x5712,
00129     0x5830, 0x5944, 0x5bb4, 0x5ef6, 0x6028, 0x63a9, 0x63f4, 0x6cbf,
00130     0x6f14, 0x708e, 0x7114, 0x7159, 0x71d5, 0x733f, 0x7e01, 0x8276,
00131     0x82d1, 0x8597, 0x9060, 0x925b, 0x9d1b, 0x5869, 0x65bc, 0x6c5a,
00132     0x7525, 0x51f9, 0x592e, 0x5965, 0x5f80, 0x5fdc,
00133     /* 0x32 */
00134     0x62bc, 0x65fa, 0x6a2a, 0x6b27, 0x6bb4, 0x738b, 0x7fc1, 0x8956,
00135     0x9d2c, 0x9d0e, 0x9ec4, 0x5ca1, 0x6c96, 0x837b, 0x5104, 0x5c4b,
00136     0x61b6, 0x81c6, 0x6876, 0x7261, 0x4e59, 0x4ffa, 0x5378, 0x6069,
00137     0x6e29, 0x7a4f, 0x97f3, 0x4e0b, 0x5316, 0x4eee, 0x4f55, 0x4f3d,
00138     0x4fa1, 0x4f73, 0x52a0, 0x53ef, 0x5609, 0x590f, 0x5ac1, 0x5bb6,
00139     0x5be1, 0x79d1, 0x6687, 0x679c, 0x67b6, 0x6b4c, 0x6cb3, 0x706b,
00140     0x73c2, 0x798d, 0x798e, 0x79be, 0x7a3c, 0x7b87, 0x82b1, 0x82bd, 0x8304,
00141     0x8377, 0x83ef, 0x83d3, 0x8766, 0x8ab2, 0x5629, 0x8ca8, 0x8fe6,
00142     0x904e, 0x971e, 0x868a, 0x4fc4, 0x5ce8, 0x6211, 0x7259, 0x753b,
00143     0x81e5, 0x82b3, 0x86fe, 0x8cc0, 0x96c5, 0x9913, 0x99d5, 0x4ecb,
00144     0x4f1a, 0x89e3, 0x56de, 0x584a, 0x58ca, 0x5efb, 0x5feb, 0x602a,
00145     0x6094, 0x6062, 0x61d0, 0x6212, 0x62d0, 0x6539,
00146     /* 0x33 */
00147     0x9b41, 0x6666, 0x68b0, 0x6d77, 0x7070, 0x754c, 0x7686, 0x7d75,
00148     0x82a5, 0x87f9, 0x958b, 0x968e, 0x8c9d, 0x51f1, 0x52be, 0x5916,
00149     0x54b3, 0x55bb3, 0x5d16, 0x6168, 0x6982, 0x6daf, 0x788d, 0x84bc,
00150     0x8857, 0x8a72, 0x93a7, 0x9ab8, 0x6d6c, 0x99a8, 0x86d9, 0x57a3,
00151     0x67ff, 0x86ce, 0x920e, 0x5283, 0x5687, 0x5404, 0x5ed3, 0x62e1,
00152     0x64b9, 0x683c, 0x6838, 0x6bbb, 0x7372, 0x78ba, 0x7a6b, 0x899a,
00153     0x89d2, 0x8d6b, 0x8f03, 0x90ed, 0x95a3, 0x9694, 0x9769, 0x5b66,
00154     0x5cb3, 0x697d, 0x984d, 0x984e, 0x639b, 0x7b20, 0x6a2b, 0x6a7f,
00155     0x68b6, 0x9c0d, 0x6f5f, 0x5272, 0x559d, 0x6070, 0x62ec, 0x6d3b,
00156     0x6e07, 0x6ed1, 0x845b, 0x8910, 0x8f44, 0x4e14, 0x9c39, 0x53f6,
00157     0x691b, 0x6a3a, 0x9784, 0x682a, 0x515c, 0x7ac3, 0x84b2, 0x91dc,
00158     0x938c, 0x565b, 0x9d28, 0x6822, 0x8305, 0x8431,
00159     /* 0x34 */
00160     0x7ca5, 0x5208, 0x82c5, 0x74e6, 0x4e7e, 0x4f83, 0x51a0, 0x5bd2,
00161     0x520a, 0x52d8, 0x52e7, 0x5dfb, 0x559a, 0x582a, 0x59e6, 0x5b8c,
00162     0x5b98, 0x5bdb, 0x5e72, 0x5e79, 0x60a3, 0x611f, 0x6163, 0x61be,
00163     0x63db, 0x6562, 0x67d1, 0x6853, 0x68fa, 0x6b3e, 0x6b53, 0x6c57,
00164     0x6f22, 0x6f97, 0x6f45, 0x74b0, 0x7518, 0x76e3, 0x770b, 0x7aff,
00165     0x7ba1, 0x7c21, 0x7de9, 0x7f36, 0x7ff0, 0x809d, 0x8266, 0x839e,
00166     0x89b3, 0x8acc, 0x8cab, 0x9084, 0x9451, 0x9593, 0x9591, 0x95a2,
00167     0x9665, 0x97d3, 0x9928, 0x8218, 0x4e38, 0x542b, 0x5cb8, 0x5dcc,
00168     0x73a9, 0x764c, 0x773c, 0x5ca9, 0x7feb, 0x8d0b, 0x96c1, 0x9811,
00169     0x9854, 0x9858, 0x4f01, 0x4f0e, 0x5371, 0x559c, 0x5668, 0x57fa,
00170     0x5947, 0x5b09, 0x5bc4, 0x5c90, 0x5e0c, 0x5e7e, 0x5fcc, 0x63ee,
00171     0x673a, 0x65d7, 0x65e2, 0x671f, 0x68cb, 0x68c4,
00172     /* 0x35 */
00173     0x6a5f, 0x5e30, 0x6bc5, 0x6c17, 0x6c7d, 0x757f, 0x7948, 0x5b63,
00174     0x7a00, 0x7d00, 0x5fbd, 0x898f, 0x8a18, 0x8cb4, 0x8d77, 0x8ecc,
00175     0x8f1d, 0x98e2, 0x9a0e, 0x9b3c, 0x4e80, 0x507d, 0x5100, 0x5993,
00176     0x5b9c, 0x622f, 0x6280, 0x64ec, 0x6b3a, 0x72a0, 0x7591, 0x7947,
00177     0x7fa9, 0x87fb, 0x8abc, 0x8b70, 0x63ac, 0x83ca, 0x97a0, 0x5409,
00178     0x5403, 0x55ab, 0x6854, 0x6a58, 0x8a70, 0x7827, 0x6775, 0x9ecd,
00179     0x5374, 0x5ba2, 0x811a, 0x8650, 0x9006, 0x4e18, 0x4e45, 0x4ec7,
00180     0x4f11, 0x53ca, 0x5438, 0x5bae, 0x5f13, 0x6025, 0x6551, 0x673d,
00181     0x6c42, 0x6c72, 0x6ce3, 0x7078, 0x7403, 0x7a76, 0x7aae, 0x7b08,
00182     0x7d1a, 0x7cfe, 0x7d66, 0x65e7, 0x725b, 0x53bb, 0x5c45, 0x5de8,
00183     0x62d2, 0x62e0, 0x6319, 0x6e20, 0x865a, 0x8a31, 0x8ddd, 0x92f8,
00184     0x6f01, 0x79a6, 0x9b5a, 0x4ea8, 0x4eab, 0x4eac,
00185     /* 0x36 */
00186     0x4f9b, 0x4fa0, 0x50d1, 0x5147, 0x7af6, 0x5171, 0x51f6, 0x5354,
00187     0x5321, 0x537f, 0x53eb, 0x55ac, 0x5883, 0x5ce1, 0x5f37, 0x5f4a,
00188     0x602f, 0x6050, 0x606d, 0x631f, 0x6559, 0x6a4b, 0x6cc1, 0x72c2,
00189     0x72ed, 0x77ef, 0x80f8, 0x8105, 0x8208, 0x854e, 0x90f7, 0x93e1,
00190     0x97ff, 0x9957, 0x9a5a, 0x4ef0, 0x51dd, 0x5c2d, 0x6681, 0x696d,
00191     0x5c40, 0x66f2, 0x6975, 0x7389, 0x6850, 0x7c81, 0x50c5, 0x52e4,
```

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00192 0x5747, 0x5dfe, 0x9326, 0x65a4, 0x6b23, 0x6b3d, 0x7434, 0x7981,
00193 0x79bd, 0x7b4b, 0x7dca, 0x82b9, 0x83cc, 0x887f, 0x895f, 0x8b39,
00194 0x8fd1, 0x91d1, 0x541f, 0x9280, 0x4e5d, 0x5036, 0x53e5, 0x533a,
00195 0x72d7, 0x7396, 0x77e9, 0x82e6, 0x8eaf, 0x99c6, 0x99c8, 0x99d2,
00196 0x5177, 0x611a, 0x865e, 0x55b0, 0x7a7a, 0x5076, 0x5bd3, 0x9047,
00197 0x9685, 0x4e32, 0x6adb, 0x91e7, 0x5c51, 0x5c48,
00198 /* 0x37 */
00199 0x6398, 0x7a9f, 0x6c93, 0x9774, 0x8f61, 0x7aaa, 0x718a, 0x9688,
00200 0x7c82, 0x6817, 0x7e70, 0x6851, 0x936c, 0x52f2, 0x541b, 0x85ab,
00201 0x8a13, 0x7fa4, 0x8ecd, 0x90e1, 0x5366, 0x8888, 0x7941, 0x4fc2,
00202 0x50be, 0x5211, 0x5144, 0x5553, 0x572d, 0x73ea, 0x578b, 0x5951,
00203 0x5f62, 0x5f84, 0x6075, 0x6176, 0x6167, 0x61a9, 0x63b2, 0x643a,
00204 0x656c, 0x666f, 0x6842, 0x6e13, 0x7566, 0x7a3d, 0x7cfb, 0x7d4c,
00205 0x7d99, 0x7e4b, 0x7f6b, 0x830e, 0x834a, 0x86cd, 0x8a08, 0x8a63,
00206 0x8b66, 0x8ef8, 0x981a, 0x9d8f, 0x82b8, 0x8fce, 0x9be8, 0x5287,
00207 0x621f, 0x6483, 0x6fc0, 0x9699, 0x6841, 0x5091, 0x6b20, 0x6c7a,
00208 0x6f54, 0x7a74, 0x7d50, 0x8840, 0x8a23, 0x6708, 0x4ef6, 0x5039,
00209 0x5026, 0x5065, 0x517c, 0x5238, 0x5263, 0x55a7, 0x570f, 0x5805,
00210 0x5acc, 0x5efa, 0x61b2, 0x61f8, 0x62f3, 0x6372,
00211 /* 0x38 */
00212 0x691c, 0x6a29, 0x727d, 0x72ac, 0x732e, 0x7814, 0x786f, 0x7d79,
00213 0x770c, 0x80a9, 0x898b, 0x8b19, 0x8ce2, 0x8ed2, 0x9063, 0x9375,
00214 0x967a, 0x9855, 0x9a13, 0x9e78, 0x5143, 0x539f, 0x53b3, 0x5e7b,
00215 0x5f2b, 0x6e1b, 0x6e90, 0x7384, 0x73fe, 0x7d43, 0x8237, 0x8a00,
00216 0x8afa, 0x9650, 0x4e4e, 0x500b, 0x53e4, 0x547c, 0x56fa, 0x59d1,
00217 0x5b64, 0x5df1, 0x5eab, 0x5f27, 0x6238, 0x6545, 0x67af, 0x6e56,
00218 0x72d0, 0x7cca, 0x88b4, 0x80a1, 0x80e1, 0x83f0, 0x864e, 0x8a87,
00219 0x8de8, 0x9237, 0x96c7, 0x9867, 0x9f13, 0x4e94, 0x4e92, 0x4f0d,
00220 0x5348, 0x5449, 0x543e, 0x5a2f, 0x5f8c, 0x5fa1, 0x609f, 0x68a7,
00221 0x6a8e, 0x745a, 0x7881, 0x8a9e, 0x8aa4, 0x8b77, 0x9190, 0x4e5e,
00222 0x9bc9, 0x4ea4, 0x4f7c, 0x4faf, 0x5019, 0x5016, 0x5149, 0x516c,
00223 0x529f, 0x52b9, 0x52fe, 0x539a, 0x53e3, 0x5411,
00224 /* 0x39 */
00225 0x540e, 0x5589, 0x5751, 0x57a2, 0x597d, 0x5b54, 0x5b5d, 0x5b8f,
00226 0x5de5, 0x5de7, 0x5df7, 0x5e78, 0x5e83, 0x5e9a, 0x5eb7, 0x5f18,
00227 0x6052, 0x614c, 0x6297, 0x62d8, 0x63a7, 0x653b, 0x6602, 0x6643,
00228 0x66f4, 0x676d, 0x6821, 0x6897, 0x69cb, 0x6c5f, 0x6d2a, 0x6d69,
00229 0x6e2f, 0x6e9d, 0x7532, 0x7687, 0x786c, 0x7a3f, 0x7ce0, 0x7d05,
00230 0x7d18, 0x7d5e, 0x7db1, 0x8015, 0x8003, 0x80af, 0x80b1, 0x8154,
00231 0x818f, 0x822a, 0x8352, 0x884c, 0x8861, 0x8b1b, 0x8ca2, 0x8cf,
00232 0x90ca, 0x9175, 0x9271, 0x783f, 0x92fc, 0x95a4, 0x964d, 0x9805,
00233 0x9999, 0x9ad8, 0x9d3b, 0x525b, 0x52ab, 0x53f7, 0x5408, 0x58d5,
00234 0x62f7, 0x6fe0, 0x8c6a, 0x8f5f, 0x9eb9, 0x514b, 0x523b, 0x544a,
00235 0x56fd, 0x7a40, 0x9177, 0x9d60, 0x9ed2, 0x7344, 0x6f09, 0x8170,
00236 0x7511, 0x5ffd, 0x60da, 0x9aa8, 0x72db, 0x8fbc,
00237 /* 0x3a */
00238 0x6b64, 0x9803, 0x4eca, 0x56f0, 0x5764, 0x58be, 0x5a5a, 0x6068,
00239 0x61c7, 0x660f, 0x6606, 0x6839, 0x68b1, 0x6df7, 0x75d5, 0x7d3a,
00240 0x826e, 0x9b42, 0x4e9b, 0x4f50, 0x53c9, 0x5506, 0x5d6f, 0x5de6,
00241 0x5dee, 0x67fb, 0x6c99, 0x7473, 0x7802, 0x8a50, 0x9396, 0x88df,
00242 0x5750, 0x5ea7, 0x632b, 0x50b5, 0x50ac, 0x518d, 0x6700, 0x54c9,
00243 0x585e, 0x59bb, 0x5bb0, 0x5f69, 0x624d, 0x63a1, 0x683d, 0x6b73,
00244 0x6e08, 0x707d, 0x91c7, 0x7280, 0x7815, 0x7826, 0x796d, 0x658e,
00245 0x7d30, 0x83dc, 0x88c1, 0x8f09, 0x969b, 0x5264, 0x5728, 0x6750,
00246 0x7f6a, 0x8ca1, 0x51b4, 0x5742, 0x962a, 0x583a, 0x698a, 0x80b4,
00247 0x54b2, 0x5d0e, 0x57fc, 0x7895, 0x9dfa, 0x4f5c, 0x524a, 0x548b,
00248 0x643e, 0x6628, 0x6714, 0x67f5, 0x7a84, 0x7b56, 0x7d22, 0x932f,
00249 0x685c, 0x9bad, 0x7b39, 0x5319, 0x518a, 0x5237,
00250 /* 0x3b */
00251 0x5bdf, 0x62f6, 0x64ae, 0x64e6, 0x672d, 0x6bba, 0x85a9, 0x96d1,
00252 0x7690, 0x9bd6, 0x634c, 0x9306, 0x9bab, 0x76bf, 0x6652, 0x4e09,
00253 0x5098, 0x53c2, 0x5c71, 0x60e8, 0x6492, 0x6563, 0x685f, 0x71e6,
00254 0x73ca, 0x7523, 0x7b97, 0x7e82, 0x8695, 0x8b83, 0x8cdb, 0x9178,
00255 0x9910, 0x65ac, 0x66ab, 0x6b8b, 0x4ed5, 0x4ed4, 0x4f3a, 0x4f7f,
00256 0x523a, 0x53f8, 0x53f2, 0x55e3, 0x56db, 0x58eb, 0x59cb, 0x59c9,
00257 0x59ff, 0x5b50, 0x5c4d, 0x5e02, 0x5e2b, 0x5fd7, 0x601d, 0x6307,
00258 0x652f, 0x5b5c, 0x65af, 0x65bd, 0x65e8, 0x679d, 0x6b62, 0x6b7b,
00259 0x6c0f, 0x7345, 0x7949, 0x79c1, 0x7cf8, 0x7d19, 0x7d2b, 0x80a2,
00260 0x8102, 0x81f3, 0x8996, 0x8a5e, 0x8a69, 0x8a66, 0x8a8c, 0x8aee,
00261 0x8cc7, 0x8cdc, 0x96cc, 0x98fc, 0x6b6f, 0x4e8b, 0x4f3c, 0x4f8d,
00262 0x5150, 0x5b57, 0x5bfa, 0x6148, 0x6301, 0x6642,
00263 /* 0x3c */
00264 0x6b21, 0x6ecb, 0x6cbb, 0x723e, 0x74bd, 0x75d4, 0x78c1, 0x793a,
00265 0x800c, 0x8033, 0x81ea, 0x8494, 0x8f9e, 0x6c50, 0x9e7f, 0x5f0f,
00266 0x8b58, 0x9d2b, 0x7afa, 0x8ef8, 0x5b8d, 0x96eb, 0x4e03, 0x53f1,
00267 0x57f7, 0x5931, 0x5ac9, 0x5ba4, 0x6089, 0x6e7f, 0x6f06, 0x75be,
00268 0x8cea, 0x5b9f, 0x8500, 0x7be0, 0x5072, 0x67f4, 0x829d, 0x5c61,
00269 0x854a, 0x7e1e, 0x820e, 0x5199, 0x5c04, 0x6368, 0x8d66, 0x659c,
00270 0x716e, 0x793e, 0x7d17, 0x8005, 0x8b1d, 0x8eca, 0x906e, 0x86c7,
00271 0x90aa, 0x501f, 0x52fa, 0x5c3a, 0x6753, 0x707c, 0x7235, 0x914c,
00272 0x91c8, 0x932b, 0x82e5, 0x5bc2, 0x5f31, 0x60f9, 0x4e3b, 0x53d6,
00273 0x5b88, 0x624b, 0x6731, 0x6b8a, 0x72e9, 0x73e0, 0x7a2e, 0x816b,
00274 0x8da3, 0x9152, 0x9996, 0x5112, 0x53d7, 0x546a, 0x5bff, 0x6388,
00275 0x6a39, 0x7dac, 0x9700, 0x56da, 0x53ce, 0x5468,
00276 /* 0x3d */
00277 0x5b97, 0x5c31, 0x5dde, 0x4fee, 0x6101, 0x62fe, 0x6d32, 0x79c0,
00278 0x79cb, 0x7d42, 0x7e4d, 0x7fd2, 0x81ed, 0x821f, 0x8490, 0x8846,
```

```
00279 0x8972, 0x8b90, 0x8e74, 0x8f2f, 0x9031, 0x914b, 0x916c, 0x96c6,
00280 0x919c, 0x4ec0, 0x4f4f, 0x5145, 0x5341, 0x5f93, 0x620e, 0x67d4,
00281 0x6c41, 0x6e0b, 0x7363, 0x7e26, 0x91cd, 0x9283, 0x53d4, 0x5919,
00282 0x5bbf, 0x6dd1, 0x795d, 0x7e2e, 0x7c9b, 0x587e, 0x719f, 0x51fa,
00283 0x8853, 0x8ff0, 0x4fca, 0x5cfc, 0x6625, 0x77ac, 0x7ae3, 0x821c,
00284 0x99ff, 0x51c6, 0x5faa, 0x65ec, 0x696f, 0x6b89, 0x6df3, 0x6e96,
00285 0x6f64, 0x76fe, 0x7d14, 0x5de1, 0x9075, 0x9187, 0x9806, 0x51e6,
00286 0x521d, 0x6240, 0x6691, 0x66d9, 0x6e1a, 0x5eb6, 0x7dd2, 0x7f72,
00287 0x66f8, 0x85af, 0x85f7, 0x8af8, 0x52a9, 0x53d9, 0x5973, 0x5e8f,
00288 0x5f90, 0x6055, 0x92e4, 0x9664, 0x50b7, 0x511f,
00289 /* 0x3e */
00290 0x52dd, 0x5320, 0x5347, 0x53ec, 0x54e8, 0x5546, 0x5531, 0x5617,
00291 0x5968, 0x59be, 0x5a3c, 0x5bb5, 0x5c06, 0x5c0f, 0x5c11, 0x5c1a,
00292 0x5e84, 0x5e8a, 0x5ee0, 0x5f70, 0x627f, 0x6284, 0x62db, 0x638c,
00293 0x6377, 0x6607, 0x660c, 0x662d, 0x6676, 0x677e, 0x68a2, 0x6a1f,
00294 0x6a35, 0x6cbc, 0x6d88, 0x6e09, 0x6e58, 0x713c, 0x7126, 0x7167,
00295 0x75c7, 0x7701, 0x785d, 0x7901, 0x7965, 0x79f0, 0x7ae0, 0x7b11,
00296 0x7ca7, 0x7d39, 0x8096, 0x83d6, 0x848b, 0x8549, 0x885d, 0x88f3,
00297 0x8a1f, 0x8a3c, 0x8a54, 0x8a73, 0x8c61, 0x8cde, 0x91a4, 0x9266,
00298 0x937e, 0x9418, 0x969c, 0x9798, 0x4e0a, 0x4e08, 0x4e1e, 0x4e57,
00299 0x5197, 0x5270, 0x57ce, 0x5834, 0x58cc, 0x5b22, 0x5e38, 0x60c5,
00300 0x64fe, 0x6761, 0x6756, 0x6d44, 0x72b6, 0x7573, 0x7a63, 0x84b8,
00301 0x8b72, 0x91b8, 0x9320, 0x5631, 0x57f4, 0x98fe,
00302 /* 0x3f */
00303 0x62ed, 0x690d, 0x6b96, 0x71ed, 0x7e54, 0x8077, 0x8272, 0x89e6,
00304 0x98df, 0x8755, 0x8fb1, 0x5c3b, 0x4f38, 0x4fe1, 0x4fb5, 0x5507,
00305 0x5a20, 0x5bdd, 0x5be9, 0x5fc3, 0x614e, 0x632f, 0x65b0, 0x664b,
00306 0x68ee, 0x699b, 0x6d78, 0x6df1, 0x7533, 0x75b9, 0x771f, 0x795e,
00307 0x79e6, 0x7d33, 0x81e3, 0x82af, 0x85aa, 0x89aa, 0x8a3a, 0x8eab,
00308 0x8f9b, 0x9032, 0x91dd, 0x9707, 0x4eba, 0x4ec1, 0x5203, 0x5875,
00309 0x58ec, 0x5c0b, 0x751a, 0x5c3d, 0x814e, 0x8a0a, 0x8fc5, 0x9663,
00310 0x976d, 0x7b25, 0x8acf, 0x9808, 0x9162, 0x56f3, 0x53a8, 0x9017,
00311 0x5439, 0x5782, 0x5e25, 0x63a8, 0x6c34, 0x708a, 0x7761, 0x7c8b,
00312 0x7fe0, 0x8870, 0x9042, 0x9154, 0x9310, 0x9318, 0x968f, 0x745e,
00313 0x9ac4, 0x5d07, 0x5d69, 0x6570, 0x67a2, 0x8da8, 0x96db, 0x636e,
00314 0x6749, 0x6919, 0x83c5, 0x9817, 0x96c0, 0x88fe,
00315 /* 0x40 */
00316 0x6f84, 0x647a, 0x5bf8, 0x4e16, 0x702c, 0x755d, 0x662f, 0x51c4,
00317 0x5236, 0x52e2, 0x59d3, 0x5f81, 0x6027, 0x6210, 0x653f, 0x6574,
00318 0x661f, 0x6674, 0x68f2, 0x6816, 0x6b63, 0x6e05, 0x7272, 0x751f,
00319 0x76db, 0x7cbe, 0x8056, 0x58f0, 0x88fd, 0x897f, 0x8aa0, 0x8a93,
00320 0x8acb, 0x901d, 0x9192, 0x9752, 0x9759, 0x6589, 0x7a0e, 0x8106,
00321 0x96bb, 0x5e2d, 0x60dc, 0x621a, 0x65a5, 0x6614, 0x6790, 0x77f3,
00322 0x7a4d, 0x7c4d, 0x7e3e, 0x810a, 0x8cac, 0x8d64, 0x8de1, 0x8e5f,
00323 0x78a9, 0x5207, 0x62d9, 0x63a5, 0x6442, 0x6298, 0x8a2d, 0x7a83,
00324 0x7bc0, 0x8aac, 0x96ea, 0x7d76, 0x820c, 0x8749, 0x4ed9, 0x5148,
00325 0x5343, 0x5360, 0x5ba3, 0x5c02, 0x5c16, 0x5ddd, 0x6226, 0x6247,
00326 0x64b0, 0x6813, 0x6834, 0x6cc9, 0x6d45, 0x6d17, 0x67d3, 0x6f5c,
00327 0x714e, 0x717d, 0x65cb, 0x7a7f, 0x7bad, 0x7dda,
00328 /* 0x41 */
00329 0x7e4a, 0x7fa8, 0x817a, 0x821b, 0x8239, 0x85a6, 0x8a6e, 0x8cce,
00330 0x8df5, 0x9078, 0x9077, 0x92ad, 0x9291, 0x9583, 0x9bae, 0x524d,
00331 0x5584, 0x6f38, 0x7136, 0x5168, 0x7985, 0x7e55, 0x81b3, 0x7cce,
00332 0x564c, 0x5851, 0x5ca8, 0x63aa, 0x66fe, 0x66fd, 0x695a, 0x72d9,
00333 0x758f, 0x758e, 0x790e, 0x7956, 0x79df, 0x7c97, 0x7d20, 0x7d44,
00334 0x8607, 0x8a34, 0x963b, 0x9061, 0x9f20, 0x50e7, 0x5275, 0x53cc,
00335 0x53e2, 0x5009, 0x55aa, 0x58ee, 0x594f, 0x723d, 0x5b8b, 0x5c64,
00336 0x531d, 0x60e3, 0x60f3, 0x635c, 0x6383, 0x633f, 0x63bb, 0x64cd,
00337 0x65e9, 0x66f9, 0x5de3, 0x69cd, 0x69fd, 0x6f15, 0x71e5, 0x4e89,
00338 0x75e9, 0x76f8, 0x7a93, 0x7cdf, 0x7dcf, 0x7d9c, 0x8061, 0x8349,
00339 0x8358, 0x846c, 0x84bc, 0x85fb, 0x88c5, 0x8d70, 0x9001, 0x906d,
00340 0x9397, 0x971c, 0x9a12, 0x50cf, 0x5897, 0x618e,
00341 /* 0x42 */
00342 0x81d3, 0x8533, 0x8d08, 0x9020, 0x4fc3, 0x5074, 0x5247, 0x5373,
00343 0x606f, 0x6349, 0x675f, 0x6e2c, 0x8db3, 0x901f, 0x4fd7, 0x5c5e,
00344 0x8cca, 0x65cf, 0x7d9a, 0x5352, 0x8896, 0x5176, 0x63c3, 0x5b58,
00345 0x5b6b, 0x5c0a, 0x640d, 0x6751, 0x905c, 0x4ed6, 0x591a, 0x592a,
00346 0x6c70, 0x8a51, 0x553e, 0x5815, 0x59a5, 0x60f0, 0x6253, 0x67c1,
00347 0x8235, 0x6955, 0x9640, 0x99c4, 0x9a28, 0x4f53, 0x5806, 0x5bfe,
00348 0x8010, 0x5cb1, 0x5e2f, 0x5f85, 0x6020, 0x614b, 0x6234, 0x66ff,
00349 0x6cf0, 0x6ede, 0x80ce, 0x817f, 0x82d4, 0x888b, 0x8cb8, 0x9000,
00350 0x902e, 0x968a, 0x9edb, 0x9bdb, 0x4ee3, 0x53f0, 0x5927, 0x7b2c,
00351 0x918d, 0x984c, 0x9df9, 0x6edd, 0x7027, 0x5353, 0x5544, 0x5b85,
00352 0x6258, 0x629e, 0x62d3, 0x6ca2, 0x6fef, 0x7422, 0x8a17, 0x9438,
00353 0x6fc1, 0x8afe, 0x8338, 0x51e7, 0x86f8, 0x53ea,
00354 /* 0x43 */
00355 0x53e9, 0x4f46, 0x9054, 0x8fb0, 0x596a, 0x8131, 0x5dfd, 0x7aea,
00356 0x8fbf, 0x68da, 0x8c37, 0x72f8, 0x9c48, 0x6a3d, 0x8ab0, 0x4e39,
00357 0x5358, 0x5606, 0x5766, 0x62c5, 0x63a2, 0x65e6, 0x6b4e, 0x6de1,
00358 0x6e5b, 0x70ad, 0x77ed, 0x7aef, 0x7baa, 0x7dbb, 0x803d, 0x80c6,
00359 0x86cb, 0x8a95, 0x935b, 0x56e3, 0x58c7, 0x5f3e, 0x65ad, 0x6696,
00360 0x6a80, 0x6bb5, 0x7537, 0x8ac7, 0x5024, 0x77e5, 0x5730, 0x5f1b,
00361 0x6065, 0x667a, 0x6c60, 0x75f4, 0x7a1a, 0x7f6e, 0x81f4, 0x8718,
00362 0x9045, 0x99b3, 0x7bc9, 0x755c, 0x7af9, 0x7b51, 0x84c4, 0x9010,
00363 0x79e9, 0x7a92, 0x8336, 0x5ae1, 0x7740, 0x4e2d, 0x4ef2, 0x5b99,
00364 0x5fe0, 0x62bd, 0x663c, 0x67f1, 0x6ce8, 0x866b, 0x8877, 0x8a3b,
00365 0x914e, 0x92f3, 0x99d0, 0x6a17, 0x7026, 0x732a, 0x82e7, 0x8457,
```

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00366 0x8caf, 0x4e01, 0x5146, 0x51cb, 0x558b, 0x5bf5,
00367 /* 0x44 */
00368 0x5e16, 0x5e33, 0x5e81, 0x5f14, 0x5f35, 0x5f6b, 0x5fb4, 0x61f2,
00369 0x6311, 0x66a2, 0x671d, 0x6f6e, 0x7252, 0x753a, 0x773a, 0x8074,
00370 0x8139, 0x8178, 0x8776, 0x8abf, 0x8adc, 0x8d85, 0x8df3, 0x929a,
00371 0x9577, 0x9802, 0x9ce5, 0x52c5, 0x6357, 0x76f4, 0x6715, 0x6c88,
00372 0x73cd, 0x8cc3, 0x93ae, 0x9673, 0x6d25, 0x589c, 0x690e, 0x69cc,
00373 0x8ffd, 0x939a, 0x75db, 0x901a, 0x585a, 0x6802, 0x63b4, 0x69fb,
00374 0x4f43, 0x6f2c, 0x67d8, 0x8fbb, 0x8526, 0x7db4, 0x9354, 0x693f,
00375 0x6f70, 0x576a, 0x58f7, 0x5b2c, 0x7d2c, 0x722a, 0x540a, 0x91e3,
00376 0x9db4, 0x4ead, 0x4f4e, 0x505c, 0x5075, 0x5243, 0x8c9e, 0x5448,
00377 0x5824, 0x5b9a, 0x5e1d, 0x5e95, 0x5ead, 0x5ef7, 0x5f1f, 0x608c,
00378 0x62b5, 0x633a, 0x63d0, 0x68af, 0x6c40, 0x7887, 0x798e, 0x7a0b,
00379 0x7de0, 0x8247, 0x8a02, 0x8ae6, 0x8e44, 0x9013,
00380 /* 0x45 */
00381 0x90b8, 0x912d, 0x91d8, 0x9f0e, 0x6ce5, 0x6458, 0x64e2, 0x6575,
00382 0x6ef4, 0x7684, 0x7b1b, 0x9069, 0x93d1, 0x6eba, 0x54f2, 0x5fb9,
00383 0x64a4, 0x8f4d, 0x8fed, 0x9244, 0x5178, 0x586b, 0x5929, 0x5c55,
00384 0x5e97, 0x6dfb, 0x7e8f, 0x751c, 0x8cbc, 0x8ee2, 0x985b, 0x70b9,
00385 0x4f1d, 0x6bbf, 0x6fb1, 0x7530, 0x96fb, 0x514e, 0x5410, 0x5835,
00386 0x5857, 0x59ac, 0x5e1d, 0x5f92, 0x6597, 0x675c, 0x6e21, 0x767b,
00387 0x83df, 0x8ced, 0x9014, 0x90fd, 0x934d, 0x7825, 0x783a, 0x52aa,
00388 0x5ea6, 0x571f, 0x5974, 0x6012, 0x5012, 0x515a, 0x51ac, 0x51cd,
00389 0x5200, 0x5510, 0x5854, 0x5858, 0x5957, 0x5b95, 0x5cf6, 0x5d8b,
00390 0x60bc, 0x6295, 0x642d, 0x6771, 0x6843, 0x68bc, 0x68df, 0x76d7,
00391 0x6dd8, 0x6e6f, 0x6d9b, 0x706f, 0x71c8, 0x5f53, 0x75d8, 0x7977,
00392 0x7b49, 0x7b54, 0x7b52, 0x7cd6, 0x7d71, 0x5230,
00393 /* 0x46 */
00394 0x8463, 0x8569, 0x85e4, 0x8a0e, 0x8b04, 0x8c46, 0x8e0f, 0x9003,
00395 0x900f, 0x9419, 0x9676, 0x982d, 0x9a30, 0x95d8, 0x50cd, 0x52d5,
00396 0x540c, 0x5802, 0x5c0e, 0x61a7, 0x649e, 0x6d1e, 0x77b3, 0x7ae5,
00397 0x80f4, 0x8404, 0x9053, 0x9285, 0x5ce0, 0x9d07, 0x533f, 0x5f97,
00398 0x5fb3, 0x6d9c, 0x7279, 0x7763, 0x79bf, 0x7be4, 0x6bd2, 0x72ec,
00399 0x8aad, 0x6803, 0x6a61, 0x51f8, 0x7a81, 0x6934, 0x5c4a, 0x9cf6,
00400 0x82eb, 0x5bc5, 0x9149, 0x701e, 0x5678, 0x5c6f, 0x60c7, 0x6566,
00401 0x6c8c, 0x8c5a, 0x9041, 0x9813, 0x5451, 0x66c7, 0x920d, 0x5948,
00402 0x90a3, 0x5185, 0x4e4d, 0x51ea, 0x8599, 0x8b0e, 0x7058, 0x637a,
00403 0x934b, 0x6962, 0x99b4, 0x7e04, 0x7577, 0x5357, 0x6960, 0x8edf,
00404 0x96e3, 0x6c5d, 0x4e8c, 0x5c3c, 0x5f10, 0x8fe9, 0x5302, 0x8cd1,
00405 0x8089, 0x8679, 0x5eff, 0x65e5, 0x4e73, 0x5165,
00406 /* 0x47 */
00407 0x5982, 0x5c3f, 0x97ee, 0x4efb, 0x598a, 0x5fcd, 0x8a8d, 0x6fe1,
00408 0x79b0, 0x7962, 0x5be7, 0x8471, 0x732b, 0x71b1, 0x5e74, 0x5ff5,
00409 0x637b, 0x649a, 0x71c3, 0x7c98, 0x4e43, 0x5efc, 0x4e4b, 0x57dc,
00410 0x56a2, 0x60a9, 0x6fc3, 0x7d0d, 0x80fd, 0x8133, 0x81b7, 0x8fb2,
00411 0x8997, 0x86a4, 0x5df4, 0x628a, 0x64ad, 0x8987, 0x6777, 0x6ce2,
00412 0x6d3e, 0x7436, 0x7834, 0x5a46, 0x7f75, 0x82ad, 0x99ac, 0x4ff3,
00413 0x5ec3, 0x62dd, 0x6392, 0x6557, 0x676f, 0x76c3, 0x724c, 0x80cc,
00414 0x80ba, 0x8f29, 0x914d, 0x500d, 0x57f9, 0x5a92, 0x6885, 0x6973,
00415 0x7164, 0x72fd, 0x8cb7, 0x58f2, 0x8ce0, 0x966a, 0x9019, 0x877f,
00416 0x79e4, 0x77e7, 0x8429, 0x4f2f, 0x5265, 0x535a, 0x62cd, 0x67cf,
00417 0x6cca, 0x767d, 0x7b94, 0x7c95, 0x8236, 0x8584, 0x8feb, 0x66dd,
00418 0x6f20, 0x7206, 0x7e1b, 0x83ab, 0x99c1, 0x9ea6,
00419 /* 0x48 */
00420 0x51fd, 0x7bb1, 0x7872, 0x7bb8, 0x8087, 0x7b48, 0x6ae8, 0x5e61,
00421 0x808c, 0x7551, 0x7560, 0x516b, 0x9262, 0x6e8c, 0x767a, 0x9197,
00422 0x9aea, 0x4f10, 0x7f70, 0x629c, 0x7b4f, 0x95a5, 0x9ce9, 0x567a,
00423 0x5859, 0x86e4, 0x96bc, 0x4f34, 0x5224, 0x534a, 0x53cd, 0x53db,
00424 0x5e06, 0x642c, 0x6591, 0x677f, 0x6c3e, 0x6c4e, 0x7248, 0x72af,
00425 0x73ed, 0x7554, 0x7e41, 0x822c, 0x85e9, 0x8ca9, 0x7bc4, 0x91c6,
00426 0x7169, 0x9812, 0x98ef, 0x633d, 0x6669, 0x756a, 0x76e4, 0x78d0,
00427 0x8543, 0x86ee, 0x532a, 0x5351, 0x5426, 0x5983, 0x5e87, 0x5f7c,
00428 0x60b2, 0x6249, 0x6279, 0x62ab, 0x6590, 0x6bd4, 0x6ccc, 0x75b2,
00429 0x76ae, 0x7891, 0x79d8, 0x7dcb, 0x7f77, 0x80a5, 0x88ab, 0x8ab9,
00430 0x8cbb, 0x907f, 0x975e, 0x98db, 0x6a0b, 0x7c38, 0x5099, 0x5c3e,
00431 0x5fae, 0x6787, 0x6bd8, 0x7435, 0x7709, 0x7f8e,
00432 /* 0x49 */
00433 0x9f3b, 0x67ca, 0x7a17, 0x5339, 0x758b, 0x9aed, 0x5f66, 0x819d,
00434 0x83f1, 0x8098, 0x5f3c, 0x5fc5, 0x7562, 0x7b46, 0x903c, 0x6867,
00435 0x59eb, 0x5a9b, 0x7d10, 0x767e, 0x8b2c, 0x4ff5, 0x5f6a, 0x6a19,
00436 0x6c37, 0x6f02, 0x74e2, 0x7968, 0x8868, 0x8a55, 0x8c79, 0x5edf,
00437 0x63cf, 0x75c5, 0x79d2, 0x82d7, 0x9328, 0x92f2, 0x849c, 0x86ed,
00438 0x9c2d, 0x54c1, 0x5f6c, 0x658c, 0x6d5c, 0x7015, 0x8ca7, 0x8cd3,
00439 0x983b, 0x654f, 0x74f6, 0x4e0d, 0x4ed8, 0x57e0, 0x592b, 0x5a66,
00440 0x5bcc, 0x51a8, 0x5e03, 0x5e9c, 0x6016, 0x6276, 0x6577, 0x65a7,
00441 0x666e, 0x6d6e, 0x7236, 0x7b26, 0x8150, 0x819a, 0x8299, 0x8b5c,
00442 0x8ca0, 0x8ce6, 0x8d74, 0x961c, 0x9644, 0x4fae, 0x64ab, 0x6b66,
00443 0x821e, 0x8461, 0x856a, 0x90e8, 0x5c01, 0x6953, 0x98a8, 0x847a,
00444 0x8557, 0x4f0f, 0x526f, 0x5fa9, 0x5e45, 0x670d,
00445 /* 0x4a */
00446 0x798f, 0x8179, 0x8907, 0x8986, 0x6df5, 0x5f17, 0x6255, 0x6cb8,
00447 0x4ecf, 0x7269, 0x9b92, 0x5206, 0x543b, 0x5674, 0x58b3, 0x61a4,
00448 0x626e, 0x711a, 0x596e, 0x7c89, 0x7cde, 0x7dlb, 0x96f0, 0x6587,
00449 0x805e, 0x4e19, 0x4f75, 0x5175, 0x5840, 0x5e63, 0x5e73, 0x5f0a,
00450 0x67c4, 0x4e26, 0x853d, 0x9589, 0x965b, 0x7c73, 0x9801, 0x50fb,
00451 0x58c1, 0x7656, 0x78a7, 0x5225, 0x77a5, 0x8511, 0x7b86, 0x504f,
00452 0x5909, 0x7247, 0x7bc7, 0x7de8, 0x8fba, 0x8fd4, 0x904d, 0x4fbf,
```

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00453 0x52c9, 0x5a29, 0x5f01, 0x97ad, 0x4fdd, 0x8217, 0x92ea, 0x5703,
00454 0x6355, 0x6b69, 0x752b, 0x88dc, 0x8f14, 0x7a42, 0x52dF, 0x5893,
00455 0x6155, 0x620a, 0x66ae, 0x6bcd, 0x7c3f, 0x83e9, 0x5023, 0x4ff8,
00456 0x5305, 0x5446, 0x5831, 0x5949, 0x5b9d, 0x5cf0, 0x5cef, 0x5d29,
00457 0x5e96, 0x62b1, 0x6367, 0x653e, 0x65b9, 0x670b,
00458 /* 0x4b */
00459 0x6cd5, 0x6ce1, 0x70f9, 0x7832, 0x7e2b, 0x80de, 0x82b3, 0x840c,
00460 0x84ec, 0x8702, 0x8912, 0x8a2a, 0x8c4a, 0x90a6, 0x92d2, 0x98fd,
00461 0x9cf3, 0x9d6c, 0x4e4f, 0x4ea1, 0x508d, 0x5256, 0x574a, 0x59a8,
00462 0x5e3d, 0x5fd8, 0x5fd9, 0x623f, 0x66b4, 0x671b, 0x67d0, 0x68d2,
00463 0x5192, 0x7d21, 0x80aa, 0x81a8, 0x8b00, 0x8c8c, 0x8cbf, 0x927e,
00464 0x9632, 0x5420, 0x982c, 0x5317, 0x50d5, 0x535c, 0x58a8, 0x64b2,
00465 0x6734, 0x7267, 0x7766, 0x7a46, 0x91e6, 0x52c3, 0x6ca1, 0x6b86,
00466 0x5800, 0x5e4c, 0x5954, 0x672c, 0x7ffb, 0x51e1, 0x76c6, 0x6469,
00467 0x78e8, 0x9b54, 0x9ebb, 0x57cb, 0x59b9, 0x6627, 0x679a, 0x6bce,
00468 0x54e9, 0x69d9, 0x5e55, 0x819c, 0x6795, 0x9baa, 0x67fe, 0x9c52,
00469 0x685d, 0x4ea6, 0x4fe3, 0x53c8, 0x62b9, 0x672b, 0x6cab, 0x8fc4,
00470 0x4fad, 0x7e6d, 0x9ebf, 0x4e07, 0x6162, 0x6e80,
00471 /* 0x4c */
00472 0x6f2b, 0x8513, 0x5473, 0x672a, 0x9b45, 0x5df3, 0x7b95, 0x5cac,
00473 0x5bc6, 0x871c, 0x6e4a, 0x84d1, 0x7a14, 0x8108, 0x5999, 0x7c8d,
00474 0x6c11, 0x7720, 0x52d9, 0x5922, 0x7121, 0x725f, 0x77db, 0x9727,
00475 0x9d61, 0x690b, 0x5a7f, 0x5a18, 0x51a5, 0x540d, 0x547d, 0x660e,
00476 0x76df, 0x8ff7, 0x9298, 0x9cf4, 0x59ea, 0x725d, 0x6ec5, 0x514d,
00477 0x68c9, 0x7dbf, 0x7dec, 0x9762, 0x9eba, 0x6478, 0x6a21, 0x8302,
00478 0x5984, 0x5b5f, 0x6bdb, 0x731b, 0x76f2, 0x7db2, 0x8017, 0x8499,
00479 0x5132, 0x6728, 0x9ed9, 0x76ee, 0x6762, 0x52ff, 0x9905, 0x5c24,
00480 0x623b, 0x7c7e, 0x8cb0, 0x554f, 0x60b6, 0x7d0b, 0x9580, 0x5301,
00481 0x4e5f, 0x51b6, 0x591c, 0x723a, 0x8036, 0x91ce, 0x5f25, 0x77e2,
00482 0x5384, 0x5f79, 0x7d04, 0x85ac, 0x8a33, 0x8e8d, 0x9756, 0x67f3,
00483 0x85ae, 0x9453, 0x6109, 0x6108, 0x6cb9, 0x7652,
00484 /* 0x4d */
00485 0x8aed, 0x8f38, 0x552f, 0x4f51, 0x512a, 0x52c7, 0x53cb, 0x5ba5,
00486 0x5e7d, 0x60a0, 0x6182, 0x63d6, 0x6709, 0x67da, 0x6e67, 0x6d8c,
00487 0x7336, 0x7337, 0x7531, 0x7950, 0x88d5, 0x8a98, 0x904a, 0x9091,
00488 0x90f5, 0x96c4, 0x878d, 0x5915, 0x4e88, 0x4f59, 0x4e0e, 0x8a89,
00489 0x8f3f, 0x9810, 0x50ad, 0x5e7c, 0x5996, 0x5bb9, 0x5eb8, 0x63da,
00490 0x63fa, 0x64c1, 0x66dc, 0x694a, 0x69d8, 0x6d0b, 0x6eb6, 0x7194,
00491 0x7528, 0x7aaF, 0x7f8a, 0x8000, 0x8449, 0x84c9, 0x8981, 0x8b21,
00492 0x8e0a, 0x9065, 0x967d, 0x990a, 0x617e, 0x6291, 0x6b32, 0x6c83,
00493 0x6d74, 0x7fcc, 0x7ffc, 0x6dc0, 0x7f85, 0x87ba, 0x88f8, 0x6765,
00494 0x83b1, 0x983c, 0x96f7, 0x6d1b, 0x7d61, 0x843d, 0x916a, 0x4e71,
00495 0x5375, 0x5d50, 0x6b04, 0x6feb, 0x85cd, 0x862d, 0x89a7, 0x5229,
00496 0x540f, 0x5c65, 0x674e, 0x68a8, 0x7406, 0x7483,
00497 /* 0x4e */
00498 0x75e2, 0x88cf, 0x88e1, 0x91cc, 0x96e2, 0x9678, 0x5f8b, 0x7387,
00499 0x7acb, 0x844e, 0x63a0, 0x7565, 0x5289, 0x6d41, 0x6e9c, 0x7409,
00500 0x7559, 0x786b, 0x7c92, 0x9686, 0x7adc, 0x9f8d, 0x4fb6, 0x616e,
00501 0x65c5, 0x865c, 0x4e86, 0x4eae, 0x50da, 0x4e21, 0x51cc, 0x5bee,
00502 0x6599, 0x6881, 0x6dbc, 0x731f, 0x7642, 0x77ad, 0x7a1c, 0x7ce7,
00503 0x826f, 0x8ad2, 0x907c, 0x91cf, 0x9675, 0x9818, 0x529b, 0x7dd1,
00504 0x502b, 0x5398, 0x6797, 0x6dcb, 0x71d0, 0x7433, 0x81e8, 0x8f2a,
00505 0x96a3, 0x9c57, 0x9e9f, 0x7460, 0x5841, 0x6d99, 0x7d2f, 0x985e,
00506 0x4ee4, 0x4f36, 0x4f8b, 0x51b7, 0x52b1, 0x5dba, 0x601c, 0x73b2,
00507 0x793c, 0x82d3, 0x9234, 0x96b7, 0x96f6, 0x970a, 0x9e97, 0x9f62,
00508 0x66a6, 0x6b74, 0x5217, 0x52a3, 0x70c8, 0x88c2, 0x5ec9, 0x604b,
00509 0x6190, 0x6f23, 0x7149, 0x7c3e, 0x7df4, 0x806f,
00510 /* 0x4f */
00511 0x84ee, 0x9023, 0x932c, 0x5442, 0x9b6f, 0x6ad3, 0x7089, 0x8cc2,
00512 0x8def, 0x9732, 0x52b4, 0x5a41, 0x5eca, 0x5f04, 0x6717, 0x697c,
00513 0x6994, 0x6d6a, 0x6f0f, 0x7262, 0x72fc, 0x7bed, 0x8001, 0x807e,
00514 0x874b, 0x90ce, 0x516d, 0x9e93, 0x7984, 0x808b, 0x9332, 0x8ad6,
00515 0x502d, 0x548c, 0x8a71, 0x6b6a, 0x8cc4, 0x8107, 0x60d1, 0x67a0,
00516 0x9df2, 0x4e99, 0x4e98, 0x9c10, 0x8a6b, 0x85c1, 0x8568, 0x6900,
00517 0x6e7e, 0x7897, 0x8155, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00518 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00519 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00520 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00521 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00522 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00523 /* 0x50 */
00524 0x5f0c, 0x4e10, 0x4e15, 0x4e2a, 0x4e31, 0x4e36, 0x4e3c, 0x4e3f,
00525 0x4e42, 0x4e56, 0x4e58, 0x4e82, 0x4e85, 0x8c6b, 0x4e8a, 0x8212,
00526 0x5f0d, 0x4e8e, 0x4e9e, 0x4e9f, 0x4ea0, 0x4ea2, 0x4eb0, 0x4eb3,
00527 0x4eb6, 0x4ece, 0x4ecd, 0x4ec4, 0x4ec6, 0x4ec2, 0x4ed7, 0x4ede,
00528 0x4eed, 0x4edf, 0x4ef7, 0x4f09, 0x4f5a, 0x4f30, 0x4f5b, 0x4f5d,
00529 0x4f57, 0x4f47, 0x4f76, 0x4f88, 0x4f8f, 0x4f98, 0x4f7b, 0x4f69,
00530 0x4f70, 0x4f91, 0x4f6f, 0x4f86, 0x4f96, 0x5118, 0x4fd4, 0x4fdf,
00531 0x4fce, 0x4fd8, 0x4fdb, 0x4fd1, 0x4fda, 0x4fd0, 0x4fe4, 0x4fe5,
00532 0x501a, 0x5028, 0x5014, 0x502a, 0x5025, 0x5005, 0x4f1c, 0x4ff6,
00533 0x5021, 0x5029, 0x502c, 0x4ffe, 0x4fef, 0x5011, 0x5006, 0x5043,
00534 0x5047, 0x6703, 0x5055, 0x5050, 0x5048, 0x505a, 0x5056, 0x506c,
00535 0x5078, 0x5080, 0x509a, 0x5085, 0x50b4, 0x50b2,
00536 /* 0x51 */
00537 0x50c9, 0x50ca, 0x50b3, 0x50c2, 0x50d6, 0x50de, 0x50e5, 0x50ed,
00538 0x50e3, 0x50ee, 0x50f9, 0x50f5, 0x5109, 0x5101, 0x5102, 0x5116,
00539 0x5115, 0x5114, 0x511a, 0x5121, 0x513a, 0x5137, 0x513c, 0x513b,
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00540 0x513f, 0x5140, 0x5152, 0x514c, 0x5154, 0x5162, 0x7af8, 0x5169,
00541 0x516a, 0x516e, 0x5180, 0x5182, 0x56d8, 0x518c, 0x5189, 0x518f,
00542 0x5191, 0x5193, 0x5195, 0x5196, 0x51a4, 0x51a6, 0x51a2, 0x51a9,
00543 0x51aa, 0x51ab, 0x51b3, 0x51b1, 0x51b2, 0x51b0, 0x51b5, 0x51bd,
00544 0x51c5, 0x51c9, 0x51db, 0x51e0, 0x8655, 0x51e9, 0x51ed, 0x51f0,
00545 0x51f5, 0x51fe, 0x5204, 0x520b, 0x5214, 0x520e, 0x5227, 0x522a,
00546 0x522e, 0x5233, 0x5239, 0x524f, 0x5244, 0x524b, 0x524c, 0x525e,
00547 0x5254, 0x526a, 0x5274, 0x5269, 0x5273, 0x527f, 0x527d, 0x528d,
00548 0x5294, 0x5292, 0x5271, 0x5288, 0x5291, 0x8fa8,
00549 /* 0x52 */
00550 0x8fa7, 0x52ac, 0x52ad, 0x52bc, 0x52b5, 0x52c1, 0x52cd, 0x52d7,
00551 0x52de, 0x52e3, 0x52e6, 0x98ed, 0x52e0, 0x52f3, 0x52f5, 0x52f8,
00552 0x52f9, 0x5306, 0x5308, 0x7538, 0x530d, 0x5310, 0x530f, 0x5315,
00553 0x531a, 0x5323, 0x532f, 0x5331, 0x5333, 0x5338, 0x5340, 0x5346,
00554 0x5345, 0x4e17, 0x5349, 0x534d, 0x51d6, 0x535e, 0x5369, 0x536e,
00555 0x5918, 0x537b, 0x5377, 0x5382, 0x5396, 0x53a0, 0x53a6, 0x53a5,
00556 0x53ae, 0x53b0, 0x53b6, 0x53c3, 0x7c12, 0x96d9, 0x53df, 0x66fc,
00557 0x71ee, 0x53ee, 0x53e8, 0x53ed, 0x53fa, 0x5401, 0x543d, 0x5440,
00558 0x542c, 0x542d, 0x543c, 0x542e, 0x5436, 0x5429, 0x541d, 0x544e,
00559 0x548f, 0x5475, 0x548e, 0x545f, 0x5471, 0x5477, 0x5470, 0x5492,
00560 0x547b, 0x5480, 0x5476, 0x5484, 0x5490, 0x5486, 0x54c7, 0x54a2,
00561 0x54b8, 0x54a5, 0x54ac, 0x54c4, 0x54c8, 0x54a8,
00562 /* 0x53 */
00563 0x54ab, 0x54c2, 0x54a4, 0x54be, 0x54bc, 0x54d8, 0x54e5, 0x54e6,
00564 0x550f, 0x5514, 0x54fd, 0x54ee, 0x54ed, 0x54fa, 0x54e2, 0x5539,
00565 0x5540, 0x5563, 0x554c, 0x552e, 0x555c, 0x5545, 0x5556, 0x5557,
00566 0x5538, 0x5533, 0x555d, 0x5559, 0x5580, 0x54af, 0x558a, 0x559f,
00567 0x557b, 0x557e, 0x5598, 0x559e, 0x55ae, 0x557c, 0x5583, 0x55a9,
00568 0x5587, 0x55a8, 0x55da, 0x55c5, 0x55df, 0x55c4, 0x55dc, 0x55e4,
00569 0x55d4, 0x5614, 0x55f7, 0x5616, 0x55fe, 0x55fd, 0x561b, 0x55f9,
00570 0x564e, 0x5650, 0x71df, 0x5634, 0x5636, 0x5632, 0x5638, 0x566b,
00571 0x5664, 0x562f, 0x566c, 0x566a, 0x5686, 0x5680, 0x568a, 0x56a0,
00572 0x5694, 0x568f, 0x56a5, 0x56ae, 0x56b6, 0x56b4, 0x56c2, 0x56bc,
00573 0x56c1, 0x56c3, 0x56c0, 0x56c8, 0x56ce, 0x56d1, 0x56d3, 0x56d7,
00574 0x56ee, 0x56f9, 0x5700, 0x56ff, 0x5704, 0x5709,
00575 /* 0x54 */
00576 0x5708, 0x570b, 0x570d, 0x5713, 0x5718, 0x5716, 0x55c7, 0x571c,
00577 0x5726, 0x5737, 0x5738, 0x574e, 0x573b, 0x5740, 0x574f, 0x5769,
00578 0x57c0, 0x5788, 0x5761, 0x577f, 0x5789, 0x5793, 0x57a0, 0x57b3,
00579 0x57a4, 0x57aa, 0x57b0, 0x57c3, 0x57c6, 0x57d4, 0x57d2, 0x57d3,
00580 0x580a, 0x57d6, 0x57e3, 0x580b, 0x5819, 0x581d, 0x5872, 0x5821,
00581 0x5862, 0x584b, 0x5870, 0x6bc0, 0x5852, 0x583d, 0x5879, 0x5885,
00582 0x58b9, 0x589f, 0x58ab, 0x58ba, 0x58de, 0x58bb, 0x58b8, 0x58ae,
00583 0x58c5, 0x58d3, 0x58d1, 0x58d7, 0x58d9, 0x58d8, 0x58e5, 0x58dc,
00584 0x58e4, 0x58df, 0x58ef, 0x58fa, 0x58f9, 0x58fb, 0x58fc, 0x58fd,
00585 0x5902, 0x590a, 0x5910, 0x591b, 0x68a6, 0x5925, 0x592c, 0x592d,
00586 0x5932, 0x5938, 0x593e, 0x7ad2, 0x5955, 0x5950, 0x594e, 0x595a,
00587 0x5958, 0x5962, 0x5960, 0x5967, 0x596c, 0x5969,
00588 /* 0x55 */
00589 0x5978, 0x5981, 0x599d, 0x4f5e, 0x4fab, 0x59a3, 0x59b2, 0x59c6,
00590 0x59e8, 0x59dc, 0x59d8, 0x59d9, 0x59da, 0x5a25, 0x5a1f, 0x5a11,
00591 0x5a1c, 0x5a09, 0x5a1a, 0x5a40, 0x5a6c, 0x5a49, 0x5a35, 0x5a36,
00592 0x5a62, 0x5a6a, 0x5a9a, 0x5abc, 0x5abe, 0x5acb, 0x5ac2, 0x5abd,
00593 0x5ae3, 0x5ad7, 0x5ae6, 0x5ae9, 0x5ad6, 0x5afa, 0x5afb, 0x5b0c,
00594 0x5b0b, 0x5b16, 0x5b32, 0x5ad0, 0x5b2a, 0x5b36, 0x5b3e, 0x5b43,
00595 0x5b45, 0x5b40, 0x5b51, 0x5b55, 0x5b5a, 0x5b5b, 0x5b65, 0x5b69,
00596 0x5b70, 0x5b73, 0x5b75, 0x5b78, 0x6588, 0x5b7a, 0x5b80, 0x5b83,
00597 0x5ba6, 0x5bb8, 0x5bc3, 0x5bc7, 0x5bc9, 0x5bd4, 0x5bd0, 0x5be4,
00598 0x5be6, 0x5be2, 0x5bde, 0x5be5, 0x5beb, 0x5bf0, 0x5bf6, 0x5bf3,
00599 0x5c05, 0x5c07, 0x5c08, 0x5c0d, 0x5c13, 0x5c20, 0x5c22, 0x5c28,
00600 0x5c38, 0x5c39, 0x5c41, 0x5c46, 0x5c4e, 0x5c53,
00601 /* 0x56 */
00602 0x5c50, 0x5c4f, 0x5b71, 0x5c6c, 0x5c6e, 0x4e62, 0x5c76, 0x5c79,
00603 0x5c8c, 0x5c91, 0x5c94, 0x599b, 0x5cab, 0x5cbb, 0x5cb6, 0x5cbc,
00604 0x5cb7, 0x5cc5, 0x5cbe, 0x5cc7, 0x5cd9, 0x5ce9, 0x5cfd, 0x5cfa,
00605 0x5ced, 0x5d8c, 0x5cea, 0x5d0b, 0x5d15, 0x5d17, 0x5d5c, 0x5d1f,
00606 0x5d1b, 0x5d11, 0x5d14, 0x5d22, 0x5d1a, 0x5d19, 0x5d18, 0x5d4c,
00607 0x5d52, 0x5d4e, 0x5d4b, 0x5d6c, 0x5d73, 0x5d76, 0x5d87, 0x5d84,
00608 0x5d82, 0x5da2, 0x5d9d, 0x5dac, 0x5dae, 0x5dbd, 0x5d90, 0x5db7,
00609 0x5dbc, 0x5dc9, 0x5dcd, 0x5dd3, 0x5dd2, 0x5dd6, 0x5ddb, 0x5deb,
00610 0x5df2, 0x5df5, 0x5e0b, 0x5e1a, 0x5e19, 0x5e11, 0x5e1b, 0x5e36,
00611 0x5e37, 0x5e44, 0x5e43, 0x5e40, 0x5e4e, 0x5e57, 0x5e54, 0x5e5f,
00612 0x5e62, 0x5e64, 0x5e47, 0x5e75, 0x5e76, 0x5e7a, 0x9ebc, 0x5e7f,
00613 0x5ea0, 0x5ec1, 0x5ec2, 0x5ec8, 0x5ed0, 0x5ecf,
00614 /* 0x57 */
00615 0x5ed6, 0x5ee3, 0x5edd, 0x5eda, 0x5edb, 0x5ee2, 0x5ee1, 0x5ee8,
00616 0x5ee9, 0x5eec, 0x5ef1, 0x5ef3, 0x5ef0, 0x5ef4, 0x5ef8, 0x5efe,
00617 0x5f03, 0x5f09, 0x5f5d, 0x5f5c, 0x5f0b, 0x5f11, 0x5f16, 0x5f29,
00618 0x5f2d, 0x5f38, 0x5f41, 0x5f48, 0x5f4c, 0x5f4e, 0x5f2f, 0x5f51,
00619 0x5f56, 0x5f57, 0x5f59, 0x5f61, 0x5f6d, 0x5f73, 0x5f77, 0x5f83,
00620 0x5f82, 0x5f7f, 0x5f8a, 0x5f88, 0x5f91, 0x5f87, 0x5f9e, 0x5f99,
00621 0x5f98, 0x5fa0, 0x5fa8, 0x5fad, 0x5fbc, 0x5fd6, 0x5fdb, 0x5fe4,
00622 0x5ff8, 0x5ff1, 0x5fdd, 0x60b3, 0x5fff, 0x6021, 0x6060, 0x6019,
00623 0x6010, 0x6029, 0x600e, 0x6031, 0x601b, 0x6015, 0x602b, 0x6026,
00624 0x600f, 0x603a, 0x605a, 0x6041, 0x606a, 0x6077, 0x605f, 0x604a,
00625 0x6046, 0x604d, 0x6063, 0x6063, 0x6043, 0x6064, 0x6042, 0x606c, 0x606b,
00626 0x6059, 0x6081, 0x608d, 0x60e7, 0x6083, 0x609a,
```



```
00627 /* 0x58 */
00628 0x6084, 0x609b, 0x6096, 0x6097, 0x6092, 0x60a7, 0x608b, 0x60e1,
00629 0x60b8, 0x60e0, 0x60d3, 0x60b4, 0x5ff0, 0x60bd, 0x60c6, 0x60b5,
00630 0x60d8, 0x614d, 0x6115, 0x6106, 0x60f6, 0x60f7, 0x6100, 0x60f4,
00631 0x60fa, 0x6103, 0x6121, 0x60fb, 0x60f1, 0x610d, 0x610e, 0x6147,
00632 0x613e, 0x6128, 0x6127, 0x614a, 0x613f, 0x613c, 0x612c, 0x6134,
00633 0x613d, 0x6142, 0x6144, 0x6173, 0x6177, 0x6158, 0x6159, 0x615a,
00634 0x616b, 0x6174, 0x616f, 0x6165, 0x6171, 0x615f, 0x615d, 0x6153,
00635 0x6175, 0x6199, 0x6196, 0x6187, 0x61ac, 0x6194, 0x619a, 0x618a,
00636 0x6191, 0x61ab, 0x61ae, 0x61cc, 0x61ca, 0x61c9, 0x61f7, 0x61c8,
00637 0x61c3, 0x61c6, 0x61ba, 0x61cb, 0x7f79, 0x61cd, 0x61e6, 0x61e3,
00638 0x61f6, 0x61fa, 0x61f4, 0x61ff, 0x61fd, 0x61fc, 0x61fe, 0x6200,
00639 0x6208, 0x6209, 0x620d, 0x620c, 0x6214, 0x621b,
00640 /* 0x59 */
00641 0x621e, 0x6221, 0x622a, 0x622e, 0x6230, 0x6232, 0x6233, 0x6241,
00642 0x624e, 0x625e, 0x6263, 0x625b, 0x6260, 0x6268, 0x627c, 0x6282,
00643 0x6289, 0x627e, 0x6292, 0x6293, 0x6296, 0x62d4, 0x6283, 0x6294,
00644 0x62d7, 0x62d1, 0x62bb, 0x62cf, 0x62ff, 0x62c6, 0x64d4, 0x62c8,
00645 0x62dc, 0x62cc, 0x62ca, 0x62c2, 0x62c7, 0x629b, 0x62c9, 0x630c,
00646 0x62ee, 0x62f1, 0x6327, 0x6302, 0x6308, 0x62ef, 0x62f5, 0x6350,
00647 0x633e, 0x634d, 0x641c, 0x634f, 0x641c, 0x634f, 0x6396, 0x638e, 0x6380, 0x63ab,
00648 0x6376, 0x63a3, 0x638f, 0x6389, 0x639f, 0x63b5, 0x636b, 0x6369,
00649 0x63be, 0x63e9, 0x63c0, 0x63c6, 0x63e3, 0x63c9, 0x63d2, 0x63f6,
00650 0x63c4, 0x6416, 0x643d, 0x6434, 0x6406, 0x6413, 0x6426, 0x6436, 0x651d,
00651 0x6417, 0x6428, 0x640f, 0x6467, 0x646f, 0x6476, 0x644e, 0x652a,
00652 0x6495, 0x6493, 0x64a5, 0x64a9, 0x6488, 0x64bc,
00653 /* 0x5a */
00654 0x64da, 0x64d2, 0x64c5, 0x64c7, 0x64bb, 0x64d8, 0x64c2, 0x64f1,
00655 0x64e7, 0x8209, 0x64e0, 0x64e1, 0x62ac, 0x64e3, 0x64ef, 0x652c,
00656 0x64f6, 0x64f4, 0x64f2, 0x64fa, 0x6500, 0x64fd, 0x6518, 0x651c,
00657 0x6505, 0x6524, 0x6523, 0x652b, 0x6534, 0x6535, 0x6537, 0x6536,
00658 0x6538, 0x754b, 0x6548, 0x6556, 0x6555, 0x654d, 0x6558, 0x655e,
00659 0x655d, 0x6572, 0x6578, 0x6582, 0x6583, 0x8b8a, 0x659b, 0x659f,
00660 0x65ab, 0x65b7, 0x65c3, 0x65c6, 0x65c1, 0x65c4, 0x65cc, 0x65d2,
00661 0x65db, 0x65d9, 0x65e0, 0x65e1, 0x65f1, 0x6772, 0x660a, 0x6603,
00662 0x65fb, 0x6773, 0x6635, 0x6636, 0x6634, 0x661c, 0x664f, 0x6644,
00663 0x6649, 0x6641, 0x665e, 0x665d, 0x6664, 0x6667, 0x6668, 0x665f,
00664 0x6662, 0x6670, 0x6683, 0x6688, 0x668e, 0x6689, 0x6684, 0x6698,
00665 0x669d, 0x66c1, 0x66b9, 0x66c9, 0x66be, 0x66bc,
00666 /* 0x5b */
00667 0x66c4, 0x66b8, 0x66d6, 0x66da, 0x66e0, 0x663f, 0x66e6, 0x66e9,
00668 0x66f0, 0x66f5, 0x66f7, 0x670f, 0x6716, 0x671e, 0x672e, 0x6727,
00669 0x9738, 0x672e, 0x673f, 0x6736, 0x6741, 0x6738, 0x6737, 0x6746,
00670 0x675e, 0x6760, 0x6759, 0x6763, 0x6764, 0x6789, 0x6770, 0x67a9,
00671 0x677c, 0x676a, 0x678b, 0x678c, 0x678b, 0x67a1, 0x6785, 0x67b7,
00672 0x67ef, 0x67b4, 0x67ec, 0x67b3, 0x67e9, 0x67b8, 0x67e4, 0x67de,
00673 0x67dd, 0x67e2, 0x67ee, 0x67b9, 0x67ce, 0x67c6, 0x67e7, 0x6a9c,
00674 0x681e, 0x6846, 0x6829, 0x6840, 0x684d, 0x6832, 0x684e, 0x68b3,
00675 0x682b, 0x6859, 0x6863, 0x6877, 0x687f, 0x689f, 0x688f, 0x68ad,
00676 0x6894, 0x689d, 0x689b, 0x6883, 0x6aae, 0x68b9, 0x6874, 0x68b5,
00677 0x68a0, 0x68ba, 0x690f, 0x688d, 0x687e, 0x6901, 0x68ca, 0x6908,
00678 0x68d8, 0x6922, 0x6926, 0x68e1, 0x690c, 0x68cd,
00679 /* 0x5c */
00680 0x68d4, 0x68e7, 0x68d5, 0x6936, 0x6912, 0x6904, 0x68d7, 0x68e3,
00681 0x6925, 0x68f9, 0x68e0, 0x68ef, 0x6928, 0x692a, 0x691a, 0x6923,
00682 0x6921, 0x68c6, 0x6979, 0x6977, 0x695c, 0x6978, 0x696b, 0x6954,
00683 0x697e, 0x696e, 0x6939, 0x6974, 0x693d, 0x6959, 0x6930, 0x6961,
00684 0x695e, 0x695d, 0x6981, 0x696a, 0x69b2, 0x69ae, 0x69d0, 0x69bf,
00685 0x69c1, 0x69d3, 0x69be, 0x69ce, 0x5be8, 0x69ca, 0x69dd, 0x69bb,
00686 0x69c3, 0x69a7, 0x6a2e, 0x6991, 0x69a0, 0x699c, 0x6995, 0x69b4,
00687 0x69de, 0x69e8, 0x6a02, 0x6a1b, 0x69ff, 0x6b0a, 0x69f9, 0x69f2,
00688 0x69e7, 0x6a05, 0x69b1, 0x6a1e, 0x69ed, 0x6a14, 0x69eb, 0x6a0a,
00689 0x6a12, 0x6ac1, 0x6a23, 0x6a13, 0x6a44, 0x6a0c, 0x6a72, 0x6a36,
00690 0x6a78, 0x6a47, 0x6a62, 0x6a59, 0x6a66, 0x6a48, 0x6a38, 0x6a22,
00691 0x6a90, 0x6a8d, 0x6aa0, 0x6a84, 0x6aa2, 0x6aa3,
00692 /* 0x5d */
00693 0x6a97, 0x8617, 0x6abb, 0x6ac3, 0x6ac2, 0x6ab8, 0x6ab3, 0x6aac,
00694 0x6ade, 0x6ad1, 0x6adf, 0x6aaa, 0x6ada, 0x6aea, 0x6afb, 0x6b05,
00695 0x8616, 0x6afa, 0x6b12, 0x6b16, 0x9b31, 0x6b1f, 0x6b38, 0x6b37,
00696 0x76dc, 0x6b39, 0x98ee, 0x6b47, 0x6b43, 0x6b49, 0x6b50, 0x6b59,
00697 0x6b54, 0x6b5b, 0x6b5f, 0x6b61, 0x6b78, 0x6b79, 0x6b7f, 0x6b80,
00698 0x6b84, 0x6b83, 0x6b8d, 0x6b98, 0x6b95, 0x6b9e, 0x6ba4, 0x6baa,
00699 0x6bab, 0x6baf, 0x6bb2, 0x6bb1, 0x6bb3, 0x6bb7, 0x6bbc, 0x6bc6,
00700 0x6bcb, 0x6bd3, 0x6bdf, 0x6bec, 0x6beb, 0x6bf3, 0x6bef, 0x9ebe,
00701 0x6c08, 0x6c13, 0x6c14, 0x6c1b, 0x6c24, 0x6c23, 0x6c5e, 0x6c55,
00702 0x6c62, 0x6c6a, 0x6c82, 0x6c8d, 0x6c9a, 0x6c81, 0x6c9b, 0x6c7e,
00703 0x6c68, 0x6c73, 0x6c92, 0x6c90, 0x6cc4, 0x6cf1, 0x6cd3, 0x6cbd,
00704 0x6cd7, 0x6cc5, 0x6cdd, 0x6cae, 0x6cb1, 0x6cbe,
00705 /* 0x5e */
00706 0x6cba, 0x6cdb, 0x6cef, 0x6cd9, 0x6cea, 0x6d1f, 0x884d, 0x6d36,
00707 0x6d2b, 0x6d3d, 0x6d38, 0x6d19, 0x6d35, 0x6d33, 0x6d12, 0x6d0c,
00708 0x6d63, 0x6d93, 0x6d64, 0x6d5a, 0x6d79, 0x6d59, 0x6d8e, 0x6d95,
00709 0x6fe4, 0x6d85, 0x6df9, 0x6e15, 0x6e0a, 0x6db5, 0x6dc7, 0x6de6,
00710 0x6db8, 0x6dc6, 0x6dec, 0x6dde, 0x6dcc, 0x6de8, 0x6dd2, 0x6dc5,
00711 0x6dfa, 0x6dd9, 0x6de4, 0x6dd5, 0x6dea, 0x6dee, 0x6e2d, 0x6e6e,
00712 0x6e2e, 0x6e19, 0x6e72, 0x6e5f, 0x6e3e, 0x6e23, 0x6e6b, 0x6e2b,
00713 0x6e76, 0x6e4d, 0x6e1f, 0x6e43, 0x6e3a, 0x6e4e, 0x6e24, 0x6eff,
```

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00714 0x6e1d, 0x6e38, 0x6e82, 0x6eaa, 0x6e98, 0x6ec9, 0x6eb7, 0x6ed3,
00715 0x6ebd, 0x6eaf, 0x6ec4, 0x6eb2, 0x6ed4, 0x6ed5, 0x6e8f, 0x6ea5,
00716 0x6ec2, 0x6e9f, 0x6ef4, 0x6f11, 0x704c, 0x6eec, 0x6ef8, 0x6efe,
00717 0x6f3f, 0x6ef2, 0x6f31, 0x6eef, 0x6f32, 0x6ecc,
00718 /* 0x5f */
00719 0x6f3e, 0x6f13, 0x6ef7, 0x6f86, 0x6f7a, 0x6f78, 0x6f81, 0x6f80,
00720 0x6f6f, 0x6f5b, 0x6ff3, 0x6f6d, 0x6f82, 0x6f7c, 0x6f58, 0x6f8e,
00721 0x6f91, 0x6fc2, 0x6f66, 0x6fb3, 0x6fa3, 0x6fa1, 0x6fa4, 0x6fb9,
00722 0x6fc6, 0x6faa, 0x6fdf, 0x6fd5, 0x6fec, 0x6fd4, 0x6fd8, 0x6ff1,
00723 0x6fee, 0x6fdb, 0x7009, 0x700b, 0x6ffa, 0x7011, 0x7001, 0x700f,
00724 0x6ffe, 0x701b, 0x701a, 0x6f74, 0x701d, 0x7018, 0x701f, 0x7030,
00725 0x703e, 0x7032, 0x7051, 0x7063, 0x7099, 0x7092, 0x70af, 0x70f1,
00726 0x70ac, 0x70b8, 0x70b3, 0x70ae, 0x70df, 0x70cb, 0x70dd, 0x70d9,
00727 0x7109, 0x70fd, 0x711c, 0x7119, 0x7165, 0x7155, 0x7188, 0x7166,
00728 0x7162, 0x714c, 0x714c, 0x7156, 0x716c, 0x718f, 0x71fb, 0x7184, 0x7195,
00729 0x71a8, 0x71ac, 0x71d7, 0x71b9, 0x71be, 0x71d2, 0x71c9, 0x71d4,
00730 0x71ce, 0x71e0, 0x71ec, 0x71e7, 0x71f5, 0x71fc,
00731 /* 0x60 */
00732 0x71f9, 0x71ff, 0x720d, 0x7210, 0x721b, 0x7228, 0x722d, 0x722c,
00733 0x7230, 0x7232, 0x723b, 0x723c, 0x723f, 0x7240, 0x7246, 0x724b,
00734 0x7258, 0x7274, 0x727e, 0x7282, 0x7281, 0x7287, 0x7292, 0x7296,
00735 0x72a2, 0x72a7, 0x72b9, 0x72b2, 0x72c3, 0x72c6, 0x72c4, 0x72ce,
00736 0x72d2, 0x72e2, 0x72e0, 0x72e1, 0x72f9, 0x72f7, 0x500f, 0x7317,
00737 0x730a, 0x731c, 0x7316, 0x7316, 0x731d, 0x7334, 0x732f, 0x7329, 0x7325,
00738 0x733e, 0x734e, 0x734f, 0x9ed8, 0x7357, 0x736a, 0x7368, 0x7370,
00739 0x7378, 0x7375, 0x737b, 0x737a, 0x73c8, 0x73b3, 0x73ce, 0x73bb,
00740 0x73c0, 0x73e5, 0x73ee, 0x73de, 0x74a2, 0x7405, 0x746f, 0x7425,
00741 0x73f8, 0x7432, 0x743a, 0x7455, 0x743f, 0x745f, 0x7459, 0x7441,
00742 0x745c, 0x7469, 0x7470, 0x7463, 0x746a, 0x7476, 0x747e, 0x748b,
00743 0x749e, 0x74a7, 0x74ca, 0x74cf, 0x74d4, 0x73f1,
00744 /* 0x61 */
00745 0x74e0, 0x74e3, 0x74e7, 0x74e9, 0x74ee, 0x74f2, 0x74f0, 0x74f1,
00746 0x74f8, 0x74ff, 0x7504, 0x7503, 0x7505, 0x750c, 0x750e, 0x750d,
00747 0x7515, 0x7513, 0x751e, 0x7526, 0x752c, 0x753c, 0x7544, 0x754d,
00748 0x754a, 0x7549, 0x755b, 0x7546, 0x755a, 0x7569, 0x7564, 0x7567,
00749 0x756b, 0x756d, 0x7578, 0x7576, 0x7586, 0x7587, 0x7574, 0x758a,
00750 0x7589, 0x7582, 0x7594, 0x759a, 0x759d, 0x75a5, 0x75a3, 0x75c2,
00751 0x75b3, 0x75c3, 0x75b5, 0x75bd, 0x75b8, 0x75bc, 0x75b1, 0x75cd,
00752 0x75ca, 0x75d2, 0x75d9, 0x75e3, 0x75de, 0x75fe, 0x75ff, 0x75fc,
00753 0x7601, 0x75f0, 0x75fa, 0x75f2, 0x75f3, 0x760b, 0x760d, 0x7609,
00754 0x761f, 0x7627, 0x7620, 0x7621, 0x7622, 0x7624, 0x7634, 0x7630,
00755 0x763b, 0x7647, 0x7648, 0x7646, 0x765c, 0x7658, 0x7661, 0x7662,
00756 0x7668, 0x7669, 0x766a, 0x7667, 0x766c, 0x7670,
00757 /* 0x62 */
00758 0x7672, 0x7676, 0x7678, 0x767c, 0x7680, 0x7683, 0x7688, 0x768b,
00759 0x768e, 0x7696, 0x7693, 0x7699, 0x769a, 0x76b0, 0x76b4, 0x76b8,
00760 0x76b9, 0x76ba, 0x76c2, 0x76cd, 0x76d6, 0x76de, 0x76e1,
00761 0x76e5, 0x76e7, 0x76ea, 0x862f, 0x76fb, 0x7708, 0x7707, 0x7704,
00762 0x7729, 0x7724, 0x771e, 0x7725, 0x7726, 0x771b, 0x7737, 0x7738,
00763 0x7747, 0x775a, 0x7768, 0x776b, 0x775b, 0x7765, 0x777f, 0x777e,
00764 0x7779, 0x778e, 0x778b, 0x7791, 0x77a0, 0x779e, 0x77b0, 0x77b6,
00765 0x77b9, 0x77bf, 0x77bc, 0x77bd, 0x77bb, 0x77c7, 0x77cd, 0x77d7,
00766 0x77da, 0x77dc, 0x77e3, 0x77ee, 0x77fc, 0x780c, 0x7812, 0x7926,
00767 0x7820, 0x792a, 0x7845, 0x788e, 0x7874, 0x7886, 0x787c, 0x789a,
00768 0x788c, 0x78a3, 0x78b5, 0x78aa, 0x78af, 0x78d1, 0x78c6, 0x78cb,
00769 0x78d4, 0x78be, 0x78bc, 0x78c5, 0x78ca, 0x78ec,
00770 /* 0x63 */
00771 0x78e7, 0x78da, 0x78fd, 0x78f4, 0x7907, 0x7912, 0x7911, 0x7919,
00772 0x792c, 0x792b, 0x7940, 0x7960, 0x7957, 0x795f, 0x795a, 0x7955,
00773 0x7953, 0x797a, 0x797f, 0x798a, 0x799d, 0x79a7, 0x9f4b, 0x79aa,
00774 0x79ae, 0x79b3, 0x79b9, 0x79ba, 0x79c9, 0x79d5, 0x79e7, 0x79ec,
00775 0x79e1, 0x79e3, 0x7a08, 0x7a0d, 0x7a18, 0x7a19, 0x7a20, 0x7a1f,
00776 0x7980, 0x7a31, 0x7a3b, 0x7a3e, 0x7a37, 0x7a43, 0x7a50, 0x7a49,
00777 0x7a61, 0x7a62, 0x7a69, 0x9f9d, 0x7a70, 0x7a79, 0x7a7d, 0x7a88,
00778 0x7a97, 0x7a95, 0x7a98, 0x7a96, 0x7aa9, 0x7ac8, 0x7ab0, 0x7ab6,
00779 0x7ac5, 0x7ac4, 0x7abf, 0x9083, 0x7ac7, 0x7aca, 0x7acd, 0x7acf,
00780 0x7ad5, 0x7ad3, 0x7ad9, 0x7ada, 0x7add, 0x7ae1, 0x7ae2, 0x7ae6,
00781 0x7aed, 0x7af0, 0x7b02, 0x7b0f, 0x7b0a, 0x7b06, 0x7b33, 0x7b18,
00782 0x7b19, 0x7b1e, 0x7b35, 0x7b28, 0x7b36, 0x7b50,
00783 /* 0x64 */
00784 0x7b7a, 0x7b04, 0x7b4d, 0x7b0b, 0x7b4c, 0x7b45, 0x7b75, 0x7b65,
00785 0x7b74, 0x7b67, 0x7b70, 0x7b71, 0x7b6c, 0x7b6e, 0x7b9d, 0x7b98,
00786 0x7b9f, 0x7b8d, 0x7b9c, 0x7b9a, 0x7b8b, 0x7b92, 0x7b8f, 0x7b5d,
00787 0x7b99, 0x7bcb, 0x7bc1, 0x7bcc, 0x7bcf, 0x7bb4, 0x7bc6, 0x7bdd,
00788 0x7be9, 0x7c11, 0x7c14, 0x7be6, 0x7be5, 0x7c60, 0x7c00, 0x7c07,
00789 0x7c13, 0x7bf3, 0x7bf7, 0x7c17, 0x7c0d, 0x7bf6, 0x7c23, 0x7c27,
00790 0x7c2a, 0x7c1f, 0x7c37, 0x7c2b, 0x7c3d, 0x7c4c, 0x7c43, 0x7c54,
00791 0x7c4f, 0x7c40, 0x7c50, 0x7c58, 0x7c5f, 0x7c64, 0x7c56, 0x7c65,
00792 0x7c6c, 0x7c75, 0x7c83, 0x7c90, 0x7ca4, 0x7cad, 0x7ca2, 0x7cab,
00793 0x7ca1, 0x7ca8, 0x7cb3, 0x7cb2, 0x7cb1, 0x7cae, 0x7cb9, 0x7cbd,
00794 0x7cc0, 0x7cc5, 0x7cc2, 0x7cd8, 0x7cd2, 0x7cdc, 0x7ce2, 0x9b3b,
00795 0x7cef, 0x7cf2, 0x7cf4, 0x7cf6, 0x7cfa, 0x7d06,
00796 /* 0x65 */
00797 0x7d02, 0x7d1c, 0x7d15, 0x7d0a, 0x7d45, 0x7d4b, 0x7d2e, 0x7d32,
00798 0x7d3f, 0x7d35, 0x7d46, 0x7d73, 0x7d56, 0x7d4e, 0x7d72, 0x7d68,
00799 0x7d6e, 0x7d4f, 0x7d63, 0x7d93, 0x7d89, 0x7d5b, 0x7d8f, 0x7d7d,
00800 0x7d9b, 0x7dba, 0x7dae, 0x7da3, 0x7db5, 0x7dc7, 0x7dbd, 0x7dab,

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00801 0x7e3d, 0x7da2, 0x7daf, 0x7ddc, 0x7db8, 0x7d9f, 0x7db0, 0x7dd8,
00802 0x7ddd, 0x7de4, 0x7dde, 0x7dfb, 0x7df2, 0x7de1, 0x7e05, 0x7e0a,
00803 0x7e23, 0x7e21, 0x7e12, 0x7e12, 0x7e31, 0x7e1f, 0x7e09, 0x7e0b, 0x7e22,
00804 0x7e46, 0x7e66, 0x7e3b, 0x7e35, 0x7e39, 0x7e43, 0x7e37, 0x7e32,
00805 0x7e3a, 0x7e67, 0x7e5d, 0x7e56, 0x7e5e, 0x7e59, 0x7e5a, 0x7e79,
00806 0x7e6a, 0x7e69, 0x7e7c, 0x7e7b, 0x7e83, 0x7dd5, 0x7e7d, 0x8fae,
00807 0x7e7f, 0x7e88, 0x7e89, 0x7e8c, 0x7e92, 0x7e90, 0x7e93, 0x7e94,
00808 0x7e96, 0x7e8e, 0x7e9b, 0x7e9c, 0x7f38, 0x7f3a,
00809 /* 0x66 */
00810 0x7f45, 0x7f4c, 0x7f4d, 0x7f4e, 0x7f50, 0x7f51, 0x7f55, 0x7f54,
00811 0x7f58, 0x7f5f, 0x7f60, 0x7f68, 0x7f69, 0x7f67, 0x7f78, 0x7f82,
00812 0x7f86, 0x7f83, 0x7f88, 0x7f87, 0x7f8c, 0x7f94, 0x7f9e, 0x7f9d,
00813 0x7f9a, 0x7fa3, 0x7faf, 0x7fb2, 0x7fb9, 0x7fae, 0x7fb6, 0x7fb8,
00814 0x8b71, 0x7fc5, 0x7fc6, 0x7fca, 0x7fd5, 0x7fd4, 0x7fe1, 0x7fe6,
00815 0x7fe9, 0x7ff3, 0x7ff9, 0x98dc, 0x8006, 0x8004, 0x800b, 0x8012,
00816 0x8018, 0x8019, 0x801c, 0x8021, 0x8028, 0x803f, 0x803b, 0x804a,
00817 0x8046, 0x8052, 0x8058, 0x805a, 0x805f, 0x8062, 0x8068, 0x8073,
00818 0x8072, 0x8070, 0x8076, 0x8079, 0x807d, 0x807f, 0x8084, 0x8086,
00819 0x8085, 0x809b, 0x8093, 0x809a, 0x80ad, 0x5190, 0x80ac, 0x80db,
00820 0x80e5, 0x80d9, 0x80dd, 0x80c4, 0x80da, 0x80d6, 0x8109, 0x80ef,
00821 0x80f1, 0x811b, 0x8129, 0x8123, 0x812f, 0x814b,
00822 /* 0x67 */
00823 0x968b, 0x8146, 0x813e, 0x8153, 0x8151, 0x80fc, 0x8171, 0x816e,
00824 0x8165, 0x8166, 0x8174, 0x8183, 0x8188, 0x818a, 0x8180, 0x8182,
00825 0x81a0, 0x8195, 0x81a4, 0x81a3, 0x815f, 0x8193, 0x81a9, 0x81b0,
00826 0x81b5, 0x81be, 0x81b8, 0x81bd, 0x81c0, 0x81c2, 0x81ba, 0x81c9,
00827 0x81cd, 0x81d1, 0x81d9, 0x81d8, 0x81c8, 0x81da, 0x81df, 0x81e0,
00828 0x81e7, 0x81fa, 0x81fb, 0x81fe, 0x8201, 0x8202, 0x8205, 0x8207,
00829 0x820a, 0x820d, 0x8210, 0x8216, 0x8229, 0x822b, 0x8238, 0x8233,
00830 0x8240, 0x8259, 0x8258, 0x825d, 0x825a, 0x825f, 0x8264, 0x8262,
00831 0x8268, 0x826a, 0x826b, 0x822e, 0x8271, 0x8277, 0x8278, 0x827e,
00832 0x828d, 0x8292, 0x82ab, 0x829f, 0x82bb, 0x82ac, 0x82e1, 0x82e3,
00833 0x82df, 0x82d2, 0x82f4, 0x82f3, 0x82fa, 0x8393, 0x8303, 0x82fb,
00834 0x82f9, 0x82de, 0x8306, 0x82dc, 0x8309, 0x82d9,
00835 /* 0x68 */
00836 0x8335, 0x8334, 0x8316, 0x8332, 0x8331, 0x8340, 0x8339, 0x8350,
00837 0x8345, 0x832f, 0x832b, 0x8317, 0x8318, 0x8385, 0x839a, 0x83aa,
00838 0x839f, 0x83a2, 0x8396, 0x8323, 0x838e, 0x8387, 0x838a, 0x837c,
00839 0x83b5, 0x8373, 0x8375, 0x83a0, 0x8389, 0x83a8, 0x83f4, 0x8413,
00840 0x83eb, 0x83ce, 0x83fd, 0x8403, 0x83d8, 0x840b, 0x83c1, 0x83f7,
00841 0x8407, 0x83e0, 0x83f2, 0x840d, 0x8422, 0x8420, 0x83bd, 0x8438,
00842 0x8506, 0x83fb, 0x83fd, 0x846d, 0x842a, 0x843c, 0x855a, 0x8484, 0x8477,
00843 0x846b, 0x84ad, 0x846e, 0x8482, 0x8469, 0x8446, 0x842c, 0x846f,
00844 0x8479, 0x8435, 0x84ca, 0x8462, 0x84b9, 0x84bf, 0x849f, 0x84d9,
00845 0x84cd, 0x84bb, 0x84da, 0x84d0, 0x84c1, 0x84c6, 0x84d6, 0x84a1,
00846 0x8521, 0x84ff, 0x84f4, 0x8517, 0x8518, 0x852c, 0x851f, 0x8515,
00847 0x8514, 0x84fc, 0x8540, 0x8563, 0x8558, 0x8548,
00848 /* 0x69 */
00849 0x8541, 0x8602, 0x854b, 0x8555, 0x8580, 0x85a4, 0x8588, 0x8591,
00850 0x858a, 0x85a8, 0x856d, 0x8594, 0x859b, 0x85ea, 0x8587, 0x859c,
00851 0x8577, 0x857e, 0x8590, 0x85c9, 0x85ba, 0x85cf, 0x85b9, 0x85d0,
00852 0x85d5, 0x85dd, 0x85e5, 0x85dc, 0x85f9, 0x860a, 0x8613, 0x860b,
00853 0x85fe, 0x85fa, 0x8606, 0x8622, 0x861a, 0x8630, 0x863f, 0x864d,
00854 0x4e55, 0x8654, 0x865f, 0x8667, 0x8671, 0x8693, 0x86a3, 0x86a9,
00855 0x86aa, 0x868b, 0x868c, 0x86b6, 0x86af, 0x86c4, 0x86c6, 0x86b0,
00856 0x86c9, 0x8823, 0x86ab, 0x86d4, 0x86de, 0x86e9, 0x86ec, 0x86df,
00857 0x86db, 0x86ef, 0x8712, 0x8706, 0x8708, 0x8700, 0x8703, 0x86fb,
00858 0x8711, 0x8709, 0x870d, 0x86f9, 0x870a, 0x8734, 0x873f, 0x8737,
00859 0x873b, 0x8725, 0x8729, 0x871a, 0x8760, 0x875f, 0x8778, 0x874c,
00860 0x874e, 0x8774, 0x8757, 0x8768, 0x876e, 0x8759,
00861 /* 0x6a */
00862 0x8753, 0x8763, 0x876a, 0x8805, 0x87a2, 0x879f, 0x8782, 0x87af,
00863 0x87cb, 0x87bd, 0x87c0, 0x87d0, 0x96d6, 0x87ab, 0x87c4, 0x87b3,
00864 0x87c7, 0x87c6, 0x87bb, 0x87ef, 0x87f2, 0x87e0, 0x880f, 0x880d,
00865 0x87fe, 0x87f6, 0x87f7, 0x880e, 0x87d2, 0x8811, 0x8816, 0x8815,
00866 0x8822, 0x8821, 0x8831, 0x8836, 0x8839, 0x8827, 0x883b, 0x8844,
00867 0x8842, 0x8852, 0x8859, 0x885e, 0x8862, 0x886b, 0x8881, 0x887e,
00868 0x889e, 0x8875, 0x887d, 0x88b5, 0x8872, 0x8882, 0x8897, 0x8892,
00869 0x88ae, 0x8899, 0x88a2, 0x888d, 0x88a4, 0x88b0, 0x88bf, 0x88b1,
00870 0x88c3, 0x88c4, 0x88d4, 0x88d8, 0x88d9, 0x88dd, 0x88f9, 0x8902,
00871 0x88fc, 0x88f4, 0x88e8, 0x88f2, 0x8904, 0x890c, 0x890a, 0x8913,
00872 0x8943, 0x891e, 0x8925, 0x892a, 0x892b, 0x8941, 0x8944, 0x893b,
00873 0x8936, 0x8938, 0x894c, 0x891d, 0x8960, 0x895e,
00874 /* 0x6b */
00875 0x8966, 0x8964, 0x896d, 0x896a, 0x896f, 0x8974, 0x8977, 0x897e,
00876 0x8983, 0x8988, 0x898a, 0x8993, 0x8998, 0x89a1, 0x89a9, 0x89a6,
00877 0x89ac, 0x89af, 0x89b2, 0x89ba, 0x89bd, 0x89bf, 0x89c0, 0x89da,
00878 0x89dc, 0x89dd, 0x89e7, 0x89f4, 0x89f8, 0x8a03, 0x8a16, 0x8a10,
00879 0x8a0c, 0x8a1b, 0x8a1d, 0x8a25, 0x8a36, 0x8a41, 0x8a55, 0x8a52,
00880 0x8a46, 0x8a48, 0x8a7c, 0x8a6d, 0x8a6c, 0x8a62, 0x8a85, 0x8a82,
00881 0x8a84, 0x8aa8, 0x8aa1, 0x8a91, 0x8aa5, 0x8aa6, 0x8a9a, 0x8aa3,
00882 0x8ac4, 0x8acd, 0x8ac2, 0x8ada, 0x8aeb, 0x8af3, 0x8aef, 0x8ae4,
00883 0x8af1, 0x8b14, 0x8ae0, 0x8ae2, 0x8af7, 0x8ade, 0x8adb, 0x8b0c,
00884 0x8b07, 0x8b1a, 0x8ae1, 0x8b16, 0x8b10, 0x8b17, 0x8b20, 0x8b33,
00885 0x97ab, 0x8b26, 0x8b2b, 0x8b3e, 0x8b28, 0x8b41, 0x8b4c, 0x8b4f,
00886 0x8b4e, 0x8b49, 0x8b56, 0x8b5b, 0x8b5a, 0x8b6b,
00887 /* 0x6c */
```

```
00888 0x8b5f, 0x8b6c, 0x8b6f, 0x8b74, 0x8b7d, 0x8b80, 0x8b8c, 0x8b8e,
00889 0x8b92, 0x8b93, 0x8b96, 0x8b99, 0x8b9a, 0x8c3a, 0x8c41, 0x8c3f,
00890 0x8c48, 0x8c4c, 0x8c4c, 0x8c4e, 0x8c50, 0x8c55, 0x8c62, 0x8c6c, 0x8c78,
00891 0x8c7a, 0x8c82, 0x8c89, 0x8c85, 0x8c8a, 0x8c8d, 0x8c8e, 0x8c94,
00892 0x8c7c, 0x8c98, 0x621d, 0x8cad, 0x8caa, 0x8cbd, 0x8cb2, 0x8cb3,
00893 0x8cae, 0x8cb6, 0x8cc8, 0x8cc1, 0x8cce, 0x8ce3, 0x8cda, 0x8cfd,
00894 0x8cfa, 0x8cfb, 0x8d04, 0x8d05, 0x8d0a, 0x8d07, 0x8d0f, 0x8d0d,
00895 0x8d10, 0x9f4e, 0x8d13, 0x8ccd, 0x8d14, 0x8d16, 0x8d67, 0x8d6d,
00896 0x8d71, 0x8d73, 0x8d81, 0x8d99, 0x8dc2, 0x8dbe, 0x8dba, 0x8dcf,
00897 0x8dda, 0x8dd6, 0x8dcc, 0x8ddb, 0x8dcb, 0x8dea, 0x8deb, 0x8ddf,
00898 0x8de3, 0x8dfc, 0x8e08, 0x8e09, 0x8dff, 0x8e1d, 0x8e1e, 0x8e10,
00899 0x8e1f, 0x8e42, 0x8e35, 0x8e30, 0x8e34, 0x8e4a,
00900 /* 0x6d */
00901 0x8e47, 0x8e49, 0x8e4c, 0x8e50, 0x8e48, 0x8e59, 0x8e64, 0x8e60,
00902 0x8e2a, 0x8e63, 0x8e55, 0x8e76, 0x8e72, 0x8e7c, 0x8e81, 0x8e87,
00903 0x8e85, 0x8e84, 0x8e8b, 0x8e8a, 0x8e93, 0x8e91, 0x8e94, 0x8e99,
00904 0x8eaa, 0x8ea1, 0x8eac, 0x8eb0, 0x8ec6, 0x8eb1, 0x8ebe, 0x8ec5,
00905 0x8ec8, 0x8ecb, 0x8edb, 0x8ee3, 0x8efc, 0x8efb, 0x8eeb, 0x8efe,
00906 0x8f0a, 0x8f05, 0x8f15, 0x8f12, 0x8f19, 0x8f13, 0x8f1c, 0x8f1f,
00907 0x8f1b, 0x8f0c, 0x8f26, 0x8f33, 0x8f3b, 0x8f39, 0x8f45, 0x8f42,
00908 0x8f3e, 0x8f4c, 0x8f49, 0x8f46, 0x8f4e, 0x8f57, 0x8f5c, 0x8f62,
00909 0x8f63, 0x8f64, 0x8f9c, 0x8f9f, 0x8fa3, 0x8fad, 0x8faf, 0x8fb7,
00910 0x8fda, 0x8fe5, 0x8fe2, 0x8fea, 0x8fef, 0x9087, 0x8fff4, 0x9005,
00911 0x8fff9, 0x8ffa, 0x9011, 0x9015, 0x9021, 0x900d, 0x901e, 0x9016,
00912 0x900b, 0x9027, 0x9036, 0x9035, 0x9039, 0x8ff8,
00913 /* 0x6e */
00914 0x904f, 0x9050, 0x9051, 0x9052, 0x900e, 0x9049, 0x903e, 0x9056,
00915 0x9058, 0x905e, 0x9068, 0x906f, 0x9076, 0x96a8, 0x9072, 0x9082,
00916 0x907d, 0x9081, 0x9080, 0x908a, 0x9089, 0x908f, 0x90a8, 0x90af,
00917 0x90b1, 0x90b5, 0x90e2, 0x90e4, 0x6248, 0x90db, 0x9102, 0x9112,
00918 0x9119, 0x9132, 0x9130, 0x914a, 0x9156, 0x9158, 0x9163, 0x9165,
00919 0x9169, 0x9173, 0x9172, 0x918b, 0x9189, 0x9182, 0x91a2, 0x91ab,
00920 0x91af, 0x91aa, 0x91b5, 0x91b4, 0x91ba, 0x91c0, 0x91c1, 0x91c9,
00921 0x91cb, 0x91d0, 0x91d6, 0x91df, 0x91e1, 0x91db, 0x91fc, 0x91f5,
00922 0x91f6, 0x921e, 0x91ff, 0x9214, 0x922c, 0x9215, 0x9211, 0x925e,
00923 0x9257, 0x9245, 0x9249, 0x9264, 0x9248, 0x9295, 0x923f, 0x924b,
00924 0x9250, 0x929c, 0x9296, 0x9293, 0x929b, 0x925a, 0x92cf, 0x92b9,
00925 0x92b7, 0x92e9, 0x930f, 0x92fa, 0x9344, 0x932e,
00926 /* 0x6f */
00927 0x9319, 0x9322, 0x931a, 0x9323, 0x933a, 0x9335, 0x933b, 0x935c,
00928 0x9360, 0x937c, 0x936e, 0x9356, 0x93b0, 0x93ac, 0x93ad, 0x9394,
00929 0x93b9, 0x93d6, 0x93d7, 0x93e8, 0x93e5, 0x93d8, 0x93c3, 0x93dd,
00930 0x93d0, 0x93c8, 0x93e4, 0x941a, 0x9414, 0x9413, 0x9403, 0x9407,
00931 0x9410, 0x9436, 0x942b, 0x9435, 0x9421, 0x943a, 0x9441, 0x9452,
00932 0x9444, 0x945b, 0x9460, 0x9462, 0x945e, 0x946a, 0x9229, 0x9470,
00933 0x9475, 0x9477, 0x947d, 0x945a, 0x947c, 0x947e, 0x9481, 0x947f,
00934 0x9582, 0x9587, 0x958a, 0x9594, 0x9596, 0x9598, 0x9599, 0x95a0,
00935 0x95a8, 0x95a7, 0x95ad, 0x95bc, 0x95bb, 0x95b9, 0x95be, 0x95ca,
00936 0x6ff6, 0x95c3, 0x95cd, 0x95cc, 0x95d5, 0x95d4, 0x95d6, 0x95dc,
00937 0x95e1, 0x95e5, 0x95e2, 0x9621, 0x9628, 0x962e, 0x962f, 0x9642,
00938 0x964c, 0x964f, 0x964b, 0x9677, 0x965c, 0x965e,
00939 /* 0x70 */
00940 0x965d, 0x965f, 0x9666, 0x9672, 0x966c, 0x968d, 0x9698, 0x9695,
00941 0x9697, 0x96aa, 0x96a7, 0x96b1, 0x96b2, 0x96b0, 0x96b4, 0x96b6,
00942 0x96b8, 0x96b9, 0x96ce, 0x96cb, 0x96c9, 0x96cd, 0x894d, 0x96dc,
00943 0x970d, 0x96d5, 0x96f9, 0x9704, 0x9706, 0x9708, 0x9713, 0x970e,
00944 0x9711, 0x970f, 0x9716, 0x9719, 0x9724, 0x972a, 0x9730, 0x9739,
00945 0x973d, 0x973e, 0x9744, 0x9746, 0x9748, 0x9742, 0x9749, 0x975c,
00946 0x9760, 0x9764, 0x9766, 0x9768, 0x52d2, 0x976b, 0x9771, 0x9779,
00947 0x9785, 0x977c, 0x9781, 0x977a, 0x9786, 0x978b, 0x978f, 0x9790,
00948 0x979c, 0x97a8, 0x97a6, 0x97a3, 0x97b3, 0x97b4, 0x97c3, 0x97c6,
00949 0x97c8, 0x97cb, 0x97dc, 0x97ed, 0x97f4, 0x97f2, 0x7adf, 0x97f6,
00950 0x97f5, 0x980f, 0x980c, 0x9838, 0x9824, 0x9821, 0x9837, 0x983d,
00951 0x9846, 0x984f, 0x984b, 0x986b, 0x986f, 0x9870,
00952 /* 0x71 */
00953 0x9871, 0x9874, 0x9873, 0x98aa, 0x98af, 0x98b1, 0x98b6, 0x98c4,
00954 0x98c3, 0x98c6, 0x98e9, 0x98eb, 0x9903, 0x9909, 0x9912, 0x9914,
00955 0x9918, 0x9921, 0x991d, 0x991e, 0x9924, 0x9920, 0x992c, 0x992e,
00956 0x993d, 0x993b, 0x9942, 0x9949, 0x9945, 0x9950, 0x994b, 0x9951,
00957 0x9952, 0x994c, 0x9955, 0x9997, 0x9998, 0x99a5, 0x99ad, 0x99ae,
00958 0x99bc, 0x99df, 0x99db, 0x99dd, 0x99d8, 0x99d1, 0x99ed, 0x99ee,
00959 0x99f1, 0x99f2, 0x99fb, 0x99f8, 0x9a01, 0x9a0f, 0x9a05, 0x99e2,
00960 0x9a19, 0x9a2b, 0x9a37, 0x9a45, 0x9a42, 0x9a40, 0x9a43, 0x9a3e,
00961 0x9a55, 0x9a4d, 0x9a5b, 0x9a57, 0x9a5f, 0x9a62, 0x9a65, 0x9a64,
00962 0x9a69, 0x9a6b, 0x9a6a, 0x9aad, 0x9ab0, 0x9abc, 0x9ac0, 0x9acf,
00963 0x9ad1, 0x9ad3, 0x9ad4, 0x9ade, 0x9adf, 0x9ae2, 0x9ae3, 0x9ae6,
00964 0x9aef, 0x9aeb, 0x9aee, 0x9af4, 0x9af1, 0x9af7,
00965 /* 0x72 */
00966 0x9afb, 0x9b06, 0x9b18, 0x9b1a, 0x9b1f, 0x9b22, 0x9b23, 0x9b25,
00967 0x9b27, 0x9b28, 0x9b29, 0x9b2a, 0x9b2e, 0x9b2f, 0x9b32, 0x9b44,
00968 0x9b43, 0x9b4f, 0x9b4d, 0x9b4e, 0x9b51, 0x9b58, 0x9b74, 0x9b93,
00969 0x9b83, 0x9b91, 0x9b96, 0x9b97, 0x9b9f, 0x9ba0, 0x9ba8, 0x9bb4,
00970 0x9bc0, 0x9bba, 0x9bb9, 0x9bc6, 0x9bcf, 0x9bd1, 0x9bd2, 0x9be3,
00971 0x9be2, 0x9be4, 0x9bd4, 0x9be1, 0x9c3a, 0x9bf2, 0x9bf1, 0x9bf0,
00972 0x9c15, 0x9c14, 0x9c09, 0x9c13, 0x9c0c, 0x9c06, 0x9c08, 0x9c12,
00973 0x9c0a, 0x9c04, 0x9c2e, 0x9c1b, 0x9c25, 0x9c24, 0x9c21, 0x9c30,
00974 0x9c47, 0x9c32, 0x9c46, 0x9c3e, 0x9c5a, 0x9c60, 0x9c67, 0x9c76,
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00975 0x9c78, 0x9ce7, 0x9cec, 0x9cf0, 0x9d09, 0x9d08, 0x9ceb, 0x9d03,
00976 0x9d06, 0x9d2a, 0x9d26, 0x9daf, 0x9d23, 0x9d1f, 0x9d44, 0x9d15,
00977 0x9d12, 0x9d41, 0x9d3f, 0x9d3e, 0x9d46, 0x9d48,
00978 /* 0x73 */
00979 0x9d5d, 0x9d5e, 0x9d64, 0x9d51, 0x9d50, 0x9d59, 0x9d72, 0x9d89,
00980 0x9d87, 0x9dab, 0x9d6f, 0x9d7a, 0x9d9a, 0x9da4, 0x9da9, 0x9db2,
00981 0x9dc4, 0x9dc1, 0x9dbb, 0x9db8, 0x9dba, 0x9dc6, 0x9dcf, 0x9dc2,
00982 0x9dd9, 0x9dd3, 0x9df8, 0x9de6, 0x9ded, 0x9def, 0x9dfd, 0x9e1a,
00983 0x9e1b, 0x9e1e, 0x9e75, 0x9e79, 0x9e7d, 0x9e81, 0x9e88, 0x9e8b,
00984 0x9e8c, 0x9e92, 0x9e95, 0x9e91, 0x9e9d, 0x9ea5, 0x9ea9, 0x9eb8,
00985 0x9eaa, 0x9ead, 0x9761, 0x9ecc, 0x9ece, 0x9ecf, 0x9ed0, 0x9ed4,
00986 0x9edc, 0x9ede, 0x9edd, 0x9ee0, 0x9ee5, 0x9ee8, 0x9eef, 0x9ef4,
00987 0x9ef6, 0x9ef7, 0x9ef9, 0x9efb, 0x9efc, 0x9efd, 0x9f07, 0x9f08,
00988 0x76b7, 0x9f15, 0x9f21, 0x9f2c, 0x9f3e, 0x9f4a, 0x9f52, 0x9f54,
00989 0x9f63, 0x9f5f, 0x9f60, 0x9f61, 0x9f66, 0x9f67, 0x9f6c, 0x9f6a,
00990 0x9f77, 0x9f72, 0x9f76, 0x9f95, 0x9f9c, 0x9fa0,
00991 /* 0x74 */
00992 0x582f, 0x69c7, 0x9059, 0x7464, 0x51dc, 0x7199,
00993 };
00994
00995 static int
00996 jisx0208_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00997 {
00998     unsigned char c1 = (s[0] & 0x7F);
00999     if ((c1 >= 0x21 && c1 <= 0x28) || (c1 >= 0x30 && c1 <= 0x74)) {
01000         if (n >= 2) {
01001             unsigned char c2 = (s[1] & 0x7F);
01002             if (c2 >= 0x21 && c2 < 0x7f) {
01003                 unsigned int i = 94 * (c1 - 0x21) + (c2 - 0x21);
01004                 unsigned short wc = 0xffff;
01005                 if (i < 1410) {
01006                     if (i < 690)
01007                         wc = jisx0208_2uni_page21[i];
01008                 } else {
01009                     if (i < 7808)
01010                         wc = jisx0208_2uni_page30[i-1410];
01011                 }
01012                 if (wc != 0xffff) {
01013                     *pwc = (ucs4_t) wc;
01014                     return 2;
01015                 }
01016             }
01017             return RET_ILSEQ;
01018         }
01019         return RET_TOOFEW(0);
01020     }
01021     return RET_ILSEQ;
01022 }
01023 #endif /* NEED_TOWC */
01024
01025 #ifdef NEED_TOMB
01026 static const unsigned short jisx0208_2charset[6879] = {
01027 0x2140, 0x2171, 0x2172, 0x2178, 0x212f, 0x224c, 0x216b, 0x215e,
01028 0x212d, 0x2279, 0x215f, 0x2160, 0x2621, 0x2622, 0x2623, 0x2624,
01029 0x2625, 0x2626, 0x2627, 0x2628, 0x2629, 0x262a, 0x262b, 0x262c,
01030 0x262d, 0x262e, 0x262f, 0x2630, 0x2631, 0x2632, 0x2633, 0x2634,
01031 0x2635, 0x2636, 0x2637, 0x2638, 0x2641, 0x2642, 0x2643, 0x2644,
01032 0x2645, 0x2646, 0x2647, 0x2648, 0x2649, 0x264a, 0x264b, 0x264c,
01033 0x264d, 0x264e, 0x264f, 0x2650, 0x2651, 0x2652, 0x2653, 0x2654,
01034 0x2655, 0x2656, 0x2657, 0x2658, 0x2727, 0x2721, 0x2722, 0x2723,
01035 0x2724, 0x2725, 0x2726, 0x2728, 0x2729, 0x272a, 0x272b, 0x272c,
01036 0x272d, 0x272e, 0x272f, 0x2730, 0x2731, 0x2732, 0x2733, 0x2734,
01037 0x2735, 0x2736, 0x2737, 0x2738, 0x2739, 0x273a, 0x273b, 0x273c,
01038 0x273d, 0x273e, 0x273f, 0x2740, 0x2741, 0x2751, 0x2752, 0x2753,
01039 0x2754, 0x2755, 0x2756, 0x2758, 0x2759, 0x275a, 0x275b, 0x275c,
01040 0x275d, 0x275e, 0x275f, 0x2760, 0x2761, 0x2762, 0x2763, 0x2764,
01041 0x2765, 0x2766, 0x2767, 0x2768, 0x2769, 0x276a, 0x276b, 0x276c,
01042 0x276d, 0x276e, 0x276f, 0x2770, 0x2771, 0x2757, 0x213e, 0x213d,
01043 0x2142, 0x2146, 0x2147, 0x2148, 0x2149, 0x2277, 0x2278, 0x2145,
01044 0x2144, 0x2273, 0x216c, 0x216d, 0x2228, 0x216e, 0x2272, 0x222b,
01045 0x222c, 0x222a, 0x222d, 0x224d, 0x224e, 0x224f, 0x225f, 0x2250,
01046 0x2260, 0x223a, 0x223b, 0x215d, 0x2265, 0x2267, 0x2167, 0x225c,
01047 0x224a, 0x224b, 0x2241, 0x2240, 0x2269, 0x226a, 0x2168, 0x2268,
01048 0x2266, 0x2262, 0x2162, 0x2261, 0x2165, 0x2166, 0x2263, 0x2264,
01049 0x223e, 0x223f, 0x223c, 0x223d, 0x225d, 0x225e, 0x2821, 0x282c,
01050 0x2822, 0x282d, 0x2823, 0x282e, 0x2824, 0x282f, 0x2826, 0x2831,
01051 0x2825, 0x2830, 0x2832, 0x2837, 0x283c, 0x2837, 0x2832, 0x2829, 0x283e,
01052 0x2839, 0x2834, 0x2828, 0x2838, 0x283d, 0x2833, 0x282a, 0x283a,
01053 0x283f, 0x2835, 0x282b, 0x283b, 0x2840, 0x2836, 0x2223, 0x2222,
01054 0x2225, 0x2224, 0x2227, 0x2226, 0x2221, 0x217e, 0x217b, 0x217d,
01055 0x217c, 0x227e, 0x217a, 0x2179, 0x216a, 0x2169, 0x2276, 0x2275,
01056 0x2274, 0x2121, 0x2122, 0x2123, 0x2137, 0x2139, 0x213a, 0x213b,
01057 0x2152, 0x2153, 0x2154, 0x2155, 0x2156, 0x2157, 0x2158, 0x2159,
01058 0x215a, 0x215b, 0x2229, 0x222e, 0x214c, 0x214d, 0x2141, 0x2421,
01059 0x2422, 0x2423, 0x2424, 0x2425, 0x2426, 0x2427, 0x2428, 0x2429,
01060 0x242a, 0x242b, 0x242c, 0x242d, 0x242e, 0x242f, 0x2430, 0x2431,
01061 0x2432, 0x2433, 0x2434, 0x2435, 0x2436, 0x2437, 0x2438, 0x2439,
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01062 0x243a, 0x243b, 0x243c, 0x243d, 0x243e, 0x243f, 0x2440, 0x2441,
01063 0x2442, 0x2443, 0x2444, 0x2445, 0x2446, 0x2447, 0x2448, 0x2449,
01064 0x244a, 0x244b, 0x244c, 0x244d, 0x244e, 0x244f, 0x2450, 0x2451,
01065 0x2452, 0x2453, 0x2454, 0x2455, 0x2456, 0x2457, 0x2458, 0x2459,
01066 0x245a, 0x245b, 0x245c, 0x245d, 0x245e, 0x245f, 0x2460, 0x2461,
01067 0x2462, 0x2463, 0x2464, 0x2465, 0x2466, 0x2467, 0x2468, 0x2469,
01068 0x246a, 0x246b, 0x246c, 0x246d, 0x246e, 0x246f, 0x2470, 0x2471,
01069 0x2472, 0x2473, 0x212b, 0x212c, 0x2135, 0x2136, 0x2521, 0x2522,
01070 0x2523, 0x2524, 0x2525, 0x2526, 0x2527, 0x2528, 0x2529, 0x252a,
01071 0x252b, 0x252c, 0x252d, 0x252e, 0x252f, 0x2530, 0x2531, 0x2532,
01072 0x2533, 0x2534, 0x2535, 0x2536, 0x2537, 0x2538, 0x2539, 0x253a,
01073 0x253b, 0x253c, 0x253d, 0x253e, 0x253f, 0x2540, 0x2541, 0x2542,
01074 0x2543, 0x2544, 0x2545, 0x2546, 0x2547, 0x2548, 0x2549, 0x254a,
01075 0x254b, 0x254c, 0x254d, 0x254e, 0x254f, 0x2550, 0x2551, 0x2552,
01076 0x2553, 0x2554, 0x2555, 0x2556, 0x2557, 0x2558, 0x2559, 0x255a,
01077 0x255b, 0x255c, 0x255d, 0x255e, 0x255f, 0x2560, 0x2561, 0x2562,
01078 0x2563, 0x2564, 0x2565, 0x2566, 0x2567, 0x2568, 0x2569, 0x256a,
01079 0x256b, 0x256c, 0x256d, 0x256e, 0x256f, 0x2570, 0x2571, 0x2572,
01080 0x2573, 0x2574, 0x2575, 0x2576, 0x2126, 0x213c, 0x2133, 0x2134,
01081 0x306c, 0x437a, 0x3c37, 0x4b7c, 0x3e66, 0x3b30, 0x3e65, 0x323c,
01082 0x4954, 0x4d3f, 0x5022, 0x312f, 0x336e, 0x5023, 0x4024, 0x5242,
01083 0x3556, 0x4a3a, 0x3e67, 0x4e3e, 0x4a42, 0x5024, 0x4366, 0x5025,
01084 0x367a, 0x5026, 0x345d, 0x4330, 0x3c67, 0x5027, 0x5028, 0x5029,
01085 0x4735, 0x3557, 0x4737, 0x4663, 0x3843, 0x4b33, 0x6949, 0x502a,
01086 0x3e68, 0x502b, 0x3235, 0x3665, 0x3870, 0x4c69, 0x5626, 0x4d70,
01087 0x467d, 0x3425, 0x3535, 0x502c, 0x502d, 0x4e3b, 0x4d3d, 0x4168,
01088 0x502f, 0x3b76, 0x4673, 0x5032, 0x313e, 0x385f, 0x385e, 0x3066,
01089 0x4f4b, 0x4f4a, 0x3a33, 0x3021, 0x5033, 0x5034, 0x5035, 0x4b34,
01090 0x5036, 0x3872, 0x3067, 0x4b72, 0x357c, 0x357d, 0x357e, 0x4462,
01091 0x4e3c, 0x5037, 0x5038, 0x5039, 0x3f4d, 0x3d3a, 0x3f4e, 0x503e,
01092 0x503c, 0x503d, 0x3558, 0x3a23, 0x3270, 0x503b, 0x503a, 0x4a29,
01093 0x3b46, 0x3b45, 0x423e, 0x503f, 0x4955, 0x4067, 0x2138, 0x5040,
01094 0x5042, 0x4265, 0x4e61, 0x304a, 0x5041, 0x323e, 0x3644, 0x4367,
01095 0x376f, 0x5043, 0x4724, 0x346b, 0x5044, 0x304b, 0x3860, 0x346c,
01096 0x497a, 0x4832, 0x3559, 0x3271, 0x5067, 0x4541, 0x476c, 0x5046,
01097 0x483c, 0x4e62, 0x3f2d, 0x3b47, 0x3b77, 0x3240, 0x4451, 0x4322,
01098 0x504a, 0x304c, 0x4463, 0x3d3b, 0x3a34, 0x4d24, 0x424e, 0x323f,
01099 0x5049, 0x4d3e, 0x5045, 0x5047, 0x3a6e, 0x5048, 0x5524, 0x5050,
01100 0x5053, 0x5051, 0x3242, 0x4a3b, 0x504b, 0x504f, 0x3873, 0x3b48,
01101 0x3426, 0x5054, 0x504c, 0x4e63, 0x3b78, 0x504d, 0x5052, 0x5055,
01102 0x504e, 0x3621, 0x304d, 0x3622, 0x3241, 0x5525, 0x4b79, 0x496e,
01103 0x3874, 0x3f2f, 0x4e37, 0x4a58, 0x3738, 0x4225, 0x3264, 0x3d53,
01104 0x5059, 0x505e, 0x505c, 0x5057, 0x422f, 0x505a, 0x505d, 0x505b,
01105 0x4a5d, 0x5058, 0x3f2e, 0x4b73, 0x505f, 0x5060, 0x3d24, 0x506d,
01106 0x4750, 0x4936, 0x5068, 0x4a70, 0x3236, 0x506c, 0x506e, 0x506f,
01107 0x4152, 0x3844, 0x475c, 0x6047, 0x506e, 0x455d, 0x5063, 0x3876,
01108 0x3875, 0x5061, 0x3c5a, 0x5069, 0x4a6f, 0x434d, 0x5065, 0x3771,
01109 0x5062, 0x506a, 0x5064, 0x4e51, 0x506b, 0x4f41, 0x3666, 0x3770,
01110 0x5070, 0x5071, 0x5075, 0x304e, 0x4a50, 0x5074, 0x5073, 0x5077,
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01112 0x5079, 0x3536, 0x507a, 0x507c, 0x4b35, 0x3766, 0x3b31, 0x4877,
01113 0x507b, 0x3a45, 0x4d43, 0x507e, 0x5123, 0x507d, 0x3a44, 0x3d7d,
01114 0x3739, 0x5124, 0x364f, 0x5121, 0x5122, 0x462f, 0x417c, 0x3623,
01115 0x4b4d, 0x5125, 0x4e3d, 0x5126, 0x5129, 0x5127, 0x414e, 0x5128,
01116 0x512a, 0x512c, 0x512b, 0x4a48, 0x3537, 0x512e, 0x512f, 0x322f,
01117 0x512d, 0x3c74, 0x5132, 0x5131, 0x5130, 0x5056, 0x5133, 0x3d7e,
01118 0x5134, 0x4d25, 0x4c59, 0x5136, 0x5135, 0x5138, 0x5137, 0x5139,
01119 0x513a, 0x3074, 0x3835, 0x373b, 0x3d3c, 0x437b, 0x3624, 0x4068,
01120 0x3877, 0x396e, 0x513c, 0x4c48, 0x4546, 0x3b79, 0x513b, 0x513d,
01121 0x455e, 0x3375, 0x513e, 0x467e, 0x4134, 0x5140, 0x5141, 0x482c,
01122 0x3878, 0x4f3b, 0x5142, 0x3626, 0x4a3c, 0x4236, 0x3671, 0x4535,
01123 0x3773, 0x5143, 0x5144, 0x4662, 0x315f, 0x5147, 0x3a7d, 0x5146,
01124 0x3a46, 0x5148, 0x5149, 0x666e, 0x5149, 0x4b41, 0x514a, 0x514c,
01125 0x3e69, 0x3c4c, 0x3427, 0x514f, 0x514d, 0x4c3d, 0x514e, 0x495a,
01126 0x5150, 0x5151, 0x5152, 0x455f, 0x5156, 0x5154, 0x5155, 0x5153,
01127 0x3a63, 0x5157, 0x4c6a, 0x4e64, 0x5158, 0x4028, 0x5159, 0x3d5a,
01128 0x515a, 0x437c, 0x4e3f, 0x4560, 0x5245, 0x515b, 0x7425, 0x3645,
01129 0x515c, 0x4b5e, 0x3d68, 0x427c, 0x515e, 0x4664, 0x515f, 0x5160,
01130 0x332e, 0x5161, 0x3627, 0x464c, 0x317a, 0x3d50, 0x4821, 0x5162,
01131 0x4561, 0x3f4f, 0x5163, 0x4a2c, 0x405a, 0x3422, 0x3429, 0x5164,
01132 0x5166, 0x373a, 0x5165, 0x4e73, 0x3d69, 0x483d, 0x4a4c, 0x5167,
01133 0x4d78, 0x5168, 0x5169, 0x457e, 0x516a, 0x4029, 0x3a7e, 0x3774,
01134 0x516b, 0x3b49, 0x396f, 0x4466, 0x516d, 0x4227, 0x3a6f, 0x516e,
01135 0x516f, 0x4130, 0x516c, 0x5171, 0x4b36, 0x3964, 0x5170, 0x3775,
01136 0x3a5e, 0x476d, 0x5174, 0x5172, 0x497b, 0x3e6a, 0x517b, 0x3364,
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01139 0x4e74, 0x3d75, 0x4558, 0x3965, 0x5222, 0x5223, 0x4e65, 0x4f2b,
01140 0x5225, 0x387a, 0x5224, 0x332f, 0x5226, 0x4b56, 0x443c, 0x4d26,
01141 0x4a59, 0x5227, 0x7055, 0x4630, 0x5228, 0x342a, 0x4c33, 0x3e21,
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01143 0x372e, 0x522e, 0x522f, 0x5230, 0x5231, 0x3c5b, 0x3878, 0x4c5e,
01144 0x4c68, 0x4677, 0x4a71, 0x5232, 0x5233, 0x5235, 0x5237, 0x5236,
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01146 0x523a, 0x485b, 0x523b, 0x523c, 0x523d, 0x523e, 0x4924, 0x3668,
01147 0x3065, 0x463f, 0x523f, 0x3d3d, 0x4069, 0x5241, 0x5240, 0x3e23,
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01151 0x3237, 0x524a, 0x362a, 0x524c, 0x4c71, 0x524d, 0x4e52, 0x387c,
01152 0x3836, 0x524e, 0x5250, 0x524f, 0x3f5f, 0x3139, 0x315e, 0x5251,
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01889 static const Summary16 jisx0208_uni2indx_page00[16] = {
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01895 };
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01904 { 109, 0xffff }, { 125, 0x0002 },
01905 };
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01922 /* 0x2300 */
01923 { 181, 0x0000 }, { 181, 0x0004 },
01924 };
01925 static const Summary16 jisx0208_uni2indx_page25[23] = {
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01931 /* 0x2600 */
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01935 static const Summary16 jisx0208_uni2indx_page30[16] = {
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01941 };
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02289 { 6038, 0x8040 }, { 6040, 0x0701 }, { 6044, 0xd94d }, { 6053, 0x0c24 },
02290 { 6057, 0x2810 }, { 6060, 0x1850 }, { 6064, 0x5001 }, { 6067, 0x5020 },
02291 { 6070, 0x1000 }, { 6071, 0x04d0 }, { 6075, 0x7080 }, { 6079, 0x0201 },
02292 { 6081, 0x0108 }, { 6083, 0x21c3 }, { 6089, 0x0132 }, { 6093, 0x0000 },
02293 /* 0x9400 */
02294 { 6093, 0x0088 }, { 6095, 0x0719 }, { 6101, 0x0802 }, { 6103, 0x0560 },
02295 { 6107, 0x0012 }, { 6109, 0x4c0e }, { 6115, 0x0405 }, { 6118, 0xf0a1 },
02296 { 6125, 0x0002 }, { 6126, 0x0000 }, { 6126, 0x0000 }, { 6126, 0x0000 },
02297 { 6126, 0x0000 }, { 6126, 0x0000 }, { 6126, 0x0000 }, { 6126, 0x0000 },
02298 /* 0x9500 */
02299 { 6126, 0x0000 }, { 6126, 0x0000 }, { 6126, 0x0000 }, { 6126, 0x0000 },
02300 { 6126, 0x0000 }, { 6126, 0x0000 }, { 6126, 0x0000 }, { 6126, 0x0080 },
02301 { 6127, 0x8e8d }, { 6135, 0x035a }, { 6141, 0x21bd }, { 6149, 0x5a04 },
02302 { 6154, 0x3488 }, { 6159, 0x1170 }, { 6164, 0x0026 }, { 6167, 0x0000 },
02303 /* 0x9600 */
02304 { 6167, 0x0000 }, { 6167, 0x1000 }, { 6168, 0xc502 }, { 6173, 0x8804 },
02305 { 6176, 0xb815 }, { 6183, 0xf801 }, { 6189, 0x147c }, { 6196, 0x25ed },
02306 { 6205, 0xed60 }, { 6213, 0x1bb0 }, { 6220, 0x0589 }, { 6225, 0x1bd7 },
02307 { 6235, 0x7af3 }, { 6246, 0x1a62 }, { 6252, 0x0d0c }, { 6257, 0x0ac5 },
02308 /* 0x9700 */
02309 { 6263, 0xe5d1 }, { 6272, 0x524a }, { 6278, 0x0490 }, { 6281, 0x6305 },
02310 { 6287, 0x0354 }, { 6292, 0x5244 }, { 6297, 0x2b57 }, { 6306, 0x1612 },
02311 { 6311, 0xa872 }, { 6318, 0x1101 }, { 6321, 0x2949 }, { 6327, 0x0018 },
02312 { 6329, 0x0948 }, { 6333, 0x1008 }, { 6335, 0x6000 }, { 6337, 0x886c },
02313 /* 0x9800 */
02314 { 6343, 0x916e }, { 6351, 0x058f }, { 6358, 0x3012 }, { 6362, 0x3990 },
02315 { 6368, 0xf840 }, { 6374, 0x4930 }, { 6379, 0x8880 }, { 6382, 0x001b },
02316 { 6386, 0x0000 }, { 6386, 0x0000 }, { 6386, 0x8500 }, { 6389, 0x0042 },
02317 { 6391, 0x0058 }, { 6394, 0x9800 }, { 6397, 0xea04 }, { 6403, 0x7014 },
02318 /* 0x9900 */
02319 { 6408, 0x1628 }, { 6413, 0x611d }, { 6420, 0x5113 }, { 6426, 0x6000 },
02320 { 6428, 0x1a24 }, { 6433, 0x00a7 }, { 6438, 0x0000 }, { 6438, 0x0000 },
02321 { 6438, 0x0000 }, { 6438, 0x03c0 }, { 6442, 0x7120 }, { 6447, 0x1018 },
02322 { 6450, 0x0172 }, { 6455, 0xa927 }, { 6463, 0x6004 }, { 6466, 0x8906 },
02323 /* 0x9a00 */
02324 { 6471, 0xc022 }, { 6475, 0x020c }, { 6478, 0x0900 }, { 6480, 0x4081 },
02325 { 6483, 0x202d }, { 6488, 0x8ca0 }, { 6493, 0x0e34 }, { 6499, 0x0000 },
02326 { 6499, 0x0000 }, { 6499, 0x0000 }, { 6499, 0x2100 }, { 6501, 0x1101 },
02327 { 6504, 0x8011 }, { 6507, 0xc11a }, { 6513, 0xec4c }, { 6521, 0x0892 },
02328 /* 0x9b00 */
02329 { 6525, 0x0040 }, { 6526, 0x8500 }, { 6529, 0xc7ac }, { 6538, 0x1806 },
02330 { 6542, 0xe03e }, { 6550, 0x0512 }, { 6554, 0x8000 }, { 6555, 0x0010 },
02331 { 6556, 0x4008 }, { 6558, 0x80ce }, { 6564, 0x6d01 }, { 6570, 0x0210 },
02332 { 6572, 0x8641 }, { 6577, 0x0856 }, { 6582, 0x011e }, { 6587, 0x0027 },
02333 /* 0x9c00 */
02334 { 6591, 0x3750 }, { 6598, 0x083d }, { 6604, 0xe032 }, { 6610, 0x4e05 },
02335 { 6616, 0x01c0 }, { 6619, 0x0484 }, { 6622, 0x0081 }, { 6624, 0x0140 },
02336 { 6626, 0x0000 }, { 6626, 0x0000 }, { 6626, 0x0000 }, { 6626, 0x0000 },
02337 { 6626, 0x0000 }, { 6626, 0x0000 }, { 6626, 0x1aa0 }, { 6631, 0x0059 },
02338 /* 0x9d00 */
02339 { 6635, 0x43c8 }, { 6641, 0x8824 }, { 6645, 0x1d48 }, { 6651, 0xc800 },
02340 { 6654, 0x0152 }, { 6658, 0x7203 }, { 6664, 0x9013 }, { 6669, 0x0404 },
02341 { 6671, 0x8280 }, { 6674, 0x0400 }, { 6675, 0x8a10 }, { 6679, 0x0d14 },
02342 { 6684, 0x8056 }, { 6689, 0x0208 }, { 6691, 0xa040 }, { 6694, 0x2704 },
02343 /* 0x9e00 */
02344 { 6699, 0x0000 }, { 6699, 0x4c00 }, { 6702, 0x0000 }, { 6702, 0x0000 },
02345 { 6702, 0x0000 }, { 6702, 0x0000 }, { 6702, 0x0000 }, { 6702, 0xa320 },
02346 { 6707, 0x1902 }, { 6711, 0xa0ae }, { 6718, 0x2660 }, { 6723, 0xdf00 },
02347 { 6730, 0xf010 }, { 6735, 0x7b15 }, { 6744, 0x8121 }, { 6748, 0x3ad0 },
02348 /* 0x9f00 */
02349 { 6755, 0x4180 }, { 6758, 0x0028 }, { 6760, 0x1003 }, { 6763, 0x4800 },
02350 { 6765, 0xcc00 }, { 6769, 0x8014 }, { 6772, 0x14cf }, { 6780, 0x00c4 },
02351 { 6783, 0x2000 }, { 6784, 0x3020 }, { 6787, 0x0001 },
02352 };
02353 static const Summary16 jisx0208_uni2indx_pageff[15] = {
02354 /* 0xff00 */
02355 { 6788, 0xdf7a }, { 6800, 0xffff }, { 6816, 0xffff }, { 6832, 0xffff },
02356 { 6847, 0xffff }, { 6863, 0xffff }, { 6877, 0x0000 }, { 6877, 0x0000 },
02357 { 6877, 0x0000 }, { 6877, 0x0000 }, { 6877, 0x0000 }, { 6877, 0x0000 },
02358 { 6877, 0x0000 }, { 6877, 0x0000 }, { 6877, 0x0028 },
02359 };
02360
02361 static int
02362 jisx0208_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
02363 {
02364     (void) conv;
02365     if (n >= 2) {
02366         const Summary16 *summary = NULL;

```

```

02367     if (wc < 0x0100)
02368         summary = &jsx0208_uni2indx_page00[(wc>4)];
02369     else if (wc >= 0x0300 && wc < 0x0460)
02370         summary = &jsx0208_uni2indx_page03[(wc>4)-0x030];
02371     else if (wc >= 0x2000 && wc < 0x2320)
02372         summary = &jsx0208_uni2indx_page20[(wc>4)-0x200];
02373     else if (wc >= 0x2500 && wc < 0x2670)
02374         summary = &jsx0208_uni2indx_page25[(wc>4)-0x250];
02375     else if (wc >= 0x3000 && wc < 0x3100)
02376         summary = &jsx0208_uni2indx_page30[(wc>4)-0x300];
02377     else if (wc >= 0x4e00 && wc < 0x9fb0)
02378         summary = &jsx0208_uni2indx_page4e[(wc>4)-0x4e0];
02379     else if (wc >= 0xff00 && wc < 0xffff)
02380         summary = &jsx0208_uni2indx_pageff[(wc>4)-0xff0];
02381     if (summary) {
02382         unsigned short used = summary->used;
02383         unsigned int i = wc & 0x0f;
02384         if (used & ((unsigned short) 1 << i)) {
02385             unsigned short c;
02386             /* Keep in `used' only the bits 0..i-1. */
02387             used &= ((unsigned short) 1 << i) - 1;
02388             /* Add `summary->indx' and the number of bits set in `used'. */
02389             used = (used & 0x5555) + ((used & 0xaaaa) >> 1);
02390             used = (used & 0x3333) + ((used & 0xcccc) >> 2);
02391             used = (used & 0x0f0f) + ((used & 0xf0f0) >> 4);
02392             used = (used & 0x00ff) + (used >> 8);
02393             c = jsx0208_2charset[summary->indx + used];
02394             r[0] = (c >> 8); r[1] = (c & 0xff);
02395             return 2;
02396         }
02397     }
02398     return RET_ILSEQ;
02399 }
02400 return RET_TOOSMALL;
02401 }
02402 #endif /* NEED_TOMB */

```

13.288 jsx0212.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/jsx0212.h,v 1.5 2003/05/27 22:26:31 tsi Exp $ */
00002
00003 /*
00004  * JISX0212.1990-0
00005  */
00006 #ifdef NEED_TOWC
00007
00008 static const unsigned short jsx0212_2uni_page22[81] = {
00009     /* 0x22 */
00010     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00011     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0x02d8, 0x02c7,
00012     0x00b8, 0x02d9, 0x02dd, 0x00af, 0x02db, 0x02da, 0x007e, 0x0384,
00013     0x0385, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00014     0xffff, 0x00a1, 0x00a6, 0x00bf, 0xffff, 0xffff, 0xffff, 0xffff,
00015     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00016     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00017     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00018     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00019     0xffff, 0xffff, 0x00ba, 0x00aa, 0x00a9, 0x00ae, 0x2122, 0x00a4,
00020     0x2116,
00021 };
00022 static const unsigned short jsx0212_2uni_page26[188] = {
00023     /* 0x26 */
00024     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00025     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00026     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00027     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00028     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00029     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00030     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00031     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00032     0x0386, 0x0388, 0x0389, 0x038a, 0x038a, 0x03aa, 0xffff, 0x038c, 0xffff,
00033     0x038e, 0x03ab, 0xffff, 0x038f, 0xffff, 0xffff, 0xffff, 0xffff,
00034     0x03ac, 0x03ad, 0x03ae, 0x03af, 0x03ca, 0x0390, 0x03cc, 0x03c2,
00035     0x03cd, 0x03cb, 0x03b0, 0x03ce, 0xffff, 0xffff,
00036     /* 0x27 */
00037     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00038     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00039     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00040     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00041     0xffff, 0x0402, 0x0403, 0x0404, 0x0405, 0x0406, 0x0407, 0x0408,
00042     0x0409, 0x040a, 0x040b, 0x040c, 0x040e, 0x040f, 0xffff, 0xffff,
00043     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00044     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00045     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00046     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,

```

```
00047 0xffff, 0x0452, 0x0453, 0x0454, 0x0455, 0x0456, 0x0457, 0x0458,
00048 0x0459, 0x045a, 0x045b, 0x045c, 0x045e, 0x045f,
00049 };
00050 static const unsigned short jisx0212_2uni_page29[275] = {
00051 /* 0x29 */
00052 0x00c6, 0x0110, 0xffff, 0x0126, 0xffff, 0x0132, 0xffff, 0x0141,
00053 0x013f, 0xffff, 0x014a, 0x00d8, 0x0152, 0xffff, 0x0166, 0x00de,
00054 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00055 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00056 0x00e6, 0x0111, 0x00f0, 0x0127, 0x0131, 0x0133, 0x0138, 0x0142,
00057 0x0140, 0x0149, 0x014b, 0x00f8, 0x0153, 0x00df, 0x0167, 0x00fe,
00058 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00059 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00060 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00061 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00062 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00063 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00064 /* 0x2a */
00065 0x00c1, 0x00c0, 0x00c4, 0x00c2, 0x0102, 0x01cd, 0x0100, 0x0104,
00066 0x00c5, 0x00c3, 0x0106, 0x0108, 0x010c, 0x00c7, 0x010a, 0x010e,
00067 0x00c9, 0x00c8, 0x00cb, 0x00ca, 0x011a, 0x0116, 0x0112, 0x0118,
00068 0xffff, 0x011c, 0x011e, 0x0122, 0x0120, 0x0124, 0x00cd, 0x00cc,
00069 0x00cf, 0x00ce, 0x01cf, 0x0130, 0x012a, 0x012e, 0x0128, 0x0134,
00070 0x0136, 0x0139, 0x013d, 0x013b, 0x0143, 0x0147, 0x0145, 0x00d1,
00071 0x00d3, 0x00d2, 0x00d6, 0x00d4, 0x01d1, 0x0150, 0x014c, 0x00d5,
00072 0x0154, 0x0158, 0x0156, 0x015a, 0x015c, 0x0160, 0x015e, 0x0164,
00073 0x0162, 0x00da, 0x00d9, 0x00dc, 0x00db, 0x016c, 0x01d3, 0x0170,
00074 0x016a, 0x0172, 0x016e, 0x0168, 0x01d7, 0x01db, 0x01d9, 0x01d5,
00075 0x0174, 0x00dd, 0x0178, 0x0176, 0x0179, 0x017d, 0x017b, 0xffff,
00076 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00077 /* 0x2b */
00078 0x00e1, 0x00e0, 0x00e4, 0x00e2, 0x0103, 0x01ce, 0x0101, 0x0105,
00079 0x00e5, 0x00e3, 0x0107, 0x0109, 0x010d, 0x00e7, 0x010b, 0x010f,
00080 0x00e9, 0x00e8, 0x00eb, 0x00ea, 0x011b, 0x0117, 0x0113, 0x0119,
00081 0x01f5, 0x011d, 0x011f, 0xffff, 0x0121, 0x0125, 0x00ed, 0x00ec,
00082 0x00ef, 0x00ee, 0x01d0, 0xffff, 0x012b, 0x012f, 0x0129, 0x0135,
00083 0x0137, 0x013a, 0x013e, 0x013c, 0x0144, 0x0148, 0x0146, 0x00f1,
00084 0x00f3, 0x00f2, 0x00f6, 0x00f4, 0x01d2, 0x0151, 0x014d, 0x00f5,
00085 0x0155, 0x0159, 0x0157, 0x015b, 0x015d, 0x0161, 0x015f, 0x0165,
00086 0x0163, 0x00fa, 0x00f9, 0x00fc, 0x00fb, 0x016d, 0x01d4, 0x0171,
00087 0x016b, 0x0173, 0x016f, 0x0169, 0x01d8, 0x01dc, 0x01da, 0x01d6,
00088 0x0175, 0x00fd, 0x00ff, 0x0177, 0x017a, 0x017e, 0x017c,
00089 };
00090 static const unsigned short jisx0212_2uni_page30[5801] = {
00091 /* 0x30 */
00092 0x4e02, 0x4e04, 0x4e05, 0x4e0c, 0x4e12, 0x4e1f, 0x4e23, 0x4e24,
00093 0x4e28, 0x4e2b, 0x4e2e, 0x4e2f, 0x4e30, 0x4e35, 0x4e40, 0x4e41,
00094 0x4e44, 0x4e47, 0x4e51, 0x4e5a, 0x4e5c, 0x4e63, 0x4e68, 0x4e69,
00095 0x4e74, 0x4e75, 0x4e79, 0x4e7f, 0x4e8d, 0x4e96, 0x4e97, 0x4e9d,
00096 0x4eaf, 0x4eb9, 0x4ec3, 0x4ed0, 0x4eda, 0x4edb, 0x4ee0, 0x4ee1,
00097 0x4ee2, 0x4ee8, 0x4eeef, 0x4ef1, 0x4ef3, 0x4ef5, 0x4efd, 0x4efe,
00098 0x4eff, 0x4f00, 0x4f02, 0x4f03, 0x4f08, 0x4f0b, 0x4f0c, 0x4f12,
00099 0x4f15, 0x4f16, 0x4f17, 0x4f19, 0x4f2e, 0x4f31, 0x4f60, 0x4f33,
00100 0x4f35, 0x4f37, 0x4f39, 0x4f3b, 0x4f3e, 0x4f40, 0x4f42, 0x4f48,
00101 0x4f49, 0x4f4b, 0x4f4c, 0x4f52, 0x4f54, 0x4f56, 0x4f58, 0x4f5f,
00102 0x4f63, 0x4f6a, 0x4f6c, 0x4f6e, 0x4f71, 0x4f77, 0x4f78, 0x4f79,
00103 0x4f7a, 0x4f7d, 0x4f7e, 0x4f81, 0x4f82, 0x4f84,
00104 /* 0x31 */
00105 0x4f85, 0x4f89, 0x4f8a, 0x4f8c, 0x4f8e, 0x4f90, 0x4f92, 0x4f93,
00106 0x4f94, 0x4f97, 0x4f99, 0x4f9a, 0x4f9e, 0x4f9f, 0x4fb2, 0x4fb7,
00107 0x4fb9, 0x4fbb, 0x4fbc, 0x4fbd, 0x4fbe, 0x4fc0, 0x4fc1, 0x4fc5,
00108 0x4fc6, 0x4fc8, 0x4fc9, 0x4fcb, 0x4fcc, 0x4fcd, 0x4fcf, 0x4fd2,
00109 0x4fdc, 0x4fe0, 0x4fe2, 0x4ff0, 0x4ff2, 0x4ffc, 0x4ffd, 0x4fff,
00110 0x5000, 0x5001, 0x5004, 0x5007, 0x500a, 0x500c, 0x500e, 0x5010,
00111 0x5013, 0x5017, 0x5018, 0x501b, 0x501c, 0x501d, 0x501e, 0x5022,
00112 0x5027, 0x502e, 0x5030, 0x5032, 0x5033, 0x5035, 0x5040, 0x5041,
00113 0x5042, 0x5045, 0x5046, 0x504a, 0x504c, 0x504e, 0x5051, 0x5052,
00114 0x5053, 0x5057, 0x5059, 0x505f, 0x5060, 0x5062, 0x5063, 0x5066,
00115 0x5067, 0x506a, 0x506d, 0x5070, 0x5071, 0x503b, 0x5081, 0x5083,
00116 0x5084, 0x5086, 0x508a, 0x508e, 0x508f, 0x5090,
00117 /* 0x32 */
00118 0x5092, 0x5093, 0x5094, 0x5096, 0x509b, 0x509c, 0x509e, 0x509f,
00119 0x50a0, 0x50a1, 0x50a2, 0x50aa, 0x50af, 0x50b0, 0x50b9, 0x50ba,
00120 0x50bd, 0x50c0, 0x50c3, 0x50c4, 0x50c7, 0x50cc, 0x50ce, 0x50d0,
00121 0x50d3, 0x50d4, 0x50d8, 0x50dc, 0x50dd, 0x50df, 0x50e2, 0x50e4,
00122 0x50e6, 0x50e8, 0x50e9, 0x50ef, 0x50f1, 0x50f6, 0x50fa, 0x50fe,
00123 0x5103, 0x5106, 0x5107, 0x5108, 0x510b, 0x510c, 0x510d, 0x510e, 0x510f,
00124 0x5102, 0x5110, 0x5117, 0x5119, 0x511b, 0x511c, 0x511d, 0x511e,
00125 0x5123, 0x5127, 0x5128, 0x512c, 0x512d, 0x512f, 0x5131, 0x5133,
00126 0x5134, 0x5135, 0x5138, 0x5139, 0x5142, 0x514a, 0x514f, 0x5153,
00127 0x5155, 0x5157, 0x5158, 0x515f, 0x5164, 0x5166, 0x517e, 0x5183,
00128 0x5184, 0x518b, 0x518e, 0x5198, 0x519d, 0x51a1, 0x51a3, 0x51ad,
00129 0x51b8, 0x51ba, 0x51bc, 0x51be, 0x51bf, 0x51c2,
00130 /* 0x33 */
00131 0x51c8, 0x51cf, 0x51d1, 0x51d2, 0x51d3, 0x51d5, 0x51d8, 0x51de,
00132 0x51e2, 0x51e5, 0x51ee, 0x51f2, 0x51f3, 0x51f4, 0x51f7, 0x5201,
00133 0x5202, 0x5205, 0x5212, 0x5213, 0x5215, 0x5216, 0x5218, 0x5222,
```

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00134 0x5228, 0x5231, 0x5232, 0x5235, 0x523c, 0x5245, 0x5249, 0x5255,
00135 0x5257, 0x5258, 0x525a, 0x525c, 0x525f, 0x5260, 0x5261, 0x5266,
00136 0x526e, 0x5277, 0x5278, 0x5279, 0x5280, 0x5282, 0x5285, 0x528a,
00137 0x528c, 0x5293, 0x5295, 0x5296, 0x5297, 0x5298, 0x529a, 0x529c,
00138 0x52a4, 0x52a5, 0x52a6, 0x52a7, 0x52af, 0x52b0, 0x52b6, 0x52b7,
00139 0x52b8, 0x52bb, 0x52bb, 0x52bd, 0x52c0, 0x52c4, 0x52c6, 0x52c8,
00140 0x52cc, 0x52cf, 0x52d1, 0x52d4, 0x52d6, 0x52db, 0x52dc, 0x52e1,
00141 0x52e5, 0x52e8, 0x52e9, 0x52ea, 0x52ec, 0x52f0, 0x52f1, 0x52f4,
00142 0x52f6, 0x52f7, 0x5300, 0x5303, 0x530a, 0x530b,
00143 /* 0x34 */
00144 0x530c, 0x5311, 0x5313, 0x5318, 0x531b, 0x531c, 0x531e, 0x531f,
00145 0x5325, 0x5327, 0x5328, 0x5329, 0x532b, 0x532c, 0x532d, 0x5330,
00146 0x5332, 0x5335, 0x533c, 0x533d, 0x533e, 0x5342, 0x534c, 0x534b,
00147 0x5359, 0x535b, 0x5361, 0x5363, 0x5365, 0x536c, 0x536d, 0x5372,
00148 0x5379, 0x537e, 0x5383, 0x5387, 0x5388, 0x538e, 0x5393, 0x5394,
00149 0x5399, 0x539d, 0x53a1, 0x53a4, 0x53aa, 0x53ab, 0x53af, 0x53b2,
00150 0x53b4, 0x53b5, 0x53b7, 0x53b8, 0x53ba, 0x53bd, 0x53c0, 0x53c5,
00151 0x53cf, 0x53d2, 0x53d3, 0x53d5, 0x53da, 0x53dd, 0x53de, 0x53e0,
00152 0x53e6, 0x53e7, 0x53f5, 0x5402, 0x5413, 0x541a, 0x5421, 0x5427,
00153 0x5428, 0x542a, 0x542f, 0x5431, 0x5434, 0x5435, 0x5443, 0x5444,
00154 0x5447, 0x544d, 0x544f, 0x545e, 0x5462, 0x5464, 0x5466, 0x5467,
00155 0x5469, 0x546b, 0x546d, 0x546e, 0x5474, 0x547f,
00156 /* 0x35 */
00157 0x5481, 0x5483, 0x5485, 0x5488, 0x5489, 0x548d, 0x5491, 0x5495,
00158 0x5496, 0x549c, 0x549f, 0x54a1, 0x54a6, 0x54a7, 0x54a9, 0x54aa,
00159 0x54ad, 0x54ae, 0x54b1, 0x54b7, 0x54b9, 0x54ba, 0x54bb, 0x54bf,
00160 0x54c6, 0x54ca, 0x54cd, 0x54ce, 0x54e0, 0x54ea, 0x54ec, 0x54ef,
00161 0x54f6, 0x54fc, 0x54fe, 0x54ff, 0x5500, 0x5501, 0x5505, 0x5508,
00162 0x5509, 0x550c, 0x550d, 0x550e, 0x5515, 0x552a, 0x552b, 0x5532,
00163 0x5535, 0x5536, 0x553b, 0x553c, 0x553d, 0x5541, 0x5547, 0x5549,
00164 0x554a, 0x554d, 0x5550, 0x5551, 0x5558, 0x555a, 0x555b, 0x555e,
00165 0x5560, 0x5561, 0x5564, 0x5566, 0x557f, 0x5581, 0x5582, 0x5586,
00166 0x5588, 0x558e, 0x558f, 0x5591, 0x5592, 0x5593, 0x5594, 0x5597,
00167 0x55a3, 0x55a4, 0x55ad, 0x55b2, 0x55bf, 0x55c1, 0x55c3, 0x55c6,
00168 0x55c9, 0x55cb, 0x55cc, 0x55ce, 0x55d1, 0x55d2,
00169 /* 0x36 */
00170 0x55d3, 0x55d7, 0x55d8, 0x55db, 0x55de, 0x55e2, 0x55e9, 0x55f6,
00171 0x55ff, 0x5605, 0x5608, 0x560a, 0x560d, 0x560e, 0x560f, 0x5610,
00172 0x5611, 0x5612, 0x5619, 0x562c, 0x562c, 0x5630, 0x5633, 0x5635, 0x5637,
00173 0x5639, 0x563b, 0x563c, 0x563d, 0x563f, 0x5640, 0x5641, 0x5643,
00174 0x5644, 0x5646, 0x5649, 0x564b, 0x564d, 0x564f, 0x5654, 0x565e,
00175 0x5660, 0x5661, 0x5662, 0x5663, 0x5666, 0x5669, 0x566d, 0x566f,
00176 0x5671, 0x5672, 0x5675, 0x5684, 0x5685, 0x5688, 0x568b, 0x568c,
00177 0x5695, 0x5699, 0x569a, 0x569d, 0x569e, 0x569f, 0x56a6, 0x56a7,
00178 0x56a8, 0x56a9, 0x56ab, 0x56ac, 0x56ad, 0x56b1, 0x56b3, 0x56b7,
00179 0x56be, 0x56c5, 0x56c9, 0x56ca, 0x56cb, 0x56cf, 0x56d0, 0x56cc,
00180 0x56cd, 0x56d9, 0x56dc, 0x56dd, 0x56df, 0x56e1, 0x56e4, 0x56e5,
00181 0x56e6, 0x56e7, 0x56e8, 0x56f1, 0x56eb, 0x56ed,
00182 /* 0x37 */
00183 0x56f6, 0x56f7, 0x5701, 0x5702, 0x5707, 0x570a, 0x570c, 0x5711,
00184 0x5715, 0x571a, 0x571b, 0x571d, 0x5720, 0x5722, 0x5723, 0x5724,
00185 0x5725, 0x5729, 0x572a, 0x572c, 0x572e, 0x572f, 0x5733, 0x5734,
00186 0x573d, 0x573e, 0x573f, 0x5745, 0x5746, 0x574c, 0x574d, 0x5752,
00187 0x5762, 0x5765, 0x5767, 0x5768, 0x576b, 0x576d, 0x576e, 0x576f,
00188 0x5770, 0x5771, 0x5773, 0x5774, 0x5775, 0x5777, 0x5779, 0x577a,
00189 0x577b, 0x577c, 0x577e, 0x5781, 0x5783, 0x578c, 0x5794, 0x5797,
00190 0x5799, 0x579a, 0x579c, 0x579d, 0x579e, 0x579f, 0x57a1, 0x5795,
00191 0x57a7, 0x57a8, 0x57a9, 0x57ac, 0x57b8, 0x57bd, 0x57c7, 0x57c8,
00192 0x57cc, 0x57cf, 0x57d5, 0x57dd, 0x57de, 0x57e4, 0x57e6, 0x57e7,
00193 0x57e9, 0x57ed, 0x57f0, 0x57f5, 0x57f6, 0x57f8, 0x57fd, 0x57fe,
00194 0x57ff, 0x5803, 0x5804, 0x5808, 0x5809, 0x57e1,
00195 /* 0x38 */
00196 0x580c, 0x580d, 0x581b, 0x581e, 0x581f, 0x5820, 0x5826, 0x5827,
00197 0x582d, 0x5832, 0x5839, 0x583f, 0x5849, 0x584c, 0x584d, 0x584f,
00198 0x5850, 0x5855, 0x585f, 0x5861, 0x5864, 0x5867, 0x5868, 0x5878,
00199 0x587c, 0x587f, 0x5880, 0x5881, 0x5887, 0x5888, 0x5889, 0x588a,
00200 0x588c, 0x588d, 0x588f, 0x5890, 0x5894, 0x5896, 0x589d, 0x58a0,
00201 0x58a1, 0x58a2, 0x58a6, 0x58a9, 0x58b1, 0x58b2, 0x58c4, 0x58bc,
00202 0x58c2, 0x58cd, 0x58cd, 0x58ce, 0x58d0, 0x58d2, 0x58d4, 0x58d6,
00203 0x58da, 0x58dd, 0x58e1, 0x58e2, 0x58e9, 0x58f3, 0x5905, 0x5906,
00204 0x590b, 0x590c, 0x5912, 0x5913, 0x5914, 0x8641, 0x591d, 0x5921,
00205 0x5923, 0x5924, 0x5928, 0x592f, 0x5930, 0x5933, 0x5935, 0x5936,
00206 0x593f, 0x5943, 0x5946, 0x5952, 0x5953, 0x5959, 0x595b, 0x595d,
00207 0x595e, 0x595f, 0x5961, 0x5963, 0x596b, 0x596d,
00208 /* 0x39 */
00209 0x596f, 0x5972, 0x5975, 0x5976, 0x5979, 0x597b, 0x597c, 0x598b,
00210 0x598c, 0x598e, 0x5992, 0x5995, 0x5997, 0x599f, 0x59a7, 0x59a7,
00211 0x59ad, 0x59ae, 0x59af, 0x59b0, 0x59b3, 0x59b7, 0x59ba, 0x59bc,
00212 0x59c1, 0x59c3, 0x59c4, 0x59c8, 0x59ca, 0x59cd, 0x59d2, 0x59dd,
00213 0x59de, 0x59df, 0x59e3, 0x59e4, 0x59e7, 0x59ee, 0x59ef, 0x59f1,
00214 0x59f2, 0x59f4, 0x59f7, 0x5a00, 0x5a04, 0x5a0c, 0x5a0d, 0x5a0e,
00215 0x5a12, 0x5a13, 0x5a1e, 0x5a23, 0x5a24, 0x5a27, 0x5a28, 0x5a2a,
00216 0x5a2d, 0x5a30, 0x5a3d, 0x5a44, 0x5a45, 0x5a47, 0x5a48, 0x5a4c, 0x5a50,
00217 0x5a55, 0x5a5e, 0x5a63, 0x5a65, 0x5a67, 0x5a6d, 0x5a77, 0x5a7a,
00218 0x5a7b, 0x5a7e, 0x5a8b, 0x5a90, 0x5a93, 0x5a96, 0x5a99, 0x5a9c,
00219 0x5a9e, 0x5a9f, 0x5aa0, 0x5aa2, 0x5aa7, 0x5aac, 0x5ab1, 0x5ab2,
00220 0x5ab3, 0x5ab5, 0x5ab8, 0x5aba, 0x5abb, 0x5abf,
```

```
00221 /* 0x3a */
00222 0x5ac4, 0x5ac6, 0x5ac8, 0x5acf, 0x5ada, 0x5adc, 0x5ae0, 0x5ae5,
00223 0x5aea, 0x5aee, 0x5af5, 0x5af6, 0x5afd, 0x5b00, 0x5b01, 0x5b08,
00224 0x5b17, 0x5b34, 0x5b19, 0x5b1b, 0x5b1d, 0x5b21, 0x5b25, 0x5b2d,
00225 0x5b38, 0x5b41, 0x5b4b, 0x5b4c, 0x5b52, 0x5b56, 0x5b5e, 0x5b68,
00226 0x5b6e, 0x5b6f, 0x5b7c, 0x5b7d, 0x5b7e, 0x5b7f, 0x5b81, 0x5b84,
00227 0x5b86, 0x5b8a, 0x5b8e, 0x5b90, 0x5b91, 0x5b93, 0x5b94, 0x5b96,
00228 0x5ba8, 0x5ba9, 0x5bac, 0x5bad, 0x5baf, 0x5bb1, 0x5bb2, 0x5bb7,
00229 0x5bba, 0x5bbc, 0x5bc0, 0x5bc1, 0x5bcd, 0x5bcf, 0x5bd6, 0x5bd7,
00230 0x5bd8, 0x5bd9, 0x5bda, 0x5be0, 0x5bef, 0x5bf1, 0x5bf4, 0x5bfd,
00231 0x5c0c, 0x5c17, 0x5c1e, 0x5c1f, 0x5c23, 0x5c26, 0x5c29, 0x5c2b,
00232 0x5c2c, 0x5c2e, 0x5c30, 0x5c32, 0x5c35, 0x5c36, 0x5c59, 0x5c5a,
00233 0x5c5c, 0x5c62, 0x5c63, 0x5c67, 0x5c68, 0x5c69,
00234 /* 0x3b */
00235 0x5c6d, 0x5c70, 0x5c74, 0x5c75, 0x5c7a, 0x5c7b, 0x5c7c, 0x5c7d,
00236 0x5c87, 0x5c88, 0x5c8a, 0x5c8f, 0x5c92, 0x5c9d, 0x5c9f, 0x5ca0,
00237 0x5ca2, 0x5ca3, 0x5ca6, 0x5caa, 0x5cb2, 0x5cb4, 0x5cb5, 0x5cba,
00238 0x5cc9, 0x5ccb, 0x5ccd, 0x5cd2, 0x5cd7, 0x5cee, 0x5cf1, 0x5cf2,
00239 0x5cf4, 0x5d01, 0x5d06, 0x5d0d, 0x5d12, 0x5d2b, 0x5d23, 0x5d24,
00240 0x5d26, 0x5d27, 0x5d31, 0x5d34, 0x5d39, 0x5d3d, 0x5d3f, 0x5d42,
00241 0x5d43, 0x5d46, 0x5d48, 0x5d49, 0x5d55, 0x5d51, 0x5d59, 0x5d4a, 0x5d5f,
00242 0x5d60, 0x5d61, 0x5d62, 0x5d64, 0x5d6a, 0x5d6d, 0x5d70, 0x5d79,
00243 0x5d7a, 0x5d7e, 0x5d7f, 0x5d81, 0x5d83, 0x5d88, 0x5d8a, 0x5d92,
00244 0x5d93, 0x5d94, 0x5d95, 0x5d99, 0x5d9b, 0x5d9f, 0x5da0, 0x5da7,
00245 0x5dab, 0x5db0, 0x5db4, 0x5db8, 0x5db9, 0x5dc3, 0x5dc7, 0x5dcb,
00246 0x5dd0, 0x5dce, 0x5dd8, 0x5dd9, 0x5de0, 0x5de4,
00247 /* 0x3c */
00248 0x5de9, 0x5df8, 0x5df9, 0x5e00, 0x5e07, 0x5e0d, 0x5e12, 0x5e14,
00249 0x5e15, 0x5e18, 0x5e1f, 0x5e20, 0x5e2e, 0x5e28, 0x5e32, 0x5e35,
00250 0x5e3e, 0x5e4b, 0x5e50, 0x5e51, 0x5e56, 0x5e58, 0x5e5b, 0x5e5b,
00251 0x5e5c, 0x5e5e, 0x5e68, 0x5e6a, 0x5e6b, 0x5e6c, 0x5e6d, 0x5e6e,
00252 0x5e70, 0x5e80, 0x5e8b, 0x5e8e, 0x5ea2, 0x5ea4, 0x5ea5, 0x5ea8,
00253 0x5eaa, 0x5eac, 0x5eb1, 0x5eb3, 0x5ebd, 0x5ebe, 0x5ebf, 0x5ec6,
00254 0x5ecc, 0x5ecb, 0x5ece, 0x5ed1, 0x5ed2, 0x5ed4, 0x5ed5, 0x5edc,
00255 0x5ede, 0x5ee5, 0x5eeb, 0x5ef0, 0x5ef6, 0x5ef7, 0x5ef8, 0x5ef9,
00256 0x5f19, 0x5f1c, 0x5f1d, 0x5f21, 0x5f22, 0x5f23, 0x5f24, 0x5f28,
00257 0x5f2b, 0x5f2c, 0x5f2e, 0x5f30, 0x5f34, 0x5f36, 0x5f3b, 0x5f3d,
00258 0x5f3f, 0x5f40, 0x5f44, 0x5f45, 0x5f47, 0x5f4d, 0x5f50, 0x5f54,
00259 0x5f58, 0x5f5b, 0x5f60, 0x5f63, 0x5f64, 0x5f67,
00260 /* 0x3d */
00261 0x5f6f, 0x5f72, 0x5f74, 0x5f75, 0x5f78, 0x5f7a, 0x5f7d, 0x5f7e,
00262 0x5f89, 0x5f8d, 0x5f8f, 0x5f96, 0x5f9c, 0x5f9d, 0x5fa2, 0x5fa7,
00263 0x5fab, 0x5fa4, 0x5fac, 0x5faf, 0x5fb0, 0x5fb1, 0x5fb8, 0x5fc4,
00264 0x5fc7, 0x5fc8, 0x5fc9, 0x5fcb, 0x5fd0, 0x5fd1, 0x5fd2, 0x5fd3,
00265 0x5fd4, 0x5fde, 0x5fe1, 0x5fe2, 0x5fe8, 0x5fe9, 0x5fea, 0x5fec,
00266 0x5fed, 0x5fee, 0x5fef, 0x5ff2, 0x5ff3, 0x5ff6, 0x5ffa, 0x5ffc,
00267 0x6007, 0x600a, 0x600d, 0x6013, 0x6014, 0x6017, 0x6018, 0x601a,
00268 0x601f, 0x6024, 0x602d, 0x6033, 0x6035, 0x6040, 0x6047, 0x6048,
00269 0x6049, 0x604c, 0x6051, 0x6054, 0x6056, 0x6057, 0x605d, 0x6061,
00270 0x6067, 0x6071, 0x607e, 0x607f, 0x6082, 0x6086, 0x6088, 0x608a,
00271 0x608e, 0x6091, 0x6093, 0x6095, 0x6098, 0x609d, 0x609e, 0x60a2,
00272 0x60a4, 0x60a5, 0x60a8, 0x60b0, 0x60b1, 0x60b7,
00273 /* 0x3e */
00274 0x60bb, 0x60be, 0x60c2, 0x60c4, 0x60c8, 0x60c9, 0x60ca, 0x60cb,
00275 0x60ce, 0x60cf, 0x60d4, 0x60d5, 0x60d9, 0x60db, 0x60dd, 0x60de,
00276 0x60e2, 0x60e5, 0x60f2, 0x60f5, 0x60f8, 0x60fc, 0x60fd, 0x6102,
00277 0x6107, 0x610a, 0x610c, 0x6110, 0x6111, 0x6112, 0x6113, 0x6114,
00278 0x6116, 0x6117, 0x6119, 0x611c, 0x611e, 0x6122, 0x612a, 0x612b,
00279 0x6130, 0x6131, 0x6135, 0x6136, 0x6137, 0x6139, 0x6141, 0x6145,
00280 0x6146, 0x6149, 0x615e, 0x6160, 0x616c, 0x6172, 0x6178, 0x617b,
00281 0x617c, 0x617f, 0x6180, 0x6181, 0x6183, 0x6184, 0x618b, 0x618d,
00282 0x6192, 0x6193, 0x6197, 0x6198, 0x619c, 0x619d, 0x619f, 0x61a0,
00283 0x61a5, 0x61a8, 0x61ad, 0x61b8, 0x61b9, 0x61bc, 0x61c0, 0x61c1,
00284 0x61c1, 0x61c2, 0x61ce, 0x61cf, 0x61d5, 0x61dc, 0x61dd, 0x61de,
00285 0x61df, 0x61e1, 0x61e2, 0x61e7, 0x61e9, 0x61e5,
00286 /* 0x3f */
00287 0x61ec, 0x61ed, 0x61ef, 0x6201, 0x6203, 0x6204, 0x6207, 0x6213,
00288 0x6215, 0x621c, 0x6220, 0x6222, 0x6223, 0x6227, 0x6229, 0x622b,
00289 0x6239, 0x623d, 0x6242, 0x6243, 0x6244, 0x6246, 0x624c, 0x6250,
00290 0x6251, 0x6252, 0x6254, 0x6256, 0x625a, 0x625c, 0x6264, 0x626d,
00291 0x626f, 0x6273, 0x627a, 0x627d, 0x628d, 0x628e, 0x628f, 0x6290,
00292 0x62a6, 0x62a8, 0x62b3, 0x62b6, 0x62b7, 0x62ba, 0x62be, 0x62bf,
00293 0x62c4, 0x62ce, 0x62d5, 0x62d6, 0x62da, 0x62ea, 0x62f2, 0x62f4,
00294 0x62fc, 0x62fd, 0x6303, 0x6304, 0x630a, 0x630b, 0x630d, 0x6310,
00295 0x6313, 0x6316, 0x6318, 0x6329, 0x632a, 0x632d, 0x6335, 0x6336,
00296 0x6339, 0x633c, 0x6341, 0x6342, 0x6343, 0x6344, 0x6346, 0x634a,
00297 0x634b, 0x634e, 0x6352, 0x6353, 0x6354, 0x6358, 0x635b, 0x6365,
00298 0x6366, 0x636c, 0x636d, 0x6371, 0x6374, 0x6375,
00299 /* 0x40 */
00300 0x6378, 0x637c, 0x637d, 0x637f, 0x6382, 0x6384, 0x6387, 0x638a,
00301 0x6390, 0x6394, 0x6395, 0x6399, 0x639a, 0x639e, 0x63a4, 0x63a6,
00302 0x63ad, 0x63ae, 0x63af, 0x63bd, 0x63c1, 0x63c5, 0x63c8, 0x63ce,
00303 0x63d1, 0x63d3, 0x63d4, 0x63d5, 0x63dc, 0x63e0, 0x63e5, 0x63ea,
00304 0x63ec, 0x63f2, 0x63f3, 0x63f5, 0x63f8, 0x63f9, 0x6409, 0x640a,
00305 0x6410, 0x6412, 0x6414, 0x6418, 0x641e, 0x6420, 0x6422, 0x6424,
00306 0x6425, 0x6429, 0x642a, 0x642f, 0x6430, 0x6435, 0x643d, 0x643f,
00307 0x644b, 0x644f, 0x6451, 0x6452, 0x6453, 0x6454, 0x645a, 0x645b,
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00308 0x645c, 0x645d, 0x645f, 0x6460, 0x6461, 0x6463, 0x646d, 0x6473,
00309 0x6474, 0x647b, 0x647d, 0x6485, 0x6487, 0x648f, 0x6490, 0x6491,
00310 0x6498, 0x6499, 0x649b, 0x649d, 0x649f, 0x64a1, 0x64a3, 0x64a6,
00311 0x64a8, 0x64ac, 0x64b3, 0x64bd, 0x64be, 0x64bf,
00312 /* 0x41 */
00313 0x64c4, 0x64c9, 0x64ca, 0x64cb, 0x64cc, 0x64ce, 0x64d0, 0x64d1,
00314 0x64d5, 0x64d7, 0x64e4, 0x64e5, 0x64e9, 0x64ea, 0x64ed, 0x64f0,
00315 0x64f5, 0x64f7, 0x64fb, 0x64ff, 0x6501, 0x6504, 0x6508, 0x6509,
00316 0x650a, 0x650f, 0x6513, 0x6514, 0x6516, 0x6519, 0x651b, 0x651e,
00317 0x651f, 0x6522, 0x6526, 0x6529, 0x652e, 0x6531, 0x653a, 0x653c,
00318 0x653d, 0x6543, 0x6547, 0x6549, 0x6550, 0x6552, 0x6554, 0x655f,
00319 0x6560, 0x6567, 0x656b, 0x657a, 0x657d, 0x6581, 0x6585, 0x658a,
00320 0x6592, 0x6595, 0x6598, 0x659d, 0x65a0, 0x65a3, 0x65a6, 0x65ae,
00321 0x65b2, 0x65b3, 0x65b4, 0x65bf, 0x65c2, 0x65c8, 0x65c9, 0x65ce,
00322 0x65d0, 0x65d4, 0x65d6, 0x65d8, 0x65df, 0x65f0, 0x65f2, 0x65f4,
00323 0x65f5, 0x65f9, 0x65fe, 0x65ff, 0x6600, 0x6604, 0x6608, 0x6609,
00324 0x660d, 0x6611, 0x6612, 0x6615, 0x6616, 0x661d,
00325 /* 0x42 */
00326 0x661e, 0x6621, 0x6622, 0x6623, 0x6624, 0x6626, 0x6629, 0x662a,
00327 0x662b, 0x662c, 0x662e, 0x6630, 0x6631, 0x6633, 0x6639, 0x6637,
00328 0x6640, 0x6645, 0x6646, 0x664a, 0x664c, 0x6651, 0x664e, 0x6657,
00329 0x6658, 0x6659, 0x665b, 0x665c, 0x6660, 0x6661, 0x666b, 0x666a,
00330 0x666b, 0x666c, 0x667e, 0x6673, 0x6675, 0x667f, 0x6677, 0x6678,
00331 0x6679, 0x667b, 0x6680, 0x667c, 0x668b, 0x668c, 0x668d, 0x6690,
00332 0x6692, 0x6699, 0x669a, 0x669b, 0x669c, 0x669f, 0x66a0, 0x66a4,
00333 0x66ad, 0x66b1, 0x66b2, 0x66b5, 0x66bb, 0x66bf, 0x66c0, 0x66c2,
00334 0x66c3, 0x66c8, 0x66cc, 0x66ce, 0x66cf, 0x66d4, 0x66db, 0x66df,
00335 0x66e8, 0x66eb, 0x66ec, 0x66ee, 0x66fa, 0x6705, 0x6707, 0x670e,
00336 0x6713, 0x6719, 0x671c, 0x6720, 0x6722, 0x6733, 0x673e, 0x6745,
00337 0x6747, 0x6748, 0x674c, 0x6754, 0x6755, 0x675d,
00338 /* 0x43 */
00339 0x6766, 0x676c, 0x676e, 0x6774, 0x6776, 0x677b, 0x6781, 0x6784,
00340 0x678e, 0x678f, 0x6791, 0x6793, 0x6796, 0x6798, 0x6799, 0x679b,
00341 0x67b0, 0x67b1, 0x67b2, 0x67b5, 0x67bb, 0x67bc, 0x67bd, 0x67e9,
00342 0x67c0, 0x67c2, 0x67c3, 0x67c5, 0x67c8, 0x67c9, 0x67d2, 0x67d7,
00343 0x67d9, 0x67dc, 0x67e1, 0x67e6, 0x67f0, 0x67f2, 0x67f6, 0x67f7,
00344 0x6852, 0x6814, 0x6819, 0x681d, 0x681f, 0x6828, 0x6827, 0x682c,
00345 0x682d, 0x682e, 0x6830, 0x6831, 0x6833, 0x683b, 0x683f, 0x6844,
00346 0x6845, 0x684a, 0x684c, 0x6855, 0x6857, 0x6858, 0x685b, 0x686b,
00347 0x686e, 0x686f, 0x6870, 0x6871, 0x6872, 0x6875, 0x6879, 0x687a,
00348 0x687b, 0x687c, 0x6882, 0x6884, 0x6886, 0x6888, 0x6896, 0x6898,
00349 0x689a, 0x689c, 0x68a1, 0x68a3, 0x68a5, 0x68a9, 0x68aa, 0x68ae,
00350 0x68b2, 0x68bb, 0x68c5, 0x68c8, 0x68cc, 0x68cf,
00351 /* 0x44 */
00352 0x68d0, 0x68d1, 0x68d3, 0x68d6, 0x68d9, 0x68dc, 0x68dd, 0x68e5,
00353 0x68e8, 0x68ea, 0x68eb, 0x68ec, 0x68ed, 0x68f0, 0x68f1, 0x68f5,
00354 0x68f6, 0x68fb, 0x68fc, 0x68fd, 0x6906, 0x6909, 0x690a, 0x6910,
00355 0x6911, 0x6913, 0x6916, 0x6917, 0x6931, 0x6933, 0x6935, 0x6938,
00356 0x693b, 0x6942, 0x6945, 0x6949, 0x694e, 0x6957, 0x695b, 0x6963,
00357 0x6964, 0x6965, 0x6966, 0x6968, 0x6969, 0x696c, 0x6970, 0x6971,
00358 0x6972, 0x697a, 0x697b, 0x697f, 0x697d, 0x698d, 0x6992, 0x6996,
00359 0x6998, 0x69a1, 0x69a5, 0x69a6, 0x69a8, 0x69ab, 0x69ad, 0x69af,
00360 0x69b7, 0x69b8, 0x69ba, 0x69bc, 0x69c5, 0x69c8, 0x69d1, 0x69d6,
00361 0x69d7, 0x69e2, 0x69e5, 0x69ee, 0x69ef, 0x69f1, 0x69f3, 0x69f5,
00362 0x69fe, 0x6a00, 0x6a01, 0x6a03, 0x6a0f, 0x6a11, 0x6a15, 0x6a1a,
00363 0x6a1d, 0x6a20, 0x6a24, 0x6a28, 0x6a30, 0x6a32,
00364 /* 0x45 */
00365 0x6a34, 0x6a37, 0x6a3b, 0x6a3e, 0x6a3f, 0x6a45, 0x6a46, 0x6a49,
00366 0x6a4a, 0x6a4e, 0x6a50, 0x6a51, 0x6a52, 0x6a55, 0x6a56, 0x6a5b,
00367 0x6a64, 0x6a67, 0x6a6a, 0x6a71, 0x6a73, 0x6a7e, 0x6a83, 0x6a83,
00368 0x6a86, 0x6a87, 0x6a89, 0x6a8b, 0x6a91, 0x6a9b, 0x6a9d, 0x6a9e,
00369 0x6a9f, 0x6aa5, 0x6aab, 0x6aaf, 0x6ab0, 0x6ab1, 0x6ab4, 0x6abd,
00370 0x6abe, 0x6abf, 0x6ac6, 0x6ac9, 0x6ac8, 0x6acc, 0x6ad0, 0x6ad4,
00371 0x6ad5, 0x6ad6, 0x6adc, 0x6add, 0x6ae4, 0x6ae7, 0x6aee, 0x6af0,
00372 0x6af1, 0x6af2, 0x6afd, 0x6afd, 0x6b02, 0x6b03, 0x6b06, 0x6b07,
00373 0x6b09, 0x6b0f, 0x6b10, 0x6b11, 0x6b17, 0x6b1b, 0x6b1e, 0x6b24,
00374 0x6b28, 0x6b2b, 0x6b2c, 0x6b2f, 0x6b35, 0x6b36, 0x6b3b, 0x6b3f,
00375 0x6b46, 0x6b4a, 0x6b4d, 0x6b52, 0x6b56, 0x6b58, 0x6b5d, 0x6b60,
00376 0x6b67, 0x6b6b, 0x6b6e, 0x6b70, 0x6b75, 0x6b7d,
00377 /* 0x46 */
00378 0x6b7e, 0x6b82, 0x6b85, 0x6b97, 0x6b9b, 0x6b9f, 0x6ba0, 0x6ba2,
00379 0x6ba3, 0x6ba8, 0x6ba9, 0x6bac, 0x6bad, 0x6bae, 0x6bb0, 0x6bb8,
00380 0x6bb9, 0x6bbd, 0x6bbe, 0x6bc3, 0x6bc4, 0x6bc9, 0x6bcc, 0x6bd6,
00381 0x6bda, 0x6be1, 0x6be3, 0x6be6, 0x6be7, 0x6bee, 0x6bf1, 0x6bf7,
00382 0x6bf9, 0x6bff, 0x6c02, 0x6c04, 0x6c05, 0x6c09, 0x6c0d, 0x6c0e,
00383 0x6c10, 0x6c12, 0x6c19, 0x6c1f, 0x6c26, 0x6c27, 0x6c28, 0x6c2c,
00384 0x6c2e, 0x6c33, 0x6c35, 0x6c36, 0x6c3a, 0x6c3b, 0x6c3f, 0x6c4a,
00385 0x6c4b, 0x6c4d, 0x6c4f, 0x6c52, 0x6c54, 0x6c59, 0x6c5b, 0x6c5c,
00386 0x6c6b, 0x6c6d, 0x6c6f, 0x6c74, 0x6c76, 0x6c78, 0x6c79, 0x6c7b,
00387 0x6c85, 0x6c86, 0x6c87, 0x6c89, 0x6c94, 0x6c95, 0x6c97, 0x6c98,
00388 0x6c9c, 0x6c9f, 0x6cb0, 0x6cb2, 0x6cb4, 0x6cc2, 0x6cc6, 0x6ccd,
00389 0x6ccf, 0x6cd0, 0x6cd1, 0x6cd2, 0x6cd4, 0x6cd6,
00390 /* 0x47 */
00391 0x6cda, 0x6cdc, 0x6ce0, 0x6ce7, 0x6ce9, 0x6ceb, 0x6cec, 0x6cee,
00392 0x6cf2, 0x6cf4, 0x6d04, 0x6d07, 0x6d0a, 0x6d0e, 0x6d0f, 0x6d11,
00393 0x6d13, 0x6d1a, 0x6d26, 0x6d27, 0x6d28, 0x6d2e, 0x6d2f, 0x6d2f,
00394 0x6d31, 0x6d39, 0x6d3c, 0x6d3f, 0x6d57, 0x6d5e, 0x6d5f, 0x6d61,
```

```
00395 0x6d65, 0x6d67, 0x6d6f, 0x6d70, 0x6d7c, 0x6d82, 0x6d87, 0x6d91,
00396 0x6d92, 0x6d94, 0x6d96, 0x6d97, 0x6d98, 0x6daa, 0x6dac, 0x6db4,
00397 0x6db7, 0x6db9, 0x6dbd, 0x6dbf, 0x6dc4, 0x6dca, 0x6dce,
00398 0x6dcf, 0x6dd6, 0x6ddb, 0x6ddd, 0x6ddf, 0x6de0, 0x6de2, 0x6de5,
00399 0x6de9, 0x6deF, 0x6df0, 0x6df4, 0x6df6, 0x6dfc, 0x6e00, 0x6e04,
00400 0x6e1e, 0x6e22, 0x6e27, 0x6e32, 0x6e36, 0x6e39, 0x6e3b, 0x6e3c,
00401 0x6e44, 0x6e45, 0x6e48, 0x6e49, 0x6e4b, 0x6e4f, 0x6e51, 0x6e52,
00402 0x6e53, 0x6e54, 0x6e57, 0x6e5c, 0x6e5d, 0x6e5e,
00403 /* 0x48 */
00404 0x6e62, 0x6e63, 0x6e68, 0x6e73, 0x6e7b, 0x6e7d, 0x6e8d, 0x6e93,
00405 0x6e99, 0x6ea0, 0x6ea7, 0x6ead, 0x6eae, 0x6eb1, 0x6eb3, 0x6ebb,
00406 0x6ebf, 0x6ec0, 0x6ec1, 0x6ec3, 0x6ec7, 0x6ec8, 0x6eca, 0x6ecd,
00407 0x6ece, 0x6ecf, 0x6eeb, 0x6eed, 0x6eee, 0x6ef9, 0x6efb, 0x6efd,
00408 0x6f04, 0x6f08, 0x6f0a, 0x6f0c, 0x6f0d, 0x6f16, 0x6f18, 0x6f1a,
00409 0x6f1b, 0x6f26, 0x6f29, 0x6f2a, 0x6f2f, 0x6f30, 0x6f33, 0x6f36,
00410 0x6f3b, 0x6f3c, 0x6f2d, 0x6f4f, 0x6f51, 0x6f52, 0x6f53, 0x6f57,
00411 0x6f59, 0x6f5a, 0x6f5d, 0x6f5e, 0x6f61, 0x6f62, 0x6f68, 0x6f6c,
00412 0x6f7d, 0x6f7e, 0x6f83, 0x6f87, 0x6f88, 0x6f8b, 0x6f8c, 0x6f8d,
00413 0x6f90, 0x6f92, 0x6f93, 0x6f94, 0x6f96, 0x6f9a, 0x6f9f, 0x6fa0,
00414 0x6fa5, 0x6fa6, 0x6fa7, 0x6fa8, 0x6fae, 0x6faf, 0x6fb0, 0x6fb5,
00415 0x6fb6, 0x6fbc, 0x6fc5, 0x6fc7, 0x6fc8, 0x6fca,
00416 /* 0x49 */
00417 0x6fda, 0x6fde, 0x6fe8, 0x6fe9, 0x6ff0, 0x6ff5, 0x6ff9, 0x6ffc,
00418 0x6ffd, 0x7000, 0x7005, 0x7006, 0x7007, 0x700d, 0x7017, 0x7020,
00419 0x7023, 0x702f, 0x7034, 0x7037, 0x7039, 0x703c, 0x7043, 0x7044,
00420 0x7048, 0x7049, 0x704a, 0x704b, 0x7054, 0x7055, 0x705d, 0x705e,
00421 0x704e, 0x7064, 0x7065, 0x706c, 0x706e, 0x7075, 0x7076, 0x707e,
00422 0x7081, 0x7085, 0x7086, 0x7094, 0x7095, 0x7096, 0x7097, 0x7098,
00423 0x709b, 0x70a4, 0x70ab, 0x70b0, 0x70b1, 0x70b4, 0x70b7, 0x70ca,
00424 0x70d1, 0x70d3, 0x70d4, 0x70d5, 0x70d6, 0x70d8, 0x70dc, 0x70e4,
00425 0x70fa, 0x7103, 0x7104, 0x7105, 0x7106, 0x7107, 0x710b, 0x710c,
00426 0x710f, 0x711e, 0x7120, 0x712b, 0x712d, 0x712f, 0x7130, 0x7131,
00427 0x7138, 0x7141, 0x7141, 0x7145, 0x7146, 0x7147, 0x714a, 0x714b, 0x7150,
00428 0x7152, 0x7157, 0x715a, 0x715c, 0x715e, 0x7160,
00429 /* 0x4a */
00430 0x7168, 0x7179, 0x7180, 0x7185, 0x7187, 0x718c, 0x7192, 0x719a,
00431 0x719b, 0x71a0, 0x71a2, 0x71af, 0x71b0, 0x71b2, 0x71b3, 0x71ba,
00432 0x71bf, 0x71c0, 0x71c1, 0x71c4, 0x71cb, 0x71cc, 0x71d3, 0x71d6,
00433 0x71d9, 0x71da, 0x71dc, 0x71fd, 0x71fe, 0x7200, 0x7207, 0x7208,
00434 0x7209, 0x7213, 0x7217, 0x721a, 0x721d, 0x721f, 0x7224, 0x722b,
00435 0x722f, 0x7234, 0x7238, 0x7239, 0x7241, 0x7242, 0x7243, 0x7245,
00436 0x724e, 0x724f, 0x7250, 0x7253, 0x7255, 0x7256, 0x725a, 0x725c,
00437 0x725e, 0x7260, 0x7263, 0x7268, 0x726b, 0x726e, 0x726f, 0x7271,
00438 0x7277, 0x7278, 0x727b, 0x727c, 0x727f, 0x7284, 0x7289, 0x728d,
00439 0x728e, 0x7293, 0x729b, 0x729c, 0x72a8, 0x72ad, 0x72ae, 0x72b1, 0x72b4,
00440 0x72be, 0x72c1, 0x72c7, 0x72c9, 0x72cc, 0x72d5, 0x72d6, 0x72d8,
00441 0x72df, 0x72e5, 0x72f3, 0x72f4, 0x72fa, 0x72fb,
00442 /* 0x4b */
00443 0x72fe, 0x7302, 0x7304, 0x7305, 0x7307, 0x730b, 0x730d, 0x7312,
00444 0x7313, 0x7318, 0x7319, 0x731e, 0x7322, 0x7324, 0x7327, 0x7328,
00445 0x732c, 0x7331, 0x7332, 0x7335, 0x733a, 0x733b, 0x733d, 0x7343,
00446 0x734d, 0x7350, 0x7352, 0x7356, 0x7358, 0x735d, 0x735e, 0x735f,
00447 0x7360, 0x7366, 0x7367, 0x7369, 0x736b, 0x736c, 0x736e, 0x736f,
00448 0x7371, 0x7377, 0x7379, 0x737c, 0x7380, 0x7381, 0x7383, 0x7385,
00449 0x7386, 0x738e, 0x7390, 0x7393, 0x7395, 0x7397, 0x7398, 0x739c,
00450 0x739e, 0x739f, 0x73a0, 0x73a2, 0x73a5, 0x73a6, 0x73aa, 0x73ab,
00451 0x73ad, 0x73b5, 0x73b7, 0x73b9, 0x73bc, 0x73bd, 0x73be, 0x73c5,
00452 0x73c6, 0x73c9, 0x73cb, 0x73cc, 0x73cf, 0x73d2, 0x73d3, 0x73d6,
00453 0x73d9, 0x73dd, 0x73e1, 0x73e3, 0x73e6, 0x73e7, 0x73e9, 0x73f4,
00454 0x73f5, 0x73f7, 0x73f9, 0x73fa, 0x73fb, 0x73fd,
00455 /* 0x4c */
00456 0x73ff, 0x7400, 0x7401, 0x7404, 0x7407, 0x740a, 0x7411, 0x741a,
00457 0x741b, 0x7424, 0x7426, 0x7428, 0x7429, 0x742a, 0x742b, 0x742c,
00458 0x742d, 0x742e, 0x742f, 0x7430, 0x7431, 0x7439, 0x7440, 0x7443,
00459 0x7444, 0x7446, 0x7447, 0x744b, 0x744d, 0x7451, 0x7452, 0x7457,
00460 0x745d, 0x7462, 0x7466, 0x7467, 0x7468, 0x746b, 0x746d, 0x746e,
00461 0x7471, 0x7472, 0x7480, 0x7481, 0x7485, 0x7486, 0x7487, 0x7489,
00462 0x748f, 0x7490, 0x7491, 0x7492, 0x7498, 0x7499, 0x749a, 0x749c,
00463 0x749f, 0x74a0, 0x74a1, 0x74a3, 0x74a6, 0x74a8, 0x74a9, 0x74aa,
00464 0x74ab, 0x74ae, 0x74af, 0x74b1, 0x74b2, 0x74b5, 0x74b9, 0x74bb,
00465 0x74bf, 0x74c8, 0x74c9, 0x74cc, 0x74d0, 0x74d3, 0x74d8, 0x74da,
00466 0x74db, 0x74de, 0x74df, 0x74e4, 0x74e8, 0x74ea, 0x74eb, 0x74ef,
00467 0x74f4, 0x74fa, 0x74fb, 0x74fc, 0x74ff, 0x7506,
00468 /* 0x4d */
00469 0x7512, 0x7516, 0x7517, 0x7520, 0x7521, 0x7524, 0x7527, 0x7529,
00470 0x752a, 0x752f, 0x7536, 0x7539, 0x753d, 0x753e, 0x753f, 0x7540,
00471 0x7543, 0x7547, 0x7548, 0x754e, 0x7550, 0x7552, 0x7557, 0x755e,
00472 0x755f, 0x7561, 0x756f, 0x7571, 0x7579, 0x757a, 0x757b, 0x757c,
00473 0x757d, 0x757e, 0x7581, 0x7585, 0x7590, 0x7592, 0x7593, 0x7595,
00474 0x7599, 0x759c, 0x75a2, 0x75a4, 0x75b4, 0x75ba, 0x75bf, 0x75c0,
00475 0x75c1, 0x75c4, 0x75c6, 0x75cc, 0x75ce, 0x75cf, 0x75d7, 0x75dc,
00476 0x75df, 0x75e0, 0x75e1, 0x75e4, 0x75e7, 0x75ec, 0x75ee, 0x75ef,
00477 0x75f1, 0x75f9, 0x7600, 0x7602, 0x7603, 0x7604, 0x7607, 0x7608,
00478 0x760a, 0x760c, 0x760f, 0x7612, 0x7613, 0x7615, 0x7616, 0x7619,
00479 0x761b, 0x761c, 0x761d, 0x761e, 0x7623, 0x7625, 0x7626, 0x7629,
00480 0x762d, 0x7632, 0x7633, 0x7635, 0x7638, 0x7639,
00481 /* 0x4e */
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```
00482 0x763a, 0x763c, 0x764a, 0x7640, 0x7641, 0x7643, 0x7644, 0x7645,
00483 0x7649, 0x764b, 0x7655, 0x7659, 0x765f, 0x7664, 0x7665, 0x766d,
00484 0x766e, 0x766f, 0x7671, 0x7674, 0x7681, 0x7685, 0x768c, 0x768d,
00485 0x7695, 0x769b, 0x769c, 0x769d, 0x769f, 0x76a0, 0x76a2, 0x76a3,
00486 0x76a4, 0x76a5, 0x76a6, 0x76a7, 0x76a8, 0x76aa, 0x76ad, 0x76bd,
00487 0x76c1, 0x76c5, 0x76c9, 0x76cb, 0x76cc, 0x76ce, 0x76d4, 0x76d9,
00488 0x76e0, 0x76e6, 0x76e8, 0x76ec, 0x76f0, 0x76f1, 0x76f6, 0x76f9,
00489 0x76fc, 0x7700, 0x7706, 0x770a, 0x770e, 0x7712, 0x7714, 0x7715,
00490 0x7717, 0x7719, 0x771a, 0x771c, 0x7722, 0x7728, 0x772d, 0x772e,
00491 0x772f, 0x7734, 0x7735, 0x7736, 0x7739, 0x773d, 0x773e, 0x7742,
00492 0x7745, 0x7746, 0x774a, 0x774d, 0x774e, 0x774f, 0x7752, 0x7756,
00493 0x7757, 0x775c, 0x775e, 0x775f, 0x7760, 0x7762,
00494 /* 0x4f */
00495 0x7764, 0x7767, 0x776a, 0x776c, 0x7770, 0x7772, 0x7773, 0x7774,
00496 0x777a, 0x777d, 0x7780, 0x7784, 0x778c, 0x778d, 0x7794, 0x7795,
00497 0x7796, 0x779a, 0x779f, 0x77a2, 0x77a7, 0x77aa, 0x77ae, 0x77af,
00498 0x77b1, 0x77b5, 0x77be, 0x77c3, 0x77c9, 0x77d1, 0x77d2, 0x77d5,
00499 0x77d9, 0x77de, 0x77df, 0x77e0, 0x77e4, 0x77e6, 0x77ea, 0x77ec,
00500 0x77f0, 0x77f1, 0x77f4, 0x77f8, 0x77fb, 0x7805, 0x7806, 0x7809,
00501 0x780d, 0x780e, 0x7811, 0x781d, 0x7821, 0x7822, 0x7823, 0x782d,
00502 0x782e, 0x7830, 0x783f, 0x7835, 0x7837, 0x7843, 0x7844, 0x7847, 0x7848,
00503 0x784c, 0x784e, 0x7852, 0x785c, 0x785e, 0x7860, 0x7861, 0x7863,
00504 0x7864, 0x7868, 0x786a, 0x786e, 0x787a, 0x787e, 0x788a, 0x788f,
00505 0x7894, 0x7898, 0x78a1, 0x789d, 0x789e, 0x789f, 0x78a4, 0x78a8,
00506 0x78ac, 0x78ad, 0x78b0, 0x78b1, 0x78b2, 0x78b3,
00507 /* 0x50 */
00508 0x78bb, 0x78bd, 0x78bf, 0x78c7, 0x78c8, 0x78c9, 0x78cc, 0x78ce,
00509 0x78d2, 0x78d3, 0x78d5, 0x78d6, 0x78e4, 0x78db, 0x78df, 0x78e0,
00510 0x78e1, 0x78e6, 0x78ea, 0x78f2, 0x78f3, 0x7900, 0x78f6, 0x78f7,
00511 0x78fa, 0x78fb, 0x78ff, 0x7906, 0x790c, 0x7910, 0x791a, 0x791c,
00512 0x791e, 0x791f, 0x7920, 0x7925, 0x7927, 0x7929, 0x792d, 0x7931,
00513 0x7934, 0x7935, 0x793b, 0x793d, 0x793f, 0x7944, 0x7945, 0x7946,
00514 0x794a, 0x794b, 0x794f, 0x7951, 0x7954, 0x7958, 0x795b, 0x795c,
00515 0x7967, 0x7969, 0x796b, 0x7972, 0x7979, 0x797b, 0x797c, 0x797e,
00516 0x798b, 0x798c, 0x7991, 0x7993, 0x7994, 0x7995, 0x7996, 0x7998,
00517 0x799b, 0x799c, 0x79a0, 0x79a1, 0x79a8, 0x79a9, 0x79ab, 0x79af, 0x79b1,
00518 0x79b4, 0x79b8, 0x79bb, 0x79c2, 0x79c4, 0x79c7, 0x79c8, 0x79ca,
00519 0x79cf, 0x79d4, 0x79d6, 0x79da, 0x79dd, 0x79de,
00520 /* 0x51 */
00521 0x79e0, 0x79e2, 0x79e5, 0x79ea, 0x79eb, 0x79ed, 0x79f1, 0x79f8,
00522 0x79fc, 0x7a02, 0x7a03, 0x7a07, 0x7a09, 0x7a0a, 0x7a0c, 0x7a11,
00523 0x7a15, 0x7a1b, 0x7a1e, 0x7a21, 0x7a27, 0x7a2b, 0x7a2d, 0x7a2f,
00524 0x7a30, 0x7a34, 0x7a35, 0x7a38, 0x7a39, 0x7a3a, 0x7a44, 0x7a45,
00525 0x7a47, 0x7a48, 0x7a4c, 0x7a55, 0x7a56, 0x7a59, 0x7a5c, 0x7a5d,
00526 0x7a5f, 0x7a60, 0x7a65, 0x7a67, 0x7a6a, 0x7a6d, 0x7a75, 0x7a78,
00527 0x7a7e, 0x7a80, 0x7a82, 0x7a85, 0x7a86, 0x7a8a, 0x7a8b, 0x7a90,
00528 0x7a91, 0x7a94, 0x7a9e, 0x7aa0, 0x7aa3, 0x7aac, 0x7ab3, 0x7ab5,
00529 0x7ab9, 0x7abb, 0x7abc, 0x7ac6, 0x7ac9, 0x7acc, 0x7ace, 0x7ad1,
00530 0x7adb, 0x7ae8, 0x7ae9, 0x7aeb, 0x7aec, 0x7af1, 0x7af4, 0x7afb,
00531 0x7afd, 0x7afe, 0x7b07, 0x7b14, 0x7b1f, 0x7b23, 0x7b27, 0x7b29,
00532 0x7b2a, 0x7b2b, 0x7b2d, 0x7b2e, 0x7b2f, 0x7b30,
00533 /* 0x52 */
00534 0x7b31, 0x7b34, 0x7b3d, 0x7b3f, 0x7b40, 0x7b41, 0x7b47, 0x7b4e,
00535 0x7b55, 0x7b60, 0x7b64, 0x7b66, 0x7b69, 0x7b6a, 0x7b6d, 0x7b6f,
00536 0x7b72, 0x7b73, 0x7b77, 0x7b84, 0x7b89, 0x7b8e, 0x7b90, 0x7b91,
00537 0x7b96, 0x7b9b, 0x7b9e, 0x7ba0, 0x7ba5, 0x7bac, 0x7baf, 0x7bb0,
00538 0x7bb2, 0x7bb5, 0x7bb6, 0x7bba, 0x7bbb, 0x7bbc, 0x7bbd, 0x7bc2,
00539 0x7bc5, 0x7bc8, 0x7bca, 0x7bd4, 0x7bd6, 0x7bd7, 0x7bd9, 0x7bda,
00540 0x7bdb, 0x7be8, 0x7bea, 0x7bf2, 0x7bf4, 0x7bf5, 0x7bf8, 0x7bf9,
00541 0x7bfa, 0x7bfc, 0x7c01, 0x7c02, 0x7c03, 0x7c04, 0x7c06,
00542 0x7c09, 0x7c0b, 0x7c0c, 0x7c0e, 0x7c0f, 0x7c19, 0x7c1b, 0x7c20,
00543 0x7c25, 0x7c26, 0x7c28, 0x7c2c, 0x7c31, 0x7c33, 0x7c34, 0x7c36,
00544 0x7c39, 0x7c3a, 0x7c46, 0x7c4a, 0x7c55, 0x7c51, 0x7c52, 0x7c53,
00545 0x7c59, 0x7c5a, 0x7c5b, 0x7c5c, 0x7c5d, 0x7c5e,
00546 /* 0x53 */
00547 0x7c61, 0x7c63, 0x7c67, 0x7c69, 0x7c6d, 0x7c6e, 0x7c70, 0x7c72,
00548 0x7c79, 0x7c7c, 0x7c7d, 0x7c86, 0x7c87, 0x7c8f, 0x7c94, 0x7c9e,
00549 0x7ca0, 0x7ca6, 0x7cb0, 0x7cb6, 0x7cb7, 0x7cba, 0x7cbb, 0x7cbc,
00550 0x7cbf, 0x7cc4, 0x7cc7, 0x7cc8, 0x7ccd, 0x7ccd, 0x7cce, 0x7cd3,
00551 0x7cd4, 0x7cd5, 0x7cd7, 0x7cd9, 0x7cda, 0x7cdd, 0x7ce6, 0x7ce9,
00552 0x7ceb, 0x7cf5, 0x7d03, 0x7d07, 0x7d09, 0x7d0f, 0x7d11,
00553 0x7d12, 0x7d13, 0x7d16, 0x7d1d, 0x7d1e, 0x7d23, 0x7d26, 0x7d2a,
00554 0x7d2d, 0x7d31, 0x7d3c, 0x7d3d, 0x7d3e, 0x7d40, 0x7d41, 0x7d47,
00555 0x7d48, 0x7d4d, 0x7d51, 0x7d53, 0x7d57, 0x7d59, 0x7d5a, 0x7d5c,
00556 0x7d5d, 0x7d65, 0x7d67, 0x7d6a, 0x7d70, 0x7d78, 0x7d7a, 0x7d7b,
00557 0x7d7f, 0x7d81, 0x7d82, 0x7d83, 0x7d85, 0x7d86, 0x7d88, 0x7d8b,
00558 0x7d8c, 0x7d8d, 0x7d91, 0x7d96, 0x7d97, 0x7d9d,
00559 /* 0x54 */
00560 0x7d9e, 0x7da6, 0x7da7, 0x7daa, 0x7db3, 0x7db6, 0x7db7, 0x7db9,
00561 0x7dc2, 0x7dc3, 0x7dc4, 0x7dc5, 0x7dc6, 0x7dcc, 0x7dcd, 0x7dce,
00562 0x7dd7, 0x7dd9, 0x7e00, 0x7de2, 0x7de5, 0x7de6, 0x7dea, 0x7deb,
00563 0x7ded, 0x7df1, 0x7df5, 0x7df6, 0x7df9, 0x7dfa, 0x7e08, 0x7e10,
00564 0x7e11, 0x7e15, 0x7e17, 0x7e1c, 0x7e1d, 0x7e20, 0x7e27, 0x7e28,
00565 0x7e2c, 0x7e2d, 0x7e2f, 0x7e33, 0x7e36, 0x7e3f, 0x7e44, 0x7e45,
00566 0x7e47, 0x7e4e, 0x7e50, 0x7e52, 0x7e58, 0x7e5f, 0x7e61, 0x7e62,
00567 0x7e65, 0x7e6b, 0x7e6e, 0x7e73, 0x7e76, 0x7e78, 0x7e7e, 0x7e81,
00568 0x7e86, 0x7e87, 0x7e8a, 0x7e8d, 0x7e91, 0x7e95, 0x7e98, 0x7e9a,
```

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00569 0x7e9d, 0x7e9e, 0x7f3c, 0x7f3b, 0x7f3d, 0x7f3e, 0x7f3f, 0x7f43,
00570 0x7f44, 0x7f47, 0x7f4f, 0x7f52, 0x7f53, 0x7f5b, 0x7f5c, 0x7f5d,
00571 0x7f61, 0x7f63, 0x7f64, 0x7f65, 0x7f66, 0x7f6d,
00572 /* 0x55 */
00573 0x7f71, 0x7f7d, 0x7f7e, 0x7f7f, 0x7f80, 0x7f8b, 0x7f8d, 0x7f8f,
00574 0x7f90, 0x7f91, 0x7f96, 0x7f97, 0x7f9c, 0x7fa1, 0x7fa2, 0x7fa6,
00575 0x7faa, 0x7fad, 0x7fb4, 0x7fbc, 0x7fbf, 0x7fc0, 0x7fc3, 0x7fc8,
00576 0x7fce, 0x7fcf, 0x7fdb, 0x7fdf, 0x7fe3, 0x7fe5, 0x7fe8, 0x7fec,
00577 0x7fee, 0x7fef, 0x7ff2, 0x7ffa, 0x7ffd, 0x7ffe, 0x7fff, 0x8007,
00578 0x8008, 0x800a, 0x800d, 0x800e, 0x800f, 0x8011, 0x8013, 0x8014,
00579 0x8016, 0x801d, 0x801e, 0x801f, 0x8020, 0x8024, 0x8026, 0x802c,
00580 0x802e, 0x8030, 0x8034, 0x8035, 0x8037, 0x8039, 0x803a, 0x803c,
00581 0x803e, 0x8040, 0x8044, 0x8060, 0x8064, 0x8066, 0x806d, 0x8071,
00582 0x8075, 0x8081, 0x8088, 0x808e, 0x809c, 0x809e, 0x80a6, 0x80a7,
00583 0x80ab, 0x80b8, 0x80b9, 0x80c8, 0x80cd, 0x80cf, 0x80d2, 0x80d4,
00584 0x80d5, 0x80d7, 0x80d8, 0x80e0, 0x80ed, 0x80ee,
00585 /* 0x56 */
00586 0x80f0, 0x80f2, 0x80f3, 0x80f6, 0x80f9, 0x80fa, 0x80fe, 0x8103,
00587 0x810b, 0x8116, 0x8117, 0x8118, 0x811c, 0x811e, 0x8120, 0x8124,
00588 0x8127, 0x812c, 0x8130, 0x8135, 0x813a, 0x813c, 0x8145, 0x8147,
00589 0x814a, 0x814c, 0x814e, 0x8152, 0x8157, 0x8160, 0x8161, 0x8167, 0x8168,
00590 0x8169, 0x816d, 0x816f, 0x8177, 0x8181, 0x8190, 0x8184, 0x8185,
00591 0x8186, 0x818b, 0x818e, 0x8196, 0x8198, 0x819b, 0x819e, 0x81a2,
00592 0x81ae, 0x81b2, 0x81b4, 0x81bb, 0x81cb, 0x81c3, 0x81c5, 0x81ca,
00593 0x81ce, 0x81cf, 0x81d5, 0x81d7, 0x81db, 0x81dd, 0x81de, 0x81e1,
00594 0x81e4, 0x81eb, 0x81ec, 0x81f0, 0x81f1, 0x81f2, 0x81f5, 0x81f6,
00595 0x81f8, 0x81f9, 0x81fd, 0x81ff, 0x8200, 0x8203, 0x820f, 0x8213,
00596 0x8214, 0x8219, 0x821a, 0x821d, 0x8221, 0x8222, 0x8228, 0x8232,
00597 0x8234, 0x823a, 0x8243, 0x8244, 0x8245, 0x8246,
00598 /* 0x57 */
00599 0x824b, 0x824e, 0x824f, 0x8251, 0x8256, 0x825c, 0x8260, 0x8263,
00600 0x8267, 0x826d, 0x8274, 0x827b, 0x827d, 0x827f, 0x8280, 0x8281,
00601 0x8283, 0x8284, 0x8287, 0x8289, 0x828a, 0x828e, 0x8291, 0x8294,
00602 0x8296, 0x8298, 0x829a, 0x829b, 0x82a0, 0x82a1, 0x82a3, 0x82a4,
00603 0x82a7, 0x82a8, 0x82a9, 0x82aa, 0x82ae, 0x82b0, 0x82b2, 0x82b4,
00604 0x82b7, 0x82ba, 0x82bc, 0x82be, 0x82bf, 0x82c6, 0x82d0, 0x82d5,
00605 0x82da, 0x82e0, 0x82e2, 0x82e4, 0x82e8, 0x82ea, 0x82ed, 0x82ef,
00606 0x82f6, 0x82f7, 0x82fd, 0x82fe, 0x8300, 0x8301, 0x8307, 0x8308,
00607 0x830a, 0x830b, 0x8354, 0x835a, 0x831b, 0x831d, 0x831e, 0x8321,
00608 0x8322, 0x832c, 0x832d, 0x832e, 0x8330, 0x8333, 0x8337, 0x833a,
00609 0x833c, 0x833d, 0x8342, 0x8343, 0x8344, 0x8347, 0x834d, 0x834e,
00610 0x8351, 0x8355, 0x8356, 0x8357, 0x8370, 0x8378,
00611 /* 0x58 */
00612 0x837d, 0x837f, 0x8380, 0x8382, 0x8384, 0x8386, 0x838d, 0x8392,
00613 0x8394, 0x8395, 0x8398, 0x8399, 0x839b, 0x839c, 0x839d, 0x83a6,
00614 0x83a7, 0x83a9, 0x83ac, 0x83be, 0x83bf, 0x83c0, 0x83c7, 0x83c9,
00615 0x83cf, 0x83d0, 0x83d1, 0x83d4, 0x83dd, 0x8353, 0x83e8, 0x83ea,
00616 0x83f6, 0x83f8, 0x83f9, 0x83fc, 0x8401, 0x8406, 0x840a, 0x840f,
00617 0x8411, 0x8415, 0x8419, 0x83ad, 0x842f, 0x8439, 0x8445, 0x8447,
00618 0x8448, 0x844a, 0x844d, 0x844f, 0x8451, 0x8452, 0x8456, 0x8458,
00619 0x8459, 0x845a, 0x845c, 0x845e, 0x8460, 0x8464, 0x8465, 0x8467, 0x846a,
00620 0x8470, 0x8473, 0x8474, 0x8476, 0x8478, 0x847c, 0x847d, 0x8481,
00621 0x8485, 0x8492, 0x8493, 0x8495, 0x849e, 0x84a6, 0x84a8, 0x84a9,
00622 0x84aa, 0x84af, 0x84b1, 0x84b4, 0x84ba, 0x84bd, 0x84be, 0x84c0,
00623 0x84c2, 0x84c7, 0x84c8, 0x84cc, 0x84cf, 0x84d3,
00624 /* 0x59 */
00625 0x84dc, 0x84e7, 0x84ea, 0x84ef, 0x84f0, 0x84f1, 0x84f2, 0x84f7,
00626 0x8532, 0x84fa, 0x84fb, 0x84fd, 0x8502, 0x8503, 0x8507, 0x850c,
00627 0x850e, 0x8510, 0x851c, 0x851e, 0x8522, 0x8523, 0x8524, 0x8525,
00628 0x8527, 0x852a, 0x852b, 0x852f, 0x8533, 0x8534, 0x8536, 0x853f,
00629 0x8546, 0x854f, 0x8550, 0x8551, 0x8552, 0x8553, 0x8556, 0x8559,
00630 0x855c, 0x855d, 0x855e, 0x855f, 0x8560, 0x8561, 0x8562, 0x8564,
00631 0x856b, 0x856e, 0x8579, 0x857a, 0x857b, 0x857d, 0x857f, 0x8581,
00632 0x8585, 0x8586, 0x8589, 0x858b, 0x858c, 0x858f, 0x8593, 0x8598,
00633 0x859d, 0x859f, 0x85a0, 0x85a2, 0x85a5, 0x85a7, 0x85b4, 0x85b6,
00634 0x85b7, 0x85b8, 0x85bc, 0x85bd, 0x85be, 0x85bf, 0x85c2, 0x85c7,
00635 0x85ca, 0x85cb, 0x85ce, 0x85ad, 0x85d8, 0x85da, 0x85df, 0x85e0,
00636 0x85e6, 0x85e8, 0x85ed, 0x85f3, 0x85f6, 0x85fc,
00637 /* 0x5a */
00638 0x85ff, 0x8600, 0x8604, 0x8605, 0x860d, 0x860e, 0x8610, 0x8611,
00639 0x8612, 0x8618, 0x8619, 0x861b, 0x861e, 0x8621, 0x8627, 0x8629,
00640 0x8636, 0x8638, 0x863a, 0x863c, 0x863d, 0x8640, 0x8642, 0x8646,
00641 0x8652, 0x8653, 0x8656, 0x8657, 0x8658, 0x8659, 0x865d, 0x8660,
00642 0x8661, 0x8662, 0x8663, 0x8664, 0x8666, 0x8669, 0x866c, 0x866f, 0x8675,
00643 0x8676, 0x8677, 0x867a, 0x868d, 0x8691, 0x8696, 0x8698, 0x869a,
00644 0x869c, 0x86a1, 0x86a6, 0x86a7, 0x86a8, 0x86ad, 0x86b1, 0x86b3,
00645 0x86b4, 0x86b5, 0x86b7, 0x86b8, 0x86b9, 0x86bf, 0x86c0, 0x86c1,
00646 0x86c3, 0x86c5, 0x86d1, 0x86d2, 0x86d5, 0x86d7, 0x86da, 0x86dc,
00647 0x86e0, 0x86e3, 0x86e5, 0x86e7, 0x8688, 0x86fa, 0x86fc, 0x86fd,
00648 0x8704, 0x8705, 0x8707, 0x870b, 0x870e, 0x870f, 0x8710, 0x8713,
00649 0x8714, 0x8719, 0x871e, 0x871f, 0x8721, 0x8723,
00650 /* 0x5b */
00651 0x8728, 0x872e, 0x872f, 0x8731, 0x8732, 0x8739, 0x873a, 0x873c,
00652 0x873d, 0x873e, 0x8740, 0x8743, 0x8745, 0x874d, 0x8758, 0x875d,
00653 0x8761, 0x8764, 0x8765, 0x876f, 0x8771, 0x8772, 0x877b, 0x8783,
00654 0x8784, 0x8785, 0x8786, 0x8787, 0x8788, 0x8789, 0x878b, 0x878c,
00655 0x8790, 0x8793, 0x8795, 0x8797, 0x8798, 0x8799, 0x879e, 0x87a0,

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00657 0x87bf, 0x87c1, 0x87c8, 0x87c9, 0x87ca, 0x87ce, 0x87d5, 0x87d6,
00658 0x87d9, 0x87da, 0x87dc, 0x87df, 0x87e2, 0x87e3, 0x87e4, 0x87ea,
00659 0x87eb, 0x87ed, 0x87f1, 0x87f3, 0x87f8, 0x87fa, 0x87ff, 0x8801,
00660 0x8803, 0x8806, 0x8809, 0x880a, 0x880b, 0x8810, 0x8819, 0x8812,
00661 0x8813, 0x8814, 0x8818, 0x881a, 0x881b, 0x881c, 0x881e, 0x881f,
00662 0x8828, 0x882d, 0x882e, 0x8830, 0x8832, 0x8835,
00663 /* 0x5c */
00664 0x883a, 0x883c, 0x8841, 0x8843, 0x8845, 0x8848, 0x8849, 0x884a,
00665 0x884b, 0x884e, 0x8851, 0x8855, 0x8856, 0x8858, 0x885a, 0x885c,
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00668 0x88ba, 0x88bd, 0x88be, 0x88c0, 0x88ca, 0x88cb, 0x88cc, 0x88cd,
00669 0x88ce, 0x88d1, 0x88d2, 0x88d3, 0x88db, 0x88de, 0x88e7, 0x88ef,
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00672 0x8926, 0x8927, 0x8928, 0x8930, 0x8931, 0x8932, 0x8935, 0x8939,
00673 0x893a, 0x893e, 0x8940, 0x8942, 0x8945, 0x8946, 0x8949, 0x894f,
00674 0x8952, 0x8957, 0x895a, 0x895b, 0x895c, 0x8961, 0x8962, 0x8963,
00675 0x896b, 0x896e, 0x8970, 0x8973, 0x8975, 0x897a,
00676 /* 0x5d */
00677 0x897b, 0x897c, 0x897d, 0x8989, 0x898d, 0x8990, 0x8994, 0x8995,
00678 0x899b, 0x899c, 0x899f, 0x89a0, 0x89a5, 0x89b0, 0x89b4, 0x89b5,
00679 0x89b6, 0x89b7, 0x89bc, 0x89d4, 0x89d5, 0x89d6, 0x89d7, 0x89d8,
00680 0x89e5, 0x89e9, 0x89eb, 0x89ed, 0x89f1, 0x89f3, 0x89f6, 0x89f9,
00681 0x89fd, 0x89ff, 0x8a04, 0x8a05, 0x8a07, 0x8a0f, 0x8a11, 0x8a12,
00682 0x8a14, 0x8a15, 0x8a1e, 0x8a1e, 0x8a20, 0x8a22, 0x8a24, 0x8a2b,
00683 0x8a2c, 0x8a2f, 0x8a35, 0x8a37, 0x8a3d, 0x8a3e, 0x8a40, 0x8a43,
00684 0x8a45, 0x8a47, 0x8a49, 0x8a4d, 0x8a4e, 0x8a53, 0x8a56, 0x8a57,
00685 0x8a58, 0x8a5c, 0x8a5d, 0x8a5d, 0x8a61, 0x8a65, 0x8a67, 0x8a76,
00686 0x8a77, 0x8a79, 0x8a7a, 0x8a7b, 0x8a7e, 0x8a7f, 0x8a80, 0x8a83,
00687 0x8a86, 0x8a8b, 0x8a8f, 0x8a90, 0x8a92, 0x8a96, 0x8a97, 0x8a99,
00688 0x8a9f, 0x8aa7, 0x8aa9, 0x8aae, 0x8aaf, 0x8ab3,
00689 /* 0x5e */
00690 0x8ab6, 0x8ab7, 0x8abb, 0x8abe, 0x8ac3, 0x8ac6, 0x8ac8, 0x8ac9,
00691 0x8aca, 0x8ad1, 0x8ad3, 0x8ad4, 0x8ad5, 0x8ad7, 0x8add, 0x8adf,
00692 0x8aec, 0x8af0, 0x8af4, 0x8af5, 0x8af6, 0x8afc, 0x8aff, 0x8b05,
00693 0x8b06, 0x8b0b, 0x8b11, 0x8b1c, 0x8b1e, 0x8b1f, 0x8b0a, 0x8b2d,
00694 0x8b30, 0x8b37, 0x8b3c, 0x8b42, 0x8b43, 0x8b44, 0x8b45, 0x8b46,
00695 0x8b48, 0x8b52, 0x8b53, 0x8b54, 0x8b59, 0x8b4d, 0x8b5e, 0x8b63,
00696 0x8b6d, 0x8b76, 0x8b78, 0x8b79, 0x8b7c, 0x8b7e, 0x8b81, 0x8b84,
00697 0x8b85, 0x8b8b, 0x8b8d, 0x8b8f, 0x8b94, 0x8b95, 0x8b9c, 0x8b9e,
00698 0x8b9f, 0x8c38, 0x8c39, 0x8c3d, 0x8c3e, 0x8c45, 0x8c47, 0x8c49,
00699 0x8c4b, 0x8c4f, 0x8c51, 0x8c53, 0x8c54, 0x8c57, 0x8c58, 0x8c5b,
00700 0x8c5d, 0x8c59, 0x8c63, 0x8c64, 0x8c66, 0x8c68, 0x8c69, 0x8c6d,
00701 0x8c73, 0x8c75, 0x8c76, 0x8c7b, 0x8c7e, 0x8c86,
00702 /* 0x5f */
00703 0x8c87, 0x8c8b, 0x8c90, 0x8c92, 0x8c93, 0x8c99, 0x8c9b, 0x8c9c,
00704 0x8ca4, 0x8cb9, 0x8cba, 0x8cc5, 0x8cc6, 0x8cc9, 0x8ccb, 0x8ccf,
00705 0x8cd6, 0x8cd5, 0x8cd9, 0x8cdd, 0x8ce1, 0x8ce8, 0x8cec, 0x8cef,
00706 0x8cf0, 0x8cf2, 0x8cf5, 0x8cf7, 0x8cf8, 0x8cfe, 0x8cfe, 0x8d01,
00707 0x8d03, 0x8d09, 0x8d12, 0x8d17, 0x8d1b, 0x8d65, 0x8d69, 0x8d6c,
00708 0x8d6e, 0x8d7f, 0x8d82, 0x8d84, 0x8d88, 0x8d8d, 0x8d90, 0x8d91,
00709 0x8d95, 0x8d9e, 0x8d9f, 0x8da0, 0x8da6, 0x8dab, 0x8dac, 0x8daf,
00710 0x8db2, 0x8db5, 0x8db7, 0x8db9, 0x8dbb, 0x8dc0, 0x8dc5, 0x8dc6,
00711 0x8dc7, 0x8dc8, 0x8dca, 0x8dce, 0x8dd1, 0x8dd4, 0x8dd5, 0x8dd7,
00712 0x8dd9, 0x8de4, 0x8de5, 0x8de7, 0x8dec, 0x8df0, 0x8dbc, 0x8df1,
00713 0x8df2, 0x8df4, 0x8dfd, 0x8e01, 0x8e04, 0x8e05, 0x8e06, 0x8e0b,
00714 0x8e11, 0x8e14, 0x8e16, 0x8e20, 0x8e21, 0x8e22,
00715 /* 0x60 */
00716 0x8e23, 0x8e26, 0x8e27, 0x8e31, 0x8e33, 0x8e36, 0x8e37, 0x8e38,
00717 0x8e39, 0x8e3d, 0x8e40, 0x8e41, 0x8e4b, 0x8e4d, 0x8e4e, 0x8e4f,
00718 0x8e54, 0x8e5b, 0x8e5c, 0x8e5d, 0x8e5e, 0x8e61, 0x8e62, 0x8e69,
00719 0x8e6c, 0x8e6d, 0x8e6f, 0x8e70, 0x8e71, 0x8e79, 0x8e7a, 0x8e7b,
00720 0x8e82, 0x8e83, 0x8e89, 0x8e90, 0x8e92, 0x8e95, 0x8e9a, 0x8e9b,
00721 0x8e9d, 0x8e9e, 0x8ea2, 0x8ea7, 0x8ea9, 0x8ead, 0x8eae, 0x8eb3,
00722 0x8eb5, 0x8eba, 0x8ebb, 0x8ec0, 0x8ec1, 0x8ec3, 0x8ec4, 0x8ec7,
00723 0x8ecf, 0x8ed1, 0x8ed4, 0x8edc, 0x8ee8, 0x8eee, 0x8ef0, 0x8ef1,
00724 0x8ef7, 0x8ef9, 0x8efa, 0x8eed, 0x8f00, 0x8f02, 0x8f07, 0x8f08,
00725 0x8f0f, 0x8f10, 0x8f16, 0x8f17, 0x8f18, 0x8f1e, 0x8f20, 0x8f21,
00726 0x8f23, 0x8f25, 0x8f27, 0x8f28, 0x8f2c, 0x8f2d, 0x8f2e, 0x8f34,
00727 0x8f35, 0x8f36, 0x8f37, 0x8f3a, 0x8f40, 0x8f41,
00728 /* 0x61 */
00729 0x8f43, 0x8f47, 0x8f4f, 0x8f51, 0x8f52, 0x8f53, 0x8f54, 0x8f55,
00730 0x8f58, 0x8f5d, 0x8f5e, 0x8f65, 0x8f9d, 0x8fa0, 0x8fa1, 0x8fa4,
00731 0x8fa5, 0x8fa6, 0x8fb5, 0x8fb6, 0x8fb8, 0x8fbe, 0x8fc0, 0x8fc1,
00732 0x8fc6, 0x8fc8, 0x8fcb, 0x8fcd, 0x8fd0, 0x8fd2, 0x8fd3, 0x8fd5,
00733 0x8fe0, 0x8fe3, 0x8fe4, 0x8fe8, 0xfee, 0x8ff1, 0x8ff5, 0x8ff6,
00734 0x8ffb, 0x8fff, 0x9002, 0x9004, 0x9008, 0x900c, 0x9018, 0x901b,
00735 0x9028, 0x9029, 0x902f, 0x902a, 0x902c, 0x902d, 0x9033, 0x9034,
00736 0x9037, 0x903f, 0x9043, 0x9044, 0x904c, 0x905b, 0x905d, 0x9062,
00737 0x9066, 0x9067, 0x906c, 0x9070, 0x9074, 0x9079, 0x9085, 0x9088,
00738 0x908b, 0x908c, 0x908e, 0x908e, 0x9090, 0x9095, 0x9097, 0x9098, 0x9099,
00739 0x909b, 0x90a0, 0x90a1, 0x90a2, 0x90a5, 0x90b0, 0x90b2, 0x90b3,
00740 0x90b4, 0x90b6, 0x90bd, 0x90cc, 0x90be, 0x90c3,
00741 /* 0x62 */
00742 0x90c4, 0x90c5, 0x90c7, 0x90c8, 0x90d5, 0x90d7, 0x90d8, 0x90d9,
```

```
00743 0x90dc, 0x90dd, 0x90df, 0x90e5, 0x90d2, 0x90f6, 0x90eb, 0x90ef,
00744 0x90f0, 0x90f4, 0x90fe, 0x90ff, 0x9100, 0x9104, 0x9105, 0x9106,
00745 0x9108, 0x910d, 0x9110, 0x9114, 0x9116, 0x9117, 0x9118, 0x911a,
00746 0x911c, 0x911e, 0x9120, 0x9125, 0x9122, 0x9123, 0x9127, 0x9129,
00747 0x912e, 0x912f, 0x9131, 0x9134, 0x9136, 0x9137, 0x9139, 0x913a,
00748 0x913c, 0x913d, 0x9143, 0x9147, 0x9148, 0x914f, 0x9153, 0x9157,
00749 0x9159, 0x915a, 0x915b, 0x9161, 0x9164, 0x9167, 0x916d, 0x9174,
00750 0x9179, 0x917a, 0x917b, 0x9181, 0x9183, 0x9185, 0x9186, 0x918a,
00751 0x918e, 0x9191, 0x9193, 0x9194, 0x9195, 0x9198, 0x919e, 0x91a1,
00752 0x91a6, 0x91a8, 0x91ac, 0x91ad, 0x91ae, 0x91b0, 0x91b1, 0x91b2,
00753 0x91b3, 0x91b6, 0x91bb, 0x91bc, 0x91bd, 0x91bf,
00754 /* 0x63 */
00755 0x91c2, 0x91c3, 0x91c5, 0x91d3, 0x91d4, 0x91d7, 0x91d9, 0x91da,
00756 0x91de, 0x91e4, 0x91e5, 0x91e9, 0x91ea, 0x91ec, 0x91ed, 0x91ee,
00757 0x91ef, 0x91f0, 0x91f1, 0x91f7, 0x91f9, 0x91fb, 0x91fd, 0x9200,
00758 0x9201, 0x9204, 0x9205, 0x9206, 0x9207, 0x9209, 0x920a, 0x920c,
00759 0x9210, 0x9212, 0x9213, 0x9216, 0x9218, 0x921c, 0x921d, 0x9223,
00760 0x9224, 0x9225, 0x9226, 0x9228, 0x922e, 0x922f, 0x9230, 0x9233,
00761 0x9235, 0x9236, 0x9238, 0x9239, 0x923a, 0x923c, 0x923e, 0x9240,
00762 0x9242, 0x9243, 0x9246, 0x9247, 0x924a, 0x924d, 0x924e, 0x924f,
00763 0x9251, 0x9258, 0x9259, 0x925c, 0x925d, 0x9260, 0x9261, 0x9265,
00764 0x9267, 0x9268, 0x9269, 0x926e, 0x926f, 0x9270, 0x9275, 0x9276,
00765 0x9277, 0x9278, 0x9279, 0x927b, 0x927c, 0x927d, 0x927f, 0x9288,
00766 0x9289, 0x928a, 0x928d, 0x928e, 0x9292, 0x9297,
00767 /* 0x64 */
00768 0x9299, 0x929f, 0x92a0, 0x92a4, 0x92a5, 0x92a7, 0x92a8, 0x92ab,
00769 0x92af, 0x92b2, 0x92b6, 0x92b8, 0x92ba, 0x92bb, 0x92bc, 0x92bd,
00770 0x92bf, 0x92c0, 0x92c1, 0x92c2, 0x92c3, 0x92c5, 0x92c6, 0x92c7,
00771 0x92c8, 0x92cb, 0x92cc, 0x92cd, 0x92ce, 0x92d0, 0x92d3, 0x92d5,
00772 0x92d7, 0x92d8, 0x92d9, 0x92dc, 0x92dd, 0x92df, 0x92e0, 0x92e1,
00773 0x92e3, 0x92e5, 0x92e7, 0x92e8, 0x92ec, 0x92ee, 0x92f0, 0x92f9,
00774 0x92fb, 0x92ff, 0x9300, 0x9302, 0x9308, 0x930d, 0x9311, 0x9314,
00775 0x9315, 0x931c, 0x931d, 0x931e, 0x931f, 0x9321, 0x9324, 0x9325,
00776 0x9327, 0x9329, 0x932a, 0x9333, 0x9334, 0x9336, 0x9337, 0x9347,
00777 0x9348, 0x9349, 0x9350, 0x9351, 0x9352, 0x9355, 0x9357, 0x9358,
00778 0x935a, 0x935e, 0x9364, 0x9365, 0x9367, 0x9369, 0x936a, 0x936d,
00779 0x936f, 0x9370, 0x9371, 0x9373, 0x9374, 0x9376,
00780 /* 0x65 */
00781 0x937a, 0x937d, 0x937f, 0x9380, 0x9381, 0x9382, 0x9388, 0x938a,
00782 0x938b, 0x938d, 0x938f, 0x9392, 0x9395, 0x9398, 0x939b, 0x939e,
00783 0x93a1, 0x93a3, 0x93a4, 0x93a6, 0x93a8, 0x93ab, 0x93b4, 0x93b5,
00784 0x93b6, 0x93ba, 0x93b9, 0x93c1, 0x93c4, 0x93c5, 0x93c6, 0x93c7,
00785 0x93c9, 0x93ca, 0x93cb, 0x93cc, 0x93cd, 0x93d3, 0x93d9, 0x93dc,
00786 0x93de, 0x93df, 0x93e2, 0x93e6, 0x93e7, 0x93f9, 0x93ff, 0x93f8,
00787 0x93fa, 0x93fb, 0x93fd, 0x9401, 0x9402, 0x9404, 0x9408, 0x9409,
00788 0x940d, 0x940e, 0x940f, 0x9415, 0x9416, 0x9417, 0x941f, 0x942e,
00789 0x942f, 0x9431, 0x9432, 0x9433, 0x9434, 0x943b, 0x943f, 0x943d,
00790 0x9443, 0x9445, 0x9448, 0x944a, 0x944c, 0x9445, 0x9459, 0x945c,
00791 0x945f, 0x9461, 0x9463, 0x9468, 0x946b, 0x946d, 0x946e, 0x946f,
00792 0x9471, 0x9472, 0x9484, 0x9483, 0x9578, 0x9579,
00793 /* 0x66 */
00794 0x957e, 0x9584, 0x9588, 0x958c, 0x958d, 0x958e, 0x959d, 0x959e,
00795 0x959f, 0x95a1, 0x95a6, 0x95a9, 0x95ab, 0x95ac, 0x95b4, 0x95b6,
00796 0x95ba, 0x95bd, 0x95bf, 0x95c6, 0x95c8, 0x95c9, 0x95cb, 0x95d0,
00797 0x95d1, 0x95d2, 0x95d3, 0x95d9, 0x95da, 0x95dd, 0x95de, 0x95df,
00798 0x95e0, 0x95e4, 0x95e6, 0x961d, 0x961e, 0x9622, 0x9624, 0x9625,
00799 0x9626, 0x962c, 0x9631, 0x9633, 0x9637, 0x9638, 0x9639, 0x963a,
00800 0x963c, 0x963d, 0x9641, 0x9652, 0x9654, 0x9656, 0x9657, 0x9658,
00801 0x9661, 0x966e, 0x9674, 0x967b, 0x967c, 0x967e, 0x967f, 0x9681,
00802 0x9682, 0x9683, 0x9684, 0x9689, 0x9691, 0x9696, 0x969a, 0x969d,
00803 0x969f, 0x96a4, 0x96a5, 0x96a6, 0x96a9, 0x96ae, 0x96af, 0x96b3,
00804 0x96ba, 0x96ca, 0x96d2, 0x5db2, 0x96d8, 0x96da, 0x96dd, 0x96de,
00805 0x96df, 0x96e9, 0x96ef, 0x96f1, 0x96fa, 0x9702,
00806 /* 0x67 */
00807 0x9703, 0x9705, 0x9709, 0x971a, 0x971b, 0x971d, 0x9721, 0x9722,
00808 0x9723, 0x9728, 0x9731, 0x9733, 0x9741, 0x9743, 0x974a, 0x974e,
00809 0x974f, 0x9755, 0x9757, 0x9758, 0x975a, 0x975b, 0x9763, 0x9767,
00810 0x976a, 0x976e, 0x9773, 0x9776, 0x9777, 0x9778, 0x977b, 0x977d,
00811 0x977f, 0x9780, 0x9789, 0x9795, 0x9796, 0x9797, 0x9799, 0x979a,
00812 0x979e, 0x979f, 0x97a2, 0x97ac, 0x97ae, 0x97b1, 0x97b2, 0x97b5,
00813 0x97b6, 0x97b8, 0x97b9, 0x97ba, 0x97bc, 0x97be, 0x97bf, 0x97c1,
00814 0x97c4, 0x97c5, 0x97c7, 0x97c9, 0x97ca, 0x97cc, 0x97cd, 0x97ce,
00815 0x97d0, 0x97d1, 0x97d4, 0x97d7, 0x97d8, 0x97d9, 0x97dd, 0x97de,
00816 0x97e0, 0x97db, 0x97e1, 0x97e4, 0x97ef, 0x97f1, 0x97fd, 0x97ff,
00817 0x97f8, 0x97fa, 0x9807, 0x980a, 0x9819, 0x980d, 0x980e, 0x9814,
00818 0x9816, 0x981c, 0x981e, 0x9820, 0x9823, 0x9826,
00819 /* 0x68 */
00820 0x982b, 0x982e, 0x982f, 0x9830, 0x9832, 0x9833, 0x9835, 0x9825,
00821 0x9838, 0x9844, 0x9847, 0x984a, 0x9851, 0x9852, 0x9853, 0x9856,
00822 0x9857, 0x9859, 0x985a, 0x985b, 0x985d, 0x9863, 0x9865, 0x9866, 0x986a,
00823 0x986c, 0x98ab, 0x98ad, 0x98ae, 0x98b0, 0x98b4, 0x98b7, 0x98b8,
00824 0x98ba, 0x98bb, 0x98bf, 0x98c2, 0x98c5, 0x98c8, 0x98cc, 0x98e1,
00825 0x98e3, 0x98e5, 0x98e6, 0x98e7, 0x98ea, 0x98f3, 0x98f6, 0x9902,
00826 0x9907, 0x9908, 0x9911, 0x9915, 0x9916, 0x9917, 0x991a, 0x991b,
00827 0x991c, 0x991f, 0x9922, 0x9926, 0x9927, 0x992b, 0x9931, 0x9932,
00828 0x9933, 0x9934, 0x9935, 0x9939, 0x993a, 0x993b, 0x993c, 0x9940,
00829 0x9941, 0x9946, 0x9947, 0x9948, 0x994d, 0x994e, 0x9954, 0x9958,
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00830 0x9959, 0x995b, 0x995c, 0x995e, 0x995f, 0x9960, 0x999b, 0x999d,
00831 0x999f, 0x99a6, 0x99b0, 0x99b1, 0x99b2, 0x99b5,
00832 /* 0x69 */
00833 0x99b9, 0x99ba, 0x99bd, 0x99bf, 0x99c3, 0x99c9, 0x99d3, 0x99d4,
00834 0x99d9, 0x99da, 0x99dc, 0x99de, 0x99e7, 0x99ea, 0x99eb, 0x99ec,
00835 0x99f0, 0x99f4, 0x99f5, 0x99f9, 0x99fd, 0x99fe, 0x9a02, 0x9a03,
00836 0x9a04, 0x9a0b, 0x9a0c, 0x9a10, 0x9a11, 0x9a16, 0x9a1e, 0x9a20,
00837 0x9a22, 0x9a23, 0x9a24, 0x9a27, 0x9a2d, 0x9a2e, 0x9a33, 0x9a35,
00838 0x9a36, 0x9a38, 0x9a47, 0x9a41, 0x9a44, 0x9a4a, 0x9a4b, 0x9a4c,
00839 0x9a4e, 0x9a51, 0x9a54, 0x9a56, 0x9a5d, 0x9aaa, 0x9aac, 0x9aae,
00840 0x9aaf, 0x9ab2, 0x9ab4, 0x9ab5, 0x9ab6, 0x9ab9, 0x9abb, 0x9abe,
00841 0x9abf, 0x9ac1, 0x9ac3, 0x9ac6, 0x9ac8, 0x9ace, 0x9ad0, 0x9ad2,
00842 0x9ad5, 0x9ad6, 0x9ad7, 0x9adb, 0x9adc, 0x9ae0, 0x9ae4, 0x9ae5,
00843 0x9ae7, 0x9ae9, 0x9aec, 0x9af2, 0x9af3, 0x9af5, 0x9af9, 0x9afa,
00844 0x9afd, 0x9aff, 0x9b00, 0x9b01, 0x9b02, 0x9b03,
00845 /* 0x6a */
00846 0x9b04, 0x9b05, 0x9b08, 0x9b09, 0x9b0b, 0x9b0c, 0x9b0d, 0x9b0e,
00847 0x9b10, 0x9b12, 0x9b16, 0x9b19, 0x9b1b, 0x9b1c, 0x9b20, 0x9b26,
00848 0x9b2b, 0x9b2d, 0x9b33, 0x9b34, 0x9b35, 0x9b37, 0x9b39, 0x9b3a,
00849 0x9b3d, 0x9b48, 0x9b4b, 0x9b4c, 0x9b55, 0x9b56, 0x9b57, 0x9b5b,
00850 0x9b5e, 0x9b61, 0x9b63, 0x9b65, 0x9b66, 0x9b68, 0x9b6a, 0x9b6b,
00851 0x9b6c, 0x9b6d, 0x9b6e, 0x9b73, 0x9b75, 0x9b77, 0x9b78, 0x9b79,
00852 0x9b7f, 0x9b80, 0x9b84, 0x9b85, 0x9b86, 0x9b87, 0x9b89, 0x9b8a,
00853 0x9b8b, 0x9b8d, 0x9b8f, 0x9b90, 0x9b94, 0x9b9a, 0x9b9d, 0x9b9e,
00854 0x9ba6, 0x9ba7, 0x9ba9, 0x9bac, 0x9bb0, 0x9bb1, 0x9bb2, 0x9bb7,
00855 0x9bb8, 0x9bbb, 0x9bbc, 0x9bbe, 0x9bbf, 0x9bc1, 0x9bc7, 0x9bc8,
00856 0x9bce, 0x9bd0, 0x9bd7, 0x9bd8, 0x9bdd, 0x9bdf, 0x9be5, 0x9be7,
00857 0x9bea, 0x9beb, 0x9bef, 0x9bf3, 0x9bf7, 0x9bf8,
00858 /* 0x6b */
00859 0x9bf9, 0x9bfa, 0x9bfd, 0x9bff, 0x9c00, 0x9c02, 0x9c0b, 0x9c0f,
00860 0x9c11, 0x9c16, 0x9c18, 0x9c19, 0x9c1a, 0x9c1c, 0x9c1e, 0x9c22,
00861 0x9c23, 0x9c26, 0x9c27, 0x9c28, 0x9c29, 0x9c2a, 0x9c31, 0x9c35,
00862 0x9c36, 0x9c37, 0x9c3d, 0x9c41, 0x9c43, 0x9c44, 0x9c45, 0x9c49,
00863 0x9c4a, 0x9c4e, 0x9c4f, 0x9c50, 0x9c53, 0x9c54, 0x9c56, 0x9c58,
00864 0x9c5b, 0x9c5d, 0x9c5e, 0x9c5f, 0x9c63, 0x9c69, 0x9c6a, 0x9c5c,
00865 0x9c6b, 0x9c68, 0x9c6e, 0x9c70, 0x9c72, 0x9c75, 0x9c77, 0x9c7b,
00866 0x9c66, 0x9c62, 0x9c67, 0x9c69, 0x9d0b, 0x9d02, 0x9d11, 0x9d17,
00867 0x9d18, 0x9d1c, 0x9d1d, 0x9d1e, 0x9d2f, 0x9d30, 0x9d32, 0x9d33,
00868 0x9d34, 0x9d3a, 0x9d3c, 0x9d3d, 0x9d45, 0x9d3d, 0x9d42, 0x9d43, 0x9d47,
00869 0x9d4a, 0x9d53, 0x9d54, 0x9d5f, 0x9d63, 0x9d62, 0x9d65, 0x9d69,
00870 0x9d6a, 0x9d6b, 0x9d70, 0x9d76, 0x9d77, 0x9d7b,
00871 /* 0x6c */
00872 0x9d7c, 0x9d7e, 0x9d83, 0x9d84, 0x9d86, 0x9d8a, 0x9d8d, 0x9d8e,
00873 0x9d92, 0x9d93, 0x9d95, 0x9d96, 0x9d97, 0x9d98, 0x9da1, 0x9daa,
00874 0x9dac, 0x9dae, 0x9db1, 0x9db5, 0x9db9, 0x9dbc, 0x9dbf, 0x9dc3,
00875 0x9dc7, 0x9dc9, 0x9dca, 0x9dd4, 0x9dd5, 0x9dd6, 0x9dd7, 0x9dda,
00876 0x9dde, 0x9ddf, 0x9de0, 0x9de5, 0x9de7, 0x9de9, 0x9deb, 0x9dee,
00877 0x9df0, 0x9df3, 0x9df4, 0x9dfe, 0x9e0a, 0x9e02, 0x9e07, 0x9e0e,
00878 0x9e10, 0x9e11, 0x9e12, 0x9e15, 0x9e16, 0x9e19, 0x9e1c, 0x9e1d,
00879 0x9e7a, 0x9e7b, 0x9e7c, 0x9e80, 0x9e82, 0x9e83, 0x9e84, 0x9e85,
00880 0x9e87, 0x9e8e, 0x9e8f, 0x9e96, 0x9e98, 0x9e9b, 0x9e9e, 0x9ea4,
00881 0x9ea8, 0x9eac, 0x9eae, 0x9eaf, 0x9eb0, 0x9eb3, 0x9eb4, 0x9eb5,
00882 0x9ec6, 0x9ec8, 0x9ecb, 0x9ed5, 0x9edf, 0x9ee4, 0x9ee7, 0x9eec,
00883 0x9eed, 0x9eee, 0x9ef0, 0x9ef1, 0x9ef2, 0x9ef5,
00884 /* 0x6d */
00885 0x9ef8, 0x9eff, 0x9f02, 0x9f03, 0x9f09, 0x9f0f, 0x9f10, 0x9f11,
00886 0x9f12, 0x9f14, 0x9f16, 0x9f17, 0x9f19, 0x9f1a, 0x9f1b, 0x9f1f,
00887 0x9f22, 0x9f26, 0x9f2a, 0x9f2b, 0x9f2f, 0x9f31, 0x9f32, 0x9f34,
00888 0x9f37, 0x9f39, 0x9f3a, 0x9f3c, 0x9f3d, 0x9f3f, 0x9f41, 0x9f43,
00889 0x9f44, 0x9f45, 0x9f46, 0x9f47, 0x9f53, 0x9f55, 0x9f56, 0x9f57,
00890 0x9f58, 0x9f5a, 0x9f5d, 0x9f5e, 0x9f68, 0x9f69, 0x9f6d, 0x9f6e,
00891 0x9f6f, 0x9f70, 0x9f71, 0x9f73, 0x9f75, 0x9f7a, 0x9f7d, 0x9f8f,
00892 0x9f90, 0x9f91, 0x9f92, 0x9f94, 0x9f96, 0x9f97, 0x9f9e, 0x9fa1,
00893 0x9fa2, 0x9fa3, 0x9fa5,
00894 };
00895
00896 static int
00897 jisx0212_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00898 {
00899     unsigned char c1 = (s[0] & 0x7F);
00900     if ((c1 == 0x22) || (c1 >= 0x26 && c1 <= 0x27) || (c1 >= 0x29 && c1 <= 0x2b) || (c1 >= 0x30 && c1 <=
0x6d)) {
00901         if (n >= 2) {
00902             unsigned char c2 = (s[1] & 0x7F);
00903             if (c2 >= 0x21 && c2 < 0x7f) {
00904                 unsigned int i = 94 * (c1 - 0x21) + (c2 - 0x21);
00905                 unsigned short wc = 0xffff;
00906                 if (i < 470) {
00907                     if (i < 175)
00908                         wc = jisx0212_2uni_page22[i-94];
00909                     } else if (i < 752) {
00910                         if (i < 658)
00911                             wc = jisx0212_2uni_page26[i-470];
00912                     } else if (i < 1410) {
00913                         if (i < 1027)
00914                             wc = jisx0212_2uni_page29[i-752];
00915                     } else {

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00916         if (i < 7211)
00917             wc = jisx0212_2uni_page30[i-1410];
00918     }
00919     if (wc != 0xffffd) {
00920         *pwc = (ucs4_t) wc;
00921         return 2;
00922     }
00923     }
00924     return RET_ILSEQ;
00925 }
00926 return RET_TOOFEW(0);
00927 }
00928 return RET_ILSEQ;
00929 }
00930 #endif /* NEED_TOWC */
00931
00932 #ifdef NEED_TOMB
00933 static const unsigned short jisx0212_2charset[6067] = {
00934     0x2237, 0x2242, 0x2270, 0x2243, 0x226d, 0x226c, 0x226e, 0x2234,
00935     0x2231, 0x226b, 0x2244, 0x2a22, 0x2a21, 0x2a24, 0x2a2a, 0x2a23,
00936     0x2a29, 0x2921, 0x2a2e, 0x2a32, 0x2a31, 0x2a34, 0x2a33, 0x2a40,
00937     0x2a3f, 0x2a42, 0x2a41, 0x2a50, 0x2a52, 0x2a51, 0x2a54, 0x2a58,
00938     0x2a53, 0x292c, 0x2a63, 0x2a62, 0x2a65, 0x2a64, 0x2a72, 0x2930,
00939     0x294e, 0x2b22, 0x2b21, 0x2b24, 0x2b2a, 0x2b23, 0x2b29, 0x2941,
00940     0x2b2e, 0x2b32, 0x2b31, 0x2b34, 0x2b33, 0x2b40, 0x2b3f, 0x2b42,
00941     0x2b41, 0x2943, 0x2b50, 0x2b52, 0x2b51, 0x2b54, 0x2b58, 0x2b53,
00942     0x294c, 0x2b63, 0x2b62, 0x2b64, 0x2b65, 0x2b64, 0x2b72, 0x2950, 0x2b73,
00943     0x2a27, 0x2b27, 0x2a25, 0x2b25, 0x2a28, 0x2b28, 0x2a2b, 0x2b2b,
00944     0x2a2c, 0x2b2c, 0x2a2f, 0x2b2f, 0x2a2d, 0x2b2d, 0x2a30, 0x2b30,
00945     0x2922, 0x2942, 0x2a37, 0x2b37, 0x2a36, 0x2b36, 0x2a38, 0x2b38,
00946     0x2a35, 0x2b35, 0x2a3a, 0x2b3a, 0x2a3b, 0x2b3b, 0x2a3d, 0x2b3d,
00947     0x2a3c, 0x2a3e, 0x2b3e, 0x2924, 0x2944, 0x2a47, 0x2b47, 0x2a45,
00948     0x2b45, 0x2a46, 0x2b46, 0x2a44, 0x2945, 0x2926, 0x2946, 0x2a48,
00949     0x2b48, 0x2a49, 0x2b49, 0x2947, 0x2a4a, 0x2b4a, 0x2a4c, 0x2b4c,
00950     0x2a4b, 0x2b4b, 0x2929, 0x2949, 0x2928, 0x2948, 0x2a4d, 0x2b4d,
00951     0x2a4f, 0x292a, 0x2b4f, 0x2a4e, 0x2b4e, 0x294a, 0x292b, 0x294b, 0x2a57,
00952     0x2b57, 0x2a56, 0x2b56, 0x292d, 0x294d, 0x2a59, 0x2b59, 0x2a5b,
00953     0x2b5b, 0x2a5a, 0x2b5a, 0x2a5c, 0x2b5c, 0x2a5d, 0x2b5d, 0x2a5f,
00954     0x2b5f, 0x2a5e, 0x2b5e, 0x2a61, 0x2b61, 0x2a60, 0x2b60, 0x292f,
00955     0x294f, 0x2a6c, 0x2b6c, 0x2a69, 0x2b69, 0x2a66, 0x2b66, 0x2a6b,
00956     0x2b6b, 0x2a68, 0x2b68, 0x2a6a, 0x2b6a, 0x2a71, 0x2b71, 0x2a74,
00957     0x2b74, 0x2a73, 0x2a75, 0x2b75, 0x2a77, 0x2b77, 0x2a76, 0x2b76,
00958     0x2a26, 0x2b26, 0x2a43, 0x2b43, 0x2a55, 0x2b55, 0x2a67, 0x2b67,
00959     0x2a70, 0x2b70, 0x2a6d, 0x2b6d, 0x2a6f, 0x2b6f, 0x2a6e, 0x2b6e,
00960     0x2b39, 0x2230, 0x223f, 0x2232, 0x223e, 0x2236, 0x2235, 0x2233, 0x2238,
00961     0x2239, 0x2661, 0x2662, 0x2663, 0x2664, 0x2667, 0x2669, 0x266c,
00962     0x2676, 0x2665, 0x266a, 0x2671, 0x2672, 0x2673, 0x2674, 0x267b,
00963     0x2678, 0x2675, 0x267a, 0x2677, 0x2679, 0x267c, 0x2742, 0x2743,
00964     0x2744, 0x2745, 0x2746, 0x2747, 0x2748, 0x2749, 0x274a, 0x274b,
00965     0x274c, 0x274d, 0x274e, 0x2772, 0x2773, 0x2774, 0x2775, 0x2776,
00966     0x2777, 0x2778, 0x2779, 0x277a, 0x277b, 0x277c, 0x277d, 0x277e,
00967     0x2271, 0x226f, 0x3021, 0x3022, 0x3023, 0x3024, 0x3025, 0x3026,
00968     0x3027, 0x3028, 0x3029, 0x302a, 0x302b, 0x302c, 0x302d, 0x302e,
00969     0x302f, 0x3030, 0x3031, 0x3032, 0x3033, 0x3034, 0x3035, 0x3036,
00970     0x3037, 0x3038, 0x3039, 0x303a, 0x303b, 0x303c, 0x303d, 0x303e,
00971     0x303f, 0x3040, 0x3041, 0x3042, 0x3043, 0x3044, 0x3045, 0x3046,
00972     0x3047, 0x3048, 0x3049, 0x304a, 0x304b, 0x304c, 0x304d, 0x304e,
00973     0x304f, 0x3050, 0x3051, 0x3052, 0x3053, 0x3054, 0x3055, 0x3056,
00974     0x3057, 0x3058, 0x3059, 0x305a, 0x305b, 0x305c, 0x305d, 0x305e,
00975     0x3060, 0x3061, 0x3062, 0x3063, 0x3064, 0x3065, 0x3066, 0x3067,
00976     0x3068, 0x3069, 0x306a, 0x306b, 0x306c, 0x306d, 0x306e, 0x306f,
00977     0x3070, 0x305f, 0x3071, 0x3072, 0x3073, 0x3074, 0x3075, 0x3076,
00978     0x3077, 0x3078, 0x3079, 0x307a, 0x307b, 0x307c, 0x307d, 0x307e,
00979     0x3121, 0x3122, 0x3123, 0x3124, 0x3125, 0x3126, 0x3127, 0x3128,
00980     0x3129, 0x312a, 0x312b, 0x312c, 0x312d, 0x312e, 0x312f, 0x3130,
00981     0x3131, 0x3132, 0x3133, 0x3134, 0x3135, 0x3136, 0x3137, 0x3138,
00982     0x3139, 0x313a, 0x313b, 0x313c, 0x313d, 0x313e, 0x313f, 0x3140,
00983     0x3141, 0x3142, 0x3143, 0x3144, 0x3145, 0x3146, 0x3147, 0x3148,
00984     0x3149, 0x314a, 0x314b, 0x314c, 0x314d, 0x314e, 0x314f, 0x3150,
00985     0x3151, 0x3152, 0x3153, 0x3154, 0x3155, 0x3156, 0x3157, 0x3158,
00986     0x3159, 0x315a, 0x315b, 0x315c, 0x315d, 0x315e, 0x315f, 0x3160,
00987     0x3161, 0x3162, 0x3163, 0x3164, 0x3165, 0x3166, 0x3167,
00988     0x3168, 0x3169, 0x316a, 0x316b, 0x316c, 0x316d, 0x316e, 0x316f,
00989     0x3170, 0x3171, 0x3172, 0x3173, 0x3174, 0x3175, 0x3176, 0x3177,
00990     0x3178, 0x3179, 0x317a, 0x317b, 0x317c, 0x317d, 0x317e, 0x3221, 0x3222,
00991     0x3223, 0x3224, 0x3225, 0x3226, 0x3227, 0x3228, 0x3229, 0x322a,
00992     0x322b, 0x322c, 0x322d, 0x322e, 0x322f, 0x3230, 0x3231, 0x3232,
00993     0x3233, 0x3234, 0x3235, 0x3236, 0x3237, 0x3238, 0x3239, 0x323a,
00994     0x323b, 0x323c, 0x323d, 0x323e, 0x323f, 0x3240, 0x3241, 0x3242,
00995     0x3243, 0x3244, 0x3245, 0x3246, 0x3247, 0x3248, 0x3249, 0x324a,
00996     0x324b, 0x324c, 0x324d, 0x324e, 0x324f, 0x3250, 0x3251, 0x3252,
00997     0x3253, 0x3254, 0x3255, 0x3256, 0x3257, 0x3258, 0x3259, 0x325a,
00998     0x325b, 0x325c, 0x325d, 0x325e, 0x325f, 0x3260, 0x3261, 0x3262,
00999     0x3263, 0x3264, 0x3265, 0x3266, 0x3267, 0x3268, 0x3269, 0x326a,
01000     0x326b, 0x326c, 0x326d, 0x326e, 0x326f, 0x3270, 0x3271, 0x3272,
01001     0x3273, 0x3274, 0x3275, 0x3276, 0x3277, 0x3278, 0x3279, 0x327a,
01002     0x327b, 0x327c, 0x327d, 0x327e, 0x3321, 0x3322, 0x3323, 0x3324,

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01003 0x3325, 0x3326, 0x3327, 0x3328, 0x3329, 0x332a, 0x332b, 0x332c,
01004 0x332d, 0x332e, 0x332f, 0x3330, 0x3331, 0x3332, 0x3333, 0x3334,
01005 0x3335, 0x3336, 0x3337, 0x3338, 0x3339, 0x333a, 0x333b, 0x333c,
01006 0x333d, 0x333e, 0x333f, 0x3340, 0x3341, 0x3342, 0x3343, 0x3344,
01007 0x3345, 0x3346, 0x3347, 0x3348, 0x3349, 0x334a, 0x334b, 0x334c,
01008 0x334d, 0x334e, 0x334f, 0x3350, 0x3351, 0x3352, 0x3353, 0x3354,
01009 0x3355, 0x3356, 0x3357, 0x3358, 0x3359, 0x335a, 0x335b, 0x335c,
01010 0x335d, 0x335e, 0x335f, 0x3360, 0x3361, 0x3362, 0x3363, 0x3364,
01011 0x3365, 0x3366, 0x3367, 0x3368, 0x3369, 0x336a, 0x336b, 0x336c,
01012 0x336d, 0x336e, 0x336f, 0x3370, 0x3371, 0x3372, 0x3373, 0x3374,
01013 0x3375, 0x3376, 0x3377, 0x3378, 0x3379, 0x337a, 0x337b, 0x337c,
01014 0x337d, 0x337e, 0x337f, 0x3380, 0x3381, 0x3382, 0x3383, 0x3384,
01015 0x3385, 0x3386, 0x3387, 0x3388, 0x3389, 0x338a, 0x338b, 0x338c,
01016 0x338d, 0x338e, 0x338f, 0x3390, 0x3391, 0x3392, 0x3393, 0x3394,
01017 0x3395, 0x3396, 0x3397, 0x3398, 0x3399, 0x339a, 0x339b, 0x339c,
01018 0x339d, 0x339e, 0x339f, 0x3400, 0x3401, 0x3402, 0x3403, 0x3404,
01019 0x3405, 0x3406, 0x3407, 0x3408, 0x3409, 0x340a, 0x340b, 0x340c,
01020 0x340d, 0x340e, 0x340f, 0x3410, 0x3411, 0x3412, 0x3413, 0x3414,
01021 0x3415, 0x3416, 0x3417, 0x3418, 0x3419, 0x341a, 0x341b, 0x341c,
01022 0x341d, 0x341e, 0x341f, 0x3420, 0x3421, 0x3422, 0x3423, 0x3424,
01023 0x3425, 0x3426, 0x3427, 0x3428, 0x3429, 0x342a, 0x342b, 0x342c,
01024 0x342d, 0x342e, 0x342f, 0x3430, 0x3431, 0x3432, 0x3433, 0x3434,
01025 0x3435, 0x3436, 0x3437, 0x3438, 0x3439, 0x343a, 0x343b, 0x343c,
01026 0x343d, 0x343e, 0x343f, 0x3440, 0x3441, 0x3442, 0x3443, 0x3444,
01027 0x3445, 0x3446, 0x3447, 0x3448, 0x3449, 0x344a, 0x344b, 0x344c,
01028 0x344d, 0x344e, 0x344f, 0x3450, 0x3451, 0x3452, 0x3453, 0x3454,
01029 0x3455, 0x3456, 0x3457, 0x3458, 0x3459, 0x345a, 0x345b, 0x345c,
01030 0x345d, 0x345e, 0x345f, 0x3460, 0x3461, 0x3462, 0x3463, 0x3464,
01031 0x3465, 0x3466, 0x3467, 0x3468, 0x3469, 0x346a, 0x346b, 0x346c,
01032 0x346d, 0x346e, 0x346f, 0x3470, 0x3471, 0x3472, 0x3473, 0x3474,
01033 0x3475, 0x3476, 0x3477, 0x3478, 0x3479, 0x347a, 0x347b, 0x347c,
01034 0x347d, 0x347e, 0x347f, 0x3480, 0x3481, 0x3482, 0x3483, 0x3484,
01035 0x3485, 0x3486, 0x3487, 0x3488, 0x3489, 0x348a, 0x348b, 0x348c,
01036 0x348d, 0x348e, 0x348f, 0x3490, 0x3491, 0x3492, 0x3493, 0x3494,
01037 0x3495, 0x3496, 0x3497, 0x3498, 0x3499, 0x349a, 0x349b, 0x349c,
01038 0x349d, 0x349e, 0x349f, 0x3500, 0x3501, 0x3502, 0x3503, 0x3504,
01039 0x3505, 0x3506, 0x3507, 0x3508, 0x3509, 0x350a, 0x350b, 0x350c,
01040 0x350d, 0x350e, 0x350f, 0x3510, 0x3511, 0x3512, 0x3513, 0x3514,
01041 0x3515, 0x3516, 0x3517, 0x3518, 0x3519, 0x351a, 0x351b, 0x351c,
01042 0x351d, 0x351e, 0x351f, 0x3520, 0x3521, 0x3522, 0x3523, 0x3524,
01043 0x3525, 0x3526, 0x3527, 0x3528, 0x3529, 0x352a, 0x352b, 0x352c,
01044 0x352d, 0x352e, 0x352f, 0x3530, 0x3531, 0x3532, 0x3533, 0x3534,
01045 0x3535, 0x3536, 0x3537, 0x3538, 0x3539, 0x353a, 0x353b, 0x353c,
01046 0x353d, 0x353e, 0x353f, 0x3540, 0x3541, 0x3542, 0x3543, 0x3544,
01047 0x3545, 0x3546, 0x3547, 0x3548, 0x3549, 0x354a, 0x354b, 0x354c,
01048 0x354d, 0x354e, 0x354f, 0x3550, 0x3551, 0x3552, 0x3553, 0x3554,
01049 0x3555, 0x3556, 0x3557, 0x3558, 0x3559, 0x355a, 0x355b, 0x355c,
01050 0x355d, 0x355e, 0x355f, 0x3560, 0x3561, 0x3562, 0x3563, 0x3564,
01051 0x3565, 0x3566, 0x3567, 0x3568, 0x3569, 0x356a, 0x356b, 0x356c,
01052 0x356d, 0x356e, 0x356f, 0x3570, 0x3571, 0x3572, 0x3573, 0x3574,
01053 0x3575, 0x3576, 0x3577, 0x3578, 0x3579, 0x357a, 0x357b, 0x357c,
01054 0x357d, 0x357e, 0x357f, 0x3580, 0x3581, 0x3582, 0x3583, 0x3584,
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01716 /* 0x0400 */
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01718 { 251, 0x0000 }, { 251, 0xdffc },
01719 };
01720 static const Summary16 jisx0212_uni2indx_page21[3] = {
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01723 };
01724 static const Summary16 jisx0212_uni2indx_page4e[1307] = {
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01730 /* 0x4f00 */
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01735 /* 0x5000 */
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01740 /* 0x5100 */
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01744 { 547, 0x8104 }, { 550, 0x412e }, { 556, 0x4024 }, { 559, 0x009c },
01745 /* 0x5200 */
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01750 /* 0x5300 */
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01960 /* 0x7d00 */
01961 { 3598, 0x8388 }, { 3603, 0x604e }, { 3609, 0x2448 }, { 3613, 0x7002 },
01962 { 3617, 0x2183 }, { 3622, 0x368a }, { 3629, 0x04a0 }, { 3632, 0x8d01 },
01963 { 3637, 0x396e }, { 3646, 0x60c2 }, { 3651, 0x04c0 }, { 3654, 0x02c8 },
01964 { 3658, 0x707c }, { 3666, 0x0280 }, { 3668, 0x2c64 }, { 3674, 0x0662 },
01965 /* 0x7e00 */
01966 { 3679, 0x0101 }, { 3681, 0x30a3 }, { 3687, 0xb181 }, { 3693, 0x8048 },
01967 { 3696, 0x40b0 }, { 3700, 0x8105 }, { 3704, 0xc826 }, { 3710, 0x4108 },
01968 { 3713, 0x24c2 }, { 3718, 0x6522 }, { 3724, 0x0000 }, { 3724, 0x0000 },
01969 { 3724, 0x0000 }, { 3724, 0x0000 }, { 3724, 0x0000 }, { 3724, 0x0000 },
01970 /* 0x7f00 */
01971 { 3724, 0x0000 }, { 3724, 0x0000 }, { 3724, 0x0000 }, { 3724, 0xf800 },
01972 { 3729, 0x8098 }, { 3733, 0x380c }, { 3738, 0x207a }, { 3744, 0xe002 },
01973 { 3748, 0xa801 }, { 3752, 0x10c3 }, { 3757, 0x2446 }, { 3762, 0x9010 },
01974 { 3765, 0xc109 }, { 3770, 0x8800 }, { 3772, 0xd128 }, { 3778, 0xe404 },
01975 /* 0x8000 */
01976 { 3783, 0xe580 }, { 3789, 0xe05a }, { 3796, 0x5051 }, { 3801, 0x56b1 },
01977 { 3809, 0x0011 }, { 3811, 0x0000 }, { 3811, 0x2051 }, { 3815, 0x0022 },
01978 { 3817, 0x4102 }, { 3820, 0x5000 }, { 3822, 0x08c0 }, { 3825, 0x0300 },
01979 { 3827, 0xa100 }, { 3830, 0x01b4 }, { 3835, 0x6001 }, { 3838, 0x464d },
01980 /* 0x8100 */
01981 { 3845, 0x0808 }, { 3847, 0x51c0 }, { 3852, 0x1091 }, { 3856, 0x1421 },
01982 { 3860, 0x14a0 }, { 3864, 0x0084 }, { 3866, 0xa383 }, { 3873, 0x0080 },
01983 { 3874, 0x4872 }, { 3880, 0x4941 }, { 3885, 0x4004 }, { 3887, 0x0814 },
01984 { 3890, 0xcc28 }, { 3896, 0x68a0 }, { 3901, 0x1812 }, { 3905, 0xa367 },
01985 /* 0x8200 */
01986 { 3914, 0x8009 }, { 3917, 0x2618 }, { 3922, 0x0106 }, { 3925, 0x0414 },
01987 { 3928, 0xc878 }, { 3935, 0x1042 }, { 3938, 0x2089 }, { 3942, 0xa810 },
01988 { 3946, 0x469b }, { 3954, 0x0d52 }, { 3960, 0x479b }, { 3969, 0xd495 },
01989 { 3977, 0x0004 }, { 3978, 0x0421 }, { 3981, 0xa515 }, { 3988, 0x60c0 },
01990 /* 0x8300 */
01991 { 3992, 0x0d83 }, { 3998, 0xe800 }, { 4002, 0x7006 }, { 4007, 0x3489 },
01992 { 4013, 0x609c }, { 4019, 0x00fa }, { 4025, 0x0000 }, { 4025, 0xa101 },
01993 { 4029, 0x2055 }, { 4034, 0x3b34 }, { 4042, 0x32c0 }, { 4047, 0xc000 },
01994 { 4049, 0x8281 }, { 4053, 0x2013 }, { 4057, 0x0500 }, { 4059, 0x1340 },
01995 /* 0x8400 */
01996 { 4063, 0x8442 }, { 4067, 0x0222 }, { 4070, 0x8000 }, { 4071, 0x0200 },
01997 { 4072, 0xa5a0 }, { 4078, 0x1746 }, { 4085, 0x04b1 }, { 4090, 0x3159 },
01998 { 4097, 0x0022 }, { 4099, 0x402c }, { 4103, 0x8740 }, { 4108, 0x6412 },
01999 { 4113, 0x9185 }, { 4119, 0x1008 }, { 4121, 0x8480 }, { 4124, 0x2c87 },
02000 /* 0x8500 */
02001 { 4131, 0x508c }, { 4136, 0x5001 }, { 4139, 0x8cbc }, { 4147, 0x805c },
02002 { 4152, 0x8040 }, { 4154, 0xf24f }, { 4164, 0x8817 }, { 4170, 0xae00 },
02003 { 4175, 0x9a62 }, { 4182, 0xa108 }, { 4186, 0x20a5 }, { 4191, 0xf1d0 },
02004 { 4199, 0x4c84 }, { 4204, 0x8500 }, { 4207, 0x2141 }, { 4211, 0x9048 },
02005 /* 0x8600 */
02006 { 4215, 0x6031 }, { 4220, 0x4b07 }, { 4227, 0x0282 }, { 4230, 0x3540 },
02007 { 4235, 0x0047 }, { 4239, 0x23cc }, { 4246, 0x921f }, { 4254, 0x04e0 },
02008 { 4258, 0x2100 }, { 4260, 0x1542 }, { 4265, 0x21c2 }, { 4270, 0x83ba },
02009 { 4278, 0x002b }, { 4282, 0x14a6 }, { 4288, 0x00a9 }, { 4292, 0x3400 },
02010 /* 0x8700 */
02011 { 4295, 0xc8b0 }, { 4301, 0xc219 }, { 4307, 0xc10a }, { 4312, 0x7606 },
02012 { 4319, 0x2029 }, { 4323, 0x2100 }, { 4325, 0x8032 }, { 4329, 0x0806 },
02013 { 4332, 0x1bf8 }, { 4341, 0x43a9 }, { 4348, 0x7089 }, { 4354, 0xc022 },
02014 { 4358, 0x4702 }, { 4363, 0x9660 }, { 4369, 0x2c1c }, { 4375, 0x850a },
02015 /* 0x8800 */
02016 { 4380, 0x0e4a }, { 4386, 0xdf1d }, { 4397, 0x6100 }, { 4400, 0x1425 },
02017 { 4405, 0x4f2a }, { 4413, 0x9562 }, { 4420, 0x0211 }, { 4423, 0x0a02 },
02018 { 4426, 0x0001 }, { 4427, 0x9d00 }, { 4432, 0x0501 }, { 4435, 0x6400 },
02019 { 4438, 0x7c01 }, { 4444, 0x480e }, { 4449, 0x8080 }, { 4451, 0x00a3 },
02020 /* 0x8900 */
02021 { 4455, 0xe042 }, { 4460, 0x1760 }, { 4466, 0x01c1 }, { 4470, 0x4627 },
02022 { 4477, 0x8265 }, { 4483, 0x1c84 }, { 4488, 0x480e }, { 4493, 0x3c29 },
02023 { 4500, 0x2200 }, { 4502, 0x9831 }, { 4508, 0x0021 }, { 4510, 0x10f1 },
02024 { 4516, 0x0000 }, { 4516, 0x01f0 }, { 4521, 0x2a20 }, { 4525, 0xa24a },
02025 /* 0x8a00 */
02026 { 4531, 0x80b0 }, { 4535, 0x4036 }, { 4540, 0x9855 }, { 4547, 0x60a0 },
02027 { 4551, 0x62a9 }, { 4558, 0x31c8 }, { 4564, 0x00a2 }, { 4567, 0xcee0 },
02028 { 4575, 0x8849 }, { 4580, 0x82c5 }, { 4586, 0xc280 }, { 4590, 0x48c8 },
02029 { 4595, 0x0748 }, { 4600, 0xa0ba }, { 4607, 0x1000 }, { 4608, 0x9071 },
02030 /* 0x8b00 */
02031 { 4614, 0x0c60 }, { 4618, 0xd002 }, { 4622, 0x2000 }, { 4623, 0x1081 },
02032 { 4626, 0x217c }, { 4633, 0x421c }, { 4638, 0x2008 }, { 4640, 0x5340 },
02033 { 4645, 0xa832 }, { 4651, 0xd030 }, { 4656, 0x0000 }, { 4656, 0x0000 },
02034 { 4656, 0x0000 }, { 4656, 0x0000 }, { 4656, 0x0000 }, { 4656, 0x0000 },
02035 /* 0x8c00 */
02036 { 4656, 0x0000 }, { 4656, 0x0000 }, { 4656, 0x0000 }, { 4656, 0x6300 },
02037 { 4660, 0x8aa0 }, { 4665, 0x2b9a }, { 4673, 0x2358 }, { 4679, 0x4868 },
02038 { 4684, 0x08c0 }, { 4687, 0x1a0d }, { 4693, 0x0010 }, { 4694, 0x0600 },
02039 { 4696, 0x8a60 }, { 4701, 0x2260 }, { 4705, 0x9102 }, { 4709, 0xc1a5 },
02040 /* 0x8d00 */
02041 { 4716, 0x020a }, { 4719, 0x0884 }, { 4722, 0x0000 }, { 4722, 0x0000 },
02042 { 4722, 0x0000 }, { 4722, 0x0000 }, { 4722, 0x5220 }, { 4726, 0x8000 },
02043 { 4727, 0x2114 }, { 4731, 0xc023 }, { 4736, 0x9841 }, { 4741, 0x1aa4 },
02044 { 4747, 0x45e1 }, { 4754, 0x02b2 }, { 4759, 0x10b0 }, { 4763, 0x2017 },
02045 /* 0x8e00 */
02046 { 4768, 0x0872 }, { 4773, 0x0052 }, { 4776, 0x00cf }, { 4782, 0x23ca },

```

```
02047 { 4789, 0xe803 }, { 4795, 0x7810 }, { 4800, 0xb206 }, { 4806, 0x0e03 },
02048 { 4811, 0x020c }, { 4814, 0x6c25 }, { 4821, 0x6284 }, { 4826, 0x0c28 },
02049 { 4830, 0x809b }, { 4836, 0x1012 }, { 4839, 0x6100 }, { 4842, 0x0683 },
02050 /* 0x8f00 */
02051 { 4847, 0x8185 }, { 4852, 0x41c1 }, { 4857, 0x71ab }, { 4866, 0x04f0 },
02052 { 4871, 0x808b }, { 4876, 0x613e }, { 4884, 0x0020 }, { 4885, 0x0000 },
02053 { 4885, 0x0000 }, { 4885, 0x2000 }, { 4886, 0x0073 }, { 4891, 0x4160 },
02054 { 4895, 0x2c43 }, { 4901, 0x002d }, { 4905, 0x4119 }, { 4910, 0x4862 },
02055 /* 0x9000 */
02056 { 4915, 0x1114 }, { 4919, 0x0900 }, { 4921, 0xb700 }, { 4927, 0x8098 },
02057 { 4931, 0x1018 }, { 4934, 0x2800 }, { 4936, 0x10c4 }, { 4940, 0x0211 },
02058 { 4943, 0x5920 }, { 4948, 0x0ba1 }, { 4954, 0x0027 }, { 4958, 0x605d },
02059 { 4965, 0x11b8 }, { 4971, 0xb3a4 }, { 4979, 0x8820 }, { 4982, 0xc051 },
02060 /* 0x9100 */
02061 { 4987, 0x2171 }, { 4993, 0x55d1 }, { 5001, 0xc2ad }, { 5009, 0x36d2 },
02062 { 5017, 0x8188 }, { 5021, 0x0e88 }, { 5026, 0x2092 }, { 5030, 0x0e10 },
02063 { 5034, 0x446a }, { 5040, 0x413a }, { 5046, 0x7142 }, { 5052, 0xb84f },
02064 { 5061, 0x002c }, { 5064, 0x4698 }, { 5070, 0xf630 }, { 5078, 0x2a83 },
02065 /* 0x9200 */
02066 { 5084, 0x16f3 }, { 5093, 0x314d }, { 5100, 0xc178 }, { 5107, 0x5769 },
02067 { 5116, 0xe4cd }, { 5125, 0x3302 }, { 5130, 0xc3a3 }, { 5138, 0xbbe1 },
02068 { 5148, 0x6700 }, { 5153, 0x8284 }, { 5157, 0x89b1 }, { 5164, 0xbd44 },
02069 { 5172, 0x79ef }, { 5184, 0xb3a9 }, { 5193, 0x51ab }, { 5201, 0x8a01 },
02070 /* 0x9300 */
02071 { 5205, 0x2105 }, { 5209, 0xf032 }, { 5216, 0x06b2 }, { 5222, 0x00d8 },
02072 { 5226, 0x0380 }, { 5229, 0x45a7 }, { 5237, 0xa6b0 }, { 5244, 0xa45b },
02073 { 5252, 0xad07 }, { 5260, 0x4924 }, { 5265, 0x0b5a }, { 5272, 0x0470 },
02074 { 5276, 0x3ef2 }, { 5286, 0xd208 }, { 5291, 0x00c4 }, { 5294, 0x2f80 },
02075 /* 0x9400 */
02076 { 5300, 0xe316 }, { 5308, 0x80e0 }, { 5312, 0xc000 }, { 5314, 0xa81e },
02077 { 5321, 0x1528 }, { 5326, 0x9220 }, { 5330, 0xe90a }, { 5337, 0x0006 },
02078 { 5339, 0x0018 }, { 5341, 0x0000 }, { 5341, 0x0000 }, { 5341, 0x0000 },
02079 { 5341, 0x0000 }, { 5341, 0x0000 }, { 5341, 0x0000 }, { 5341, 0x0000 },
02080 /* 0x9500 */
02081 { 5341, 0x0000 }, { 5341, 0x0000 }, { 5341, 0x0000 }, { 5341, 0x0000 },
02082 { 5341, 0x0000 }, { 5341, 0x0000 }, { 5341, 0x0000 }, { 5341, 0x4300 },
02083 { 5344, 0x7110 }, { 5349, 0xe000 }, { 5352, 0x1a42 }, { 5357, 0xa450 },
02084 { 5362, 0x0b40 }, { 5366, 0xe60f }, { 5375, 0x0051 }, { 5378, 0x0000 },
02085 /* 0x9600 */
02086 { 5378, 0x0000 }, { 5378, 0x6000 }, { 5380, 0x1074 }, { 5385, 0x378a },
02087 { 5393, 0x0002 }, { 5394, 0x01d4 }, { 5399, 0x4002 }, { 5401, 0xd810 },
02088 { 5406, 0x021e }, { 5411, 0xa442 }, { 5416, 0xc270 }, { 5422, 0x0408 },
02089 { 5424, 0x0400 }, { 5425, 0xe504 }, { 5431, 0x8200 }, { 5433, 0x0402 },
02090 /* 0x9700 */
02091 { 5435, 0x022c }, { 5439, 0x2c00 }, { 5442, 0x010e }, { 5446, 0x000a },
02092 { 5448, 0xc40a }, { 5453, 0x0da0 }, { 5458, 0x4488 }, { 5462, 0xa9c8 },
02093 { 5469, 0x0201 }, { 5471, 0xc6e0 }, { 5478, 0x5004 }, { 5481, 0xd766 },
02094 { 5491, 0x76b2 }, { 5500, 0x6b93 }, { 5509, 0x8013 }, { 5513, 0x0592 },
02095 /* 0x9800 */
02096 { 5518, 0x6480 }, { 5522, 0x5250 }, { 5527, 0xc869 }, { 5534, 0x402d },
02097 { 5539, 0x0490 }, { 5542, 0x06ce }, { 5549, 0x146c }, { 5555, 0x0000 },
02098 { 5555, 0x0000 }, { 5555, 0x0000 }, { 5555, 0x6800 }, { 5558, 0x8d91 },
02099 { 5565, 0x1124 }, { 5569, 0x0000 }, { 5569, 0x04ea }, { 5575, 0x0048 },
02100 /* 0x9900 */
02101 { 5577, 0x0184 }, { 5580, 0x9ce2 }, { 5588, 0x08c4 }, { 5592, 0x1e3e },
02102 { 5601, 0x61c3 }, { 5608, 0xdb10 }, { 5615, 0x0001 }, { 5616, 0x0000 },
02103 { 5616, 0x0000 }, { 5616, 0xa800 }, { 5619, 0x0040 }, { 5620, 0xa627 },
02104 { 5628, 0x0208 }, { 5630, 0x5618 }, { 5636, 0x1c80 }, { 5640, 0x6231 },
02105 /* 0x9a00 */
02106 { 5646, 0x181c }, { 5651, 0x4043 }, { 5655, 0x609d }, { 5662, 0x0168 },
02107 { 5666, 0x5c92 }, { 5673, 0x2052 }, { 5677, 0x0000 }, { 5677, 0x0000 },
02108 { 5677, 0x0000 }, { 5677, 0x0000 }, { 5677, 0xd400 }, { 5681, 0xca74 },
02109 { 5689, 0x414a }, { 5694, 0x18e5 }, { 5701, 0x12b1 }, { 5707, 0xa62c },
02110 /* 0x9b00 */
02111 { 5714, 0x7b3f }, { 5726, 0x1a45 }, { 5732, 0x2841 }, { 5736, 0x26b8 },
02112 { 5743, 0x1900 }, { 5746, 0x48e0 }, { 5751, 0x7d6a }, { 5761, 0x83a8 },
02113 { 5767, 0xae11 }, { 5777, 0x6411 }, { 5782, 0x12c0 }, { 5786, 0xd987 },
02114 { 5795, 0x4182 }, { 5799, 0xa181 }, { 5804, 0x8ca0 }, { 5809, 0xa788 },
02115 /* 0x9c00 */
02116 { 5816, 0x8805 }, { 5820, 0x5742 }, { 5827, 0x07cc }, { 5834, 0x20e2 },
02117 { 5839, 0xc63a }, { 5847, 0xf959 }, { 5857, 0x4f08 }, { 5863, 0x08a5 },
02118 { 5868, 0x0000 }, { 5868, 0x0000 }, { 5868, 0x0000 }, { 5868, 0x0000 },
02119 { 5868, 0x0000 }, { 5868, 0x0000 }, { 5868, 0x0040 }, { 5869, 0x0284 },
02120 /* 0x9d00 */
02121 { 5872, 0x0804 }, { 5874, 0x7182 }, { 5880, 0x8000 }, { 5881, 0x341d },
02122 { 5888, 0x04ac }, { 5893, 0x8018 }, { 5896, 0x0e2c }, { 5902, 0x58c1 },
02123 { 5908, 0x6458 }, { 5914, 0x01ec }, { 5920, 0x5402 }, { 5924, 0x9222 },
02124 { 5929, 0x0688 }, { 5933, 0xc4f0 }, { 5940, 0x4aa1 }, { 5946, 0x4019 },
02125 /* 0x9e00 */
02126 { 5950, 0x4484 }, { 5954, 0x3267 }, { 5962, 0x0000 }, { 5962, 0x0000 },
02127 { 5962, 0x0000 }, { 5962, 0x0000 }, { 5962, 0x0000 }, { 5962, 0x1c00 },
02128 { 5965, 0xc0bd }, { 5973, 0x4940 }, { 5977, 0xd110 }, { 5982, 0x0039 },
02129 { 5986, 0x0940 }, { 5989, 0x8020 }, { 5991, 0x7090 }, { 5996, 0x8127 },
02130 /* 0x9f00 */
02131 { 6002, 0x820c }, { 6006, 0x8ed7 }, { 6016, 0x8c44 }, { 6021, 0xb696 },
02132 { 6030, 0x00fa }, { 6036, 0x65e8 }, { 6044, 0xe300 }, { 6049, 0x242b },
02133 { 6055, 0x8000 }, { 6056, 0x40d7 }, { 6063, 0x002e },
```

```

02134 };
02135
02136 static int
02137 jisx0212_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
02138 {
02139     (void)conv;
02140     if (n >= 2) {
02141         const Summary16 *summary = NULL;
02142         if (wc < 0x0460)
02143             summary = &jisx0212_uni2indx_page00[(wc>4)];
02144         else if (wc >= 0x2100 && wc < 0x2130)
02145             summary = &jisx0212_uni2indx_page21[(wc>4)-0x210];
02146         else if (wc >= 0x4e00 && wc < 0x9fb0)
02147             summary = &jisx0212_uni2indx_page4e[(wc>4)-0x4e0];
02148         if (summary) {
02149             unsigned short used = summary->used;
02150             unsigned int i = wc & 0x0f;
02151             if (used & ((unsigned short) 1 << i)) {
02152                 unsigned short c;
02153                 /* Keep in `used' only the bits 0..i-1. */
02154                 used &= ((unsigned short) 1 << i) - 1;
02155                 /* Add `summary->indx' and the number of bits set in `used'. */
02156                 used = (used & 0x5555) + ((used & 0xaaaa) >> 1);
02157                 used = (used & 0x3333) + ((used & 0xcccc) >> 2);
02158                 used = (used & 0x0f0f) + ((used & 0xf0f0) >> 4);
02159                 used = (used & 0x00ff) + (used >> 8);
02160                 c = jisx0212_2charset[summary->indx + used];
02161                 r[0] = (c >> 8); r[1] = (c & 0xff);
02162                 return 2;
02163             }
02164         }
02165         return RET_ILSEQ;
02166     }
02167     return RET_TOOSMALL;
02168 }
02169 #endif /* NEED_TOMB */

```

13.289 koi8_c.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/koi8_c.h,v 1.2 2000/11/28 16:10:29 dawes Exp $ */
00002
00003 /*
00004  * KOI8-C
00005  */
00006
00007 static const unsigned short koi8_c_2uni[128] = {
00008     /* 0x80 */
00009     0x0493, 0x0497, 0x049b, 0x049d, 0x04a3, 0x04af, 0x04b1, 0x04b3,
00010     0x04b7, 0x04b9, 0x04bb, 0x2580, 0x04d9, 0x04e3, 0x04e9, 0x04ef,
00011     /* 0x90 */
00012     0x0492, 0x0496, 0x049a, 0x049c, 0x04a2, 0x04ae, 0x04b0, 0x04b2,
00013     0x04b6, 0x04b8, 0x04ba, 0x2321, 0x04d8, 0x04e2, 0x04e8, 0x04ee,
00014     /* 0xa0 */
00015     0x00a0, 0x0452, 0x0453, 0x0451, 0x0454, 0x0455, 0x0456, 0x0457,
00016     0x0458, 0x0459, 0x045a, 0x045b, 0x045c, 0x0491, 0x045e, 0x045f,
00017     /* 0xb0 */
00018     0x2116, 0x0402, 0x0403, 0x0401, 0x0404, 0x0405, 0x0406, 0x0407,
00019     0x0486, 0x0409, 0x040a, 0x040b, 0x040c, 0x0490, 0x040e, 0x040f,
00020     /* 0xc0 */
00021     0x044e, 0x0430, 0x0431, 0x0446, 0x0434, 0x0435, 0x0444, 0x0433,
00022     0x0445, 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e,
00023     /* 0xd0 */
00024     0x043f, 0x044f, 0x0440, 0x0441, 0x0442, 0x0443, 0x0436, 0x0432,
00025     0x044c, 0x044b, 0x0437, 0x0448, 0x044d, 0x0449, 0x0447, 0x044a,
00026     /* 0xe0 */
00027     0x042e, 0x0410, 0x0411, 0x0426, 0x0414, 0x0415, 0x0424, 0x0413,
00028     0x0425, 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e,
00029     /* 0xf0 */
00030     0x041f, 0x042f, 0x0420, 0x0421, 0x0422, 0x0423, 0x0416, 0x0412,
00031     0x042c, 0x042b, 0x0417, 0x0428, 0x042d, 0x0429, 0x0427, 0x042a,
00032 };
00033
00034 static int
00035 koi8_c_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00036 {
00037     unsigned char c = *s;
00038     if (c < 0x80)
00039         *pwc = (ucs4_t) c;
00040     else
00041         *pwc = (ucs4_t) koi8_c_2uni[c-0x80];
00042     return 1;
00043 }
00044
00045 static const unsigned char koi8_c_page00[1] = {
00046     0xa0, /* 0xa0-0xa7 */

```

```

00047 };
00048 static const unsigned char koi8_c_page04[240] = {
00049 0x00, 0xb3, 0xb1, 0xb2, 0xb4, 0xb5, 0xb6, 0xb7, /* 0x00-0x07 */
00050 0xb8, 0xb9, 0xba, 0xbb, 0xbc, 0x00, 0xbe, 0xbf, /* 0x08-0x0f */
00051 0xe1, 0xe2, 0xf7, 0xe7, 0xe4, 0xe5, 0xf6, 0xfa, /* 0x10-0x17 */
00052 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, 0xf0, /* 0x18-0x1f */
00053 0xf2, 0xf3, 0xf4, 0xf5, 0xe6, 0xe8, 0xe3, 0xfe, /* 0x20-0x27 */
00054 0xfb, 0xfd, 0xff, 0xf9, 0xf8, 0xfc, 0xe0, 0xf1, /* 0x28-0x2f */
00055 0xc1, 0xc2, 0xd7, 0xc7, 0xc4, 0xc5, 0xd6, 0xda, /* 0x30-0x37 */
00056 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, 0xd0, /* 0x38-0x3f */
00057 0xd2, 0xd3, 0xd4, 0xd5, 0xc6, 0xc8, 0xc3, 0xde, /* 0x40-0x47 */
00058 0xdb, 0xdd, 0xdf, 0xd9, 0xd8, 0xdc, 0xc0, 0xd1, /* 0x48-0x4f */
00059 0x00, 0xa3, 0xa1, 0xa2, 0xa4, 0xa5, 0xa6, 0xa7, /* 0x50-0x57 */
00060 0xa8, 0xa9, 0xaa, 0xab, 0xac, 0x00, 0xae, 0xaf, /* 0x58-0x5f */
00061 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00062 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00063 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00064 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00065 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00066 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00067 0xbd, 0xad, 0x90, 0x80, 0x00, 0x91, 0x81, /* 0x90-0x97 */
00068 0x00, 0x00, 0x92, 0x82, 0x93, 0x83, 0x00, 0x00, /* 0x98-0x9f */
00069 0x00, 0x00, 0x94, 0x84, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00070 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x95, 0x85, /* 0xa8-0xaf */
00071 0x96, 0x86, 0x97, 0x87, 0x00, 0x00, 0x98, 0x88, /* 0xb0-0xb7 */
00072 0x99, 0x89, 0x9a, 0x8a, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00073 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00074 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00075 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00076 0x9c, 0x8c, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00077 0x00, 0x00, 0x9d, 0x8d, 0x00, 0x00, 0x00, 0x00, /* 0xe0-0xe7 */
00078 0x9e, 0x8e, 0x00, 0x00, 0x00, 0x00, 0x9f, 0x8f, /* 0xe8-0xef */
00079 };
00080 static const unsigned char koi8_c_page22[1] = {
00081 0xb0, /* 0x16-0x16 */
00082 };
00083
00084 static int
00085 koi8_c_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00086 {
00087     unsigned char c = 0;
00088     if (wc < 0x0080) {
00089         *r = wc;
00090         return 1;
00091     }
00092     else if (wc >= 0x00a0 && wc < 0x00a1)
00093         c = koi8_c_page00[wc-0x00a0];
00094     else if (wc >= 0x0400 && wc < 0x04ef)
00095         c = koi8_c_page04[wc-0x0400];
00096     else if (wc >= 0x2216 && wc < 0x2217)
00097         c = koi8_c_page22[wc-0x2216];
00098     if (c != 0) {
00099         *r = c;
00100         return 1;
00101     }
00102     return RET_ILSEQ;
00103 }

```

13.290 koi8_r.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/koi8_r.h,v 1.3 2000/11/29 17:40:34 dawes Exp $ */
00002
00003 /*
00004  * KOI8-R
00005  */
00006
00007 /* Specification: RFC 1489 */
00008
00009 #ifdef NEED_TOWC
00010 static const unsigned short koi8_r_2uni[128] = {
00011     /* 0x80 */
00012     0x2500, 0x2502, 0x250c, 0x2510, 0x2514, 0x2518, 0x251c, 0x2524,
00013     0x252c, 0x2534, 0x253c, 0x2580, 0x2584, 0x2588, 0x258c, 0x2590,
00014     /* 0x90 */
00015     0x2591, 0x2592, 0x2593, 0x2320, 0x25a0, 0x2219, 0x221a, 0x2248,
00016     0x2264, 0x2265, 0x00a0, 0x2321, 0x00b0, 0x00b2, 0x00b7, 0x00f7,
00017     /* 0xa0 */
00018     0x2550, 0x2551, 0x2552, 0x0451, 0x2553, 0x2554, 0x2555, 0x2556,
00019     0x2557, 0x2558, 0x2559, 0x255a, 0x255b, 0x255c, 0x255d, 0x255e,
00020     /* 0xb0 */
00021     0x255f, 0x2560, 0x2561, 0x0401, 0x2562, 0x2563, 0x2564, 0x2565,
00022     0x2566, 0x2567, 0x2568, 0x2569, 0x256a, 0x256b, 0x256c, 0x00a9,
00023     /* 0xc0 */
00024     0x044e, 0x0430, 0x0431, 0x0446, 0x0434, 0x0435, 0x0444, 0x0433,
00025     0x0445, 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e,

```

```

00026 /* 0xd0 */
00027 0x043f, 0x044f, 0x0440, 0x0441, 0x0442, 0x0443, 0x0436, 0x0432,
00028 0x044c, 0x044b, 0x0437, 0x0448, 0x044d, 0x0449, 0x0447, 0x044a,
00029 /* 0xe0 */
00030 0x042e, 0x0410, 0x0411, 0x0426, 0x0414, 0x0415, 0x0424, 0x0413,
00031 0x0425, 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e,
00032 /* 0xf0 */
00033 0x041f, 0x042f, 0x0420, 0x0421, 0x0422, 0x0423, 0x0416, 0x0412,
00034 0x042c, 0x042b, 0x0417, 0x0428, 0x042d, 0x0429, 0x0427, 0x042a,
00035 };
00036
00037 static int
00038 koi8_r_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00039 {
00040     unsigned char c = *s;
00041     if (c < 0x80)
00042         *pwc = (ucs4_t) c;
00043     else
00044         *pwc = (ucs4_t) koi8_r_2uni[c-0x80];
00045     return 1;
00046 }
00047 #endif /* NEED_TOWC */
00048
00049 #ifndef NEED_TOMB
00050 static const unsigned char koi8_r_page00[88] = {
00051     0x9a, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00052     0x00, 0xbf, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa8-0xaf */
00053     0x9c, 0x00, 0x9d, 0x00, 0x00, 0x00, 0x00, 0x9e, /* 0xb0-0xb7 */
00054     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00055     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00056     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00057     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00058     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00059     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe0-0xe7 */
00060     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe8-0xef */
00061     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x9f, /* 0xf0-0xf7 */
00062 };
00063 static const unsigned char koi8_r_page04[88] = {
00064     0x00, 0xb3, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x00-0x07 */
00065     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00066     0xe1, 0xe2, 0xf7, 0xe7, 0xe4, 0xe5, 0xf6, 0xfa, /* 0x10-0x17 */
00067     0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, 0xf0, /* 0x18-0x1f */
00068     0xf2, 0xf3, 0xf4, 0xf5, 0xe6, 0xe8, 0xe3, 0xfe, /* 0x20-0x27 */
00069     0xfb, 0xfd, 0xff, 0xf9, 0xf8, 0xfc, 0xe0, 0xf1, /* 0x28-0x2f */
00070     0xc1, 0xc2, 0xd7, 0xc7, 0xc4, 0xc5, 0xd6, 0xda, /* 0x30-0x37 */
00071     0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, 0xd0, /* 0x38-0x3f */
00072     0xd2, 0xd3, 0xd4, 0xd5, 0xc6, 0xc8, 0xc3, 0xde, /* 0x40-0x47 */
00073     0xdb, 0xdd, 0xdf, 0xd9, 0xd8, 0xdc, 0xc0, 0xd1, /* 0x48-0x4f */
00074     0x00, 0xa3, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00075 };
00076 static const unsigned char koi8_r_page22[80] = {
00077     0x00, 0x95, 0x96, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00078     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00079     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00080     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00081     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00082     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00083     0x97, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00084     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00085     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00086     0x00, 0x00, 0x00, 0x00, 0x98, 0x99, 0x00, 0x00, /* 0x60-0x67 */
00087 };
00088 static const unsigned char koi8_r_page23[8] = {
00089     0x93, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00090 };
00091 static const unsigned char koi8_r_page25[168] = {
00092     0x80, 0x00, 0x81, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x00-0x07 */
00093     0x00, 0x00, 0x00, 0x00, 0x82, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00094     0x83, 0x00, 0x00, 0x00, 0x84, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00095     0x85, 0x00, 0x00, 0x00, 0x86, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00096     0x00, 0x00, 0x00, 0x00, 0x87, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00097     0x00, 0x00, 0x00, 0x00, 0x88, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00098     0x00, 0x00, 0x00, 0x00, 0x89, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00099     0x00, 0x00, 0x00, 0x00, 0x8a, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00100     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00101     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00102     0xa0, 0xa1, 0xa2, 0xa4, 0xa5, 0xa6, 0xa7, 0xa8, /* 0x50-0x57 */
00103     0xa9, 0xaa, 0xab, 0xac, 0xad, 0xae, 0xaf, 0xb0, /* 0x58-0x5f */
00104     0xb1, 0xb2, 0xb4, 0xb5, 0xb6, 0xb7, 0xb8, 0xb9, /* 0x60-0x67 */
00105     0xba, 0xbb, 0xbc, 0xbd, 0xbe, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00106     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00107     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00108     0x8b, 0x00, 0x00, 0x00, 0x8c, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00109     0x8d, 0x00, 0x00, 0x00, 0x8e, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00110     0x8f, 0x90, 0x91, 0x92, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00111     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x98-0x9f */
00112     0x94, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */

```



```

00113 };
00114
00115 static int
00116 koi8_r_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00117 {
00118     (void)conv; (void)n;
00119     unsigned char c = 0;
00120     if (wc < 0x0080) {
00121         *r = wc;
00122         return 1;
00123     }
00124     else if (wc >= 0x00a0 && wc < 0x00f8)
00125         c = koi8_r_page00[wc-0x00a0];
00126     else if (wc >= 0x0400 && wc < 0x0458)
00127         c = koi8_r_page04[wc-0x0400];
00128     else if (wc >= 0x2218 && wc < 0x2268)
00129         c = koi8_r_page22[wc-0x2218];
00130     else if (wc >= 0x2320 && wc < 0x2328)
00131         c = koi8_r_page23[wc-0x2320];
00132     else if (wc >= 0x2500 && wc < 0x25a8)
00133         c = koi8_r_page25[wc-0x2500];
00134     if (c != 0) {
00135         *r = c;
00136         return 1;
00137     }
00138     return RET_ILSEQ;
00139 }
00140 #endif /* NEED_TOMB */

```

13.291 koi8_u.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/koi8_u.h,v 1.3 2000/11/29 17:40:34 dawes Exp $ */
00002
00003 /*
00004  * KOI8-U
00005  */
00006
00007 /* Specification: RFC 2319 */
00008 #ifdef NEED_TOWC
00009 static const unsigned short koi8_u_2uni[128] = {
00010     /* 0x80 */
00011     0x2500, 0x2502, 0x250c, 0x2510, 0x2514, 0x2518, 0x251c, 0x2524,
00012     0x252c, 0x2534, 0x253c, 0x2580, 0x2584, 0x2588, 0x258c, 0x2590,
00013     /* 0x90 */
00014     0x2591, 0x2592, 0x2593, 0x2320, 0x25a0, 0x2219, 0x221a, 0x2248,
00015     0x2264, 0x2265, 0x00a0, 0x2321, 0x00b0, 0x00b2, 0x00b7, 0x00f7,
00016     /* 0xa0 */
00017     0x2550, 0x2551, 0x2552, 0x0451, 0x0454, 0x2554, 0x0456, 0x0457,
00018     0x2557, 0x2558, 0x2559, 0x255a, 0x255b, 0x0491, 0x255d, 0x255e,
00019     /* 0xb0 */
00020     0x255f, 0x2560, 0x2561, 0x0401, 0x0404, 0x2563, 0x0406, 0x0407,
00021     0x2566, 0x2567, 0x2568, 0x2569, 0x256a, 0x0490, 0x256c, 0x00a9,
00022     /* 0xc0 */
00023     0x044e, 0x0430, 0x0431, 0x0446, 0x0434, 0x0435, 0x0444, 0x0433,
00024     0x0445, 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e,
00025     /* 0xd0 */
00026     0x043f, 0x044f, 0x0440, 0x0441, 0x0442, 0x0443, 0x0436, 0x0432,
00027     0x044c, 0x044b, 0x0437, 0x0448, 0x044d, 0x0449, 0x0447, 0x044a,
00028     /* 0xe0 */
00029     0x042e, 0x0410, 0x0411, 0x0426, 0x0414, 0x0415, 0x0424, 0x0413,
00030     0x0425, 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e,
00031     /* 0xf0 */
00032     0x041f, 0x042f, 0x0420, 0x0421, 0x0422, 0x0423, 0x0416, 0x0412,
00033     0x042c, 0x042b, 0x0417, 0x0428, 0x042d, 0x0429, 0x0427, 0x042a,
00034 };
00035
00036 static int
00037 koi8_u_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00038 {
00039     unsigned char c = *s;
00040     if (c < 0x80)
00041         *pwc = (ucs4_t) c;
00042     else
00043         *pwc = (ucs4_t) koi8_u_2uni[c-0x80];
00044     return 1;
00045 }
00046 #endif /* NEED_TOWC */
00047
00048 #ifdef NEED_TOMB
00049 static const unsigned char koi8_u_page00[88] = {
00050     0x9a, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00051     0x00, 0xbf, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa8-0xaf */
00052     0x9c, 0x00, 0x9d, 0x00, 0x00, 0x00, 0x00, 0x9e, /* 0xb0-0xb7 */
00053     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00054     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */

```

```

00055 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00056 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00057 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00058 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe0-0xe7 */
00059 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe8-0xef */
00060 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x9f, /* 0xf0-0xf7 */
00061 };
00062 static const unsigned char koi8_u_page04[152] = {
00063 0x00, 0xb3, 0x00, 0x00, 0xb4, 0x00, 0xb6, 0xb7, /* 0x00-0x07 */
00064 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00065 0xe1, 0xe2, 0xf7, 0xe7, 0xe4, 0xe5, 0xf6, 0xfa, /* 0x10-0x17 */
00066 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, 0xf0, /* 0x18-0x1f */
00067 0xf2, 0xf3, 0xf4, 0xf5, 0xe6, 0xe8, 0xe3, 0xfe, /* 0x20-0x27 */
00068 0xfb, 0xfd, 0xff, 0xf9, 0xf8, 0xfc, 0xe0, 0xf1, /* 0x28-0x2f */
00069 0xc1, 0xc2, 0xd7, 0xc7, 0xc4, 0xc5, 0xd6, 0xda, /* 0x30-0x37 */
00070 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, 0xd0, /* 0x38-0x3f */
00071 0xd2, 0xd3, 0xd4, 0xd5, 0xc6, 0xc8, 0xc3, 0xde, /* 0x40-0x47 */
00072 0xdb, 0xdd, 0xdf, 0xd9, 0xd8, 0xdc, 0xc0, 0xd1, /* 0x48-0x4f */
00073 0x00, 0xa3, 0x00, 0x00, 0xa4, 0x00, 0xa6, 0xa7, /* 0x50-0x57 */
00074 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00075 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00076 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00077 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00078 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00079 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00080 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00081 0xbd, 0xad, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00082 };
00083 static const unsigned char koi8_u_page22[80] = {
00084 0x00, 0x95, 0x96, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00085 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00086 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00087 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00088 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00089 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00090 0x97, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00091 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00092 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00093 0x00, 0x00, 0x00, 0x00, 0x98, 0x99, 0x00, 0x00, /* 0x60-0x67 */
00094 };
00095 static const unsigned char koi8_u_page23[8] = {
00096 0x93, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00097 };
00098 static const unsigned char koi8_u_page25[168] = {
00099 0x80, 0x00, 0x81, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x00-0x07 */
00100 0x00, 0x00, 0x00, 0x00, 0x82, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00101 0x83, 0x00, 0x00, 0x00, 0x84, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00102 0x85, 0x00, 0x00, 0x00, 0x86, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00103 0x00, 0x00, 0x00, 0x00, 0x87, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00104 0x00, 0x00, 0x00, 0x00, 0x88, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00105 0x00, 0x00, 0x00, 0x00, 0x89, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00106 0x00, 0x00, 0x00, 0x00, 0x8a, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00107 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00108 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00109 0xa0, 0xa1, 0xa2, 0x00, 0xa5, 0x00, 0x00, 0xa8, /* 0x50-0x57 */
00110 0xa9, 0xaa, 0xab, 0xac, 0x00, 0xae, 0xaf, 0xb0, /* 0x58-0x5f */
00111 0xb1, 0xb2, 0x00, 0xb5, 0x00, 0xb8, 0xb9, /* 0x60-0x67 */
00112 0xba, 0xbb, 0xbc, 0x00, 0xbe, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00113 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00114 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00115 0x8b, 0x00, 0x00, 0x00, 0x8c, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00116 0x8d, 0x00, 0x00, 0x00, 0x8e, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00117 0x8f, 0x90, 0x91, 0x92, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00118 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x98-0x9f */
00119 0x94, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00120 };
00121
00122 static int
00123 koi8_u_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00124 {
00125     (void)conv; (void)n;
00126     unsigned char c = 0;
00127     if (wc < 0x0080) {
00128         *r = wc;
00129         return 1;
00130     }
00131     else if (wc >= 0x00a0 && wc < 0x00f8)
00132         c = koi8_u_page00[wc-0x00a0];
00133     else if (wc >= 0x0400 && wc < 0x0498)
00134         c = koi8_u_page04[wc-0x0400];
00135     else if (wc >= 0x2218 && wc < 0x2268)
00136         c = koi8_u_page22[wc-0x2218];
00137     else if (wc >= 0x2320 && wc < 0x2328)
00138         c = koi8_u_page23[wc-0x2320];
00139     else if (wc >= 0x2500 && wc < 0x25a8)
00140         c = koi8_u_page25[wc-0x2500];
00141     if (c != 0) {

```

```

00142     *r = c;
00143     return 1;
00144 }
00145 return RET_ILSEQ;
00146 }
00147 #endif /* NEED_TOMB */

```

13.292 ksc5601.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/ksc5601.h,v 1.5 2003/05/27 22:26:34 tsi Exp $ */
00002
00003 /*
00004  * KSC5601.1987-0
00005  */
00006 #ifdef NEED_TOWC
00007 static const unsigned short ksc5601_2uni_page21[1115] = {
00008     /* 0x21 */
00009     0x3000, 0x3001, 0x3002, 0x00b7, 0x2025, 0x2026, 0x00a8, 0x3003,
00010     0x00ad, 0x2015, 0x2225, 0xff3c, 0x223c, 0x2018, 0x2019, 0x201c,
00011     0x201d, 0x3014, 0x3015, 0x3008, 0x3009, 0x300a, 0x300b, 0x300c,
00012     0x300d, 0x300e, 0x300f, 0x3010, 0x3011, 0x00b1, 0x00d7, 0x00f7,
00013     0x2260, 0x2264, 0x2265, 0x221e, 0x2234, 0x00b0, 0x2032, 0x2033,
00014     0x2103, 0x212b, 0xffe0, 0xffe1, 0xffe5, 0x2642, 0x2640, 0x2220,
00015     0x22a5, 0x2312, 0x2202, 0x2207, 0x2261, 0x2252, 0x00a7, 0x203b,
00016     0x2606, 0x2605, 0x25cb, 0x25cf, 0x25ce, 0x25c7, 0x25c6, 0x25a1,
00017     0x25a0, 0x25b3, 0x25b2, 0x25bd, 0x25bc, 0x2192, 0x2190, 0x2191,
00018     0x2193, 0x2194, 0x3013, 0x226a, 0x226b, 0x221a, 0x223d, 0x221d,
00019     0x2235, 0x222b, 0x222c, 0x2208, 0x220b, 0x2286, 0x2287, 0x2282,
00020     0x2283, 0x222a, 0x2229, 0x2227, 0x2228, 0xffe2,
00021     /* 0x22 */
00022     0x21d2, 0x21d4, 0x2200, 0x2203, 0x00b4, 0xff5e, 0x02c7, 0x02d8,
00023     0x02dd, 0x02da, 0x02d9, 0x00b8, 0x02db, 0x00a1, 0x00bf, 0x02d0,
00024     0x222e, 0x2211, 0x220f, 0x00a4, 0x2109, 0x2030, 0x25c1, 0x25c0,
00025     0x25b7, 0x25b6, 0x2664, 0x2660, 0x2661, 0x2665, 0x2667, 0x2663,
00026     0x2299, 0x25c8, 0x25a3, 0x25d0, 0x25d1, 0x2592, 0x25a4, 0x25a5,
00027     0x25a8, 0x25a7, 0x25a6, 0x25a9, 0x2668, 0x260f, 0x260e, 0x261c,
00028     0x261e, 0x00b6, 0x0202, 0x0201, 0x2195, 0x2197, 0x2199, 0x2196,
00029     0x2198, 0x266d, 0x2669, 0x266a, 0x266c, 0x327f, 0x321c, 0x2116,
00030     0x33c7, 0x2122, 0x33c2, 0x33d8, 0x2121, 0xffff, 0xffff, 0xffff,
00031     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00032     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00033     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00034     /* 0x23 */
00035     0xff01, 0xff02, 0xff03, 0xff04, 0xff05, 0xff06, 0xff07, 0xff08,
00036     0xff09, 0xff0a, 0xff0b, 0xff0c, 0xff0d, 0xff0e, 0xff0f, 0xff10,
00037     0xff11, 0xff12, 0xff13, 0xff14, 0xff15, 0xff16, 0xff17, 0xff18,
00038     0xff19, 0xff1a, 0xff1b, 0xff1c, 0xff1d, 0xff1e, 0xff1f, 0xff20,
00039     0xff21, 0xff22, 0xff23, 0xff24, 0xff25, 0xff26, 0xff27, 0xff28,
00040     0xff29, 0xff2a, 0xff2b, 0xff2c, 0xff2d, 0xff2e, 0xff2f, 0xff30,
00041     0xff31, 0xff32, 0xff33, 0xff34, 0xff35, 0xff36, 0xff37, 0xff38,
00042     0xff39, 0xff3a, 0xff3b, 0xffe6, 0xff3d, 0xff3e, 0xff3f, 0xff40,
00043     0xff41, 0xff42, 0xff43, 0xff44, 0xff45, 0xff46, 0xff47, 0xff48,
00044     0xff49, 0xff4a, 0xff4b, 0xff4c, 0xff4d, 0xff4e, 0xff4f, 0xff50,
00045     0xff51, 0xff52, 0xff53, 0xff54, 0xff55, 0xff56, 0xff57, 0xff58,
00046     0xff59, 0xff5a, 0xff5b, 0xff5c, 0xff5d, 0xffe3,
00047     /* 0x24 */
00048     0x3131, 0x3132, 0x3133, 0x3134, 0x3135, 0x3136, 0x3137, 0x3138,
00049     0x3139, 0x313a, 0x313b, 0x313c, 0x313d, 0x313e, 0x313f, 0x3140,
00050     0x3141, 0x3142, 0x3143, 0x3144, 0x3145, 0x3146, 0x3147, 0x3148,
00051     0x3149, 0x314a, 0x314b, 0x314c, 0x314d, 0x314e, 0x314f, 0x3150,
00052     0x3151, 0x3152, 0x3153, 0x3154, 0x3155, 0x3156, 0x3157, 0x3158,
00053     0x3159, 0x315a, 0x315b, 0x315c, 0x315d, 0x315e, 0x315f, 0x3160,
00054     0x3161, 0x3162, 0x3163, 0x3164, 0x3165, 0x3166, 0x3167, 0x3168,
00055     0x3169, 0x316a, 0x316b, 0x316c, 0x316d, 0x316e, 0x316f, 0x3170,
00056     0x3171, 0x3172, 0x3173, 0x3174, 0x3175, 0x3176, 0x3177, 0x3178,
00057     0x3179, 0x317a, 0x317b, 0x317c, 0x317d, 0x317e, 0x317f, 0x3180,
00058     0x3181, 0x3182, 0x3183, 0x3184, 0x3185, 0x3186, 0x3187, 0x3188,
00059     0x3189, 0x318a, 0x318b, 0x318c, 0x318d, 0x318e,
00060     /* 0x25 */
00061     0x2170, 0x2171, 0x2172, 0x2173, 0x2174, 0x2175, 0x2176, 0x2177,
00062     0x2178, 0x2179, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0x2160,
00063     0x2161, 0x2162, 0x2163, 0x2164, 0x2165, 0x2166, 0x2167, 0x2168,
00064     0x2169, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00065     0x0391, 0x0392, 0x0393, 0x0394, 0x0395, 0x0396, 0x0397, 0x0398,
00066     0x0399, 0x039a, 0x039b, 0x039c, 0x039d, 0x039e, 0x039f, 0x03a0,
00067     0x03a1, 0x03a2, 0x03a3, 0x03a4, 0x03a5, 0x03a6, 0x03a7, 0x03a8, 0x03a9,
00068     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00069     0x03b1, 0x03b2, 0x03b3, 0x03b4, 0x03b5, 0x03b6, 0x03b7, 0x03b8,
00070     0x03b9, 0x03ba, 0x03bb, 0x03bc, 0x03bd, 0x03be, 0x03bf, 0x03c0,
00071     0x03c1, 0x03c2, 0x03c3, 0x03c4, 0x03c5, 0x03c6, 0x03c7, 0x03c8, 0x03c9,
00072     0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00073     /* 0x26 */
00074     0x2500, 0x2502, 0x250c, 0x2510, 0x2518, 0x2514, 0x251c, 0x252c,
00075     0x2524, 0x2534, 0x253c, 0x2501, 0x2503, 0x250f, 0x2513, 0x251b,
00076     0x2517, 0x2523, 0x2533, 0x252b, 0x253b, 0x254b, 0x2520, 0x252f,

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00077 0x2528, 0x2537, 0x253f, 0x251d, 0x2530, 0x2525, 0x2538, 0x2542,
00078 0x2512, 0x2511, 0x251a, 0x2519, 0x2516, 0x2515, 0x250e, 0x250d,
00079 0x251e, 0x251f, 0x2521, 0x2522, 0x2526, 0x2527, 0x2529, 0x252a,
00080 0x252d, 0x252e, 0x2531, 0x2532, 0x2535, 0x2536, 0x2539, 0x253a,
00081 0x253d, 0x253e, 0x2540, 0x2541, 0x2543, 0x2544, 0x2545, 0x2546,
00082 0x2547, 0x2548, 0x2549, 0x254a, 0xffff, 0xffff, 0xffff, 0xffff,
00083 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00084 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00085 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00086 /* 0x27 */
00087 0x3395, 0x3396, 0x3397, 0x2113, 0x3398, 0x33c4, 0x33a3, 0x33a4,
00088 0x33a5, 0x33a6, 0x3399, 0x339a, 0x339b, 0x339c, 0x339d, 0x339e,
00089 0x339f, 0x33a0, 0x33a1, 0x33a2, 0x33ca, 0x338d, 0x338e, 0x338f,
00090 0x33cf, 0x3388, 0x3389, 0x33c8, 0x33a7, 0x33a8, 0x33b0, 0x33b1,
00091 0x33b2, 0x33b3, 0x33b4, 0x33b5, 0x33b6, 0x33b7, 0x33b8, 0x33b9,
00092 0x3380, 0x3381, 0x3382, 0x3383, 0x3384, 0x33ba, 0x33bb, 0x33bc,
00093 0x33bd, 0x33be, 0x33bf, 0x3390, 0x3391, 0x3392, 0x3393, 0x3394,
00094 0x2126, 0x33c0, 0x33c1, 0x338a, 0x338b, 0x338c, 0x33d6, 0x33c5,
00095 0x33ad, 0x33ae, 0x33af, 0x33db, 0x33a9, 0x33aa, 0x33ab, 0x33ac,
00096 0x33dd, 0x33d0, 0x33d3, 0x33c3, 0x33c9, 0x33dc, 0x33ce, 0xffff,
00097 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00098 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00099 /* 0x28 */
00100 0x00c6, 0x00d0, 0x00aa, 0x0126, 0xffff, 0x0132, 0xffff, 0x013f,
00101 0x0141, 0x00d8, 0x0152, 0x00ba, 0x00de, 0x0166, 0x014a, 0xffff,
00102 0x3260, 0x3261, 0x3262, 0x3263, 0x3264, 0x3265, 0x3266, 0x3267,
00103 0x3268, 0x3269, 0x326a, 0x326b, 0x326c, 0x326d, 0x326e, 0x326f,
00104 0x3270, 0x3271, 0x3272, 0x3273, 0x3274, 0x3275, 0x3276, 0x3277,
00105 0x3278, 0x3279, 0x327a, 0x327b, 0x24d0, 0x24d1, 0x24d2, 0x24d3,
00106 0x24d4, 0x24d5, 0x24d6, 0x24d7, 0x24d8, 0x24d9, 0x24da, 0x24db,
00107 0x24dc, 0x24dd, 0x24de, 0x24df, 0x24e0, 0x24e1, 0x24e2, 0x24e3,
00108 0x24e4, 0x24e5, 0x24e6, 0x24e7, 0x24e8, 0x24e9, 0x2460, 0x2461,
00109 0x2462, 0x2463, 0x2464, 0x2465, 0x2466, 0x2467, 0x2468, 0x2469,
00110 0x246a, 0x246b, 0x246c, 0x246d, 0x246e, 0x00bd, 0x2153, 0x2154,
00111 0x00bc, 0x00be, 0x215b, 0x215c, 0x215d, 0x215e,
00112 /* 0x29 */
00113 0x00e6, 0x0111, 0x00f0, 0x0127, 0x0131, 0x0133, 0x0138, 0x0140,
00114 0x0142, 0x00f8, 0x0153, 0x00df, 0x00fe, 0x0167, 0x014b, 0x0149,
00115 0x3200, 0x3201, 0x3202, 0x3203, 0x3204, 0x3205, 0x3206, 0x3207,
00116 0x3208, 0x3209, 0x320a, 0x320b, 0x320c, 0x320d, 0x320e, 0x320f,
00117 0x3210, 0x3211, 0x3212, 0x3213, 0x3214, 0x3215, 0x3216, 0x3217,
00118 0x3218, 0x3219, 0x321a, 0x321b, 0x249c, 0x249d, 0x249e, 0x249f,
00119 0x24a0, 0x24a1, 0x24a2, 0x24a3, 0x24a4, 0x24a5, 0x24a6, 0x24a7,
00120 0x24a8, 0x24a9, 0x24aa, 0x24ab, 0x24ac, 0x24ad, 0x24ae, 0x24af,
00121 0x24b0, 0x24b1, 0x24b2, 0x24b3, 0x24b4, 0x24b5, 0x2474, 0x2475,
00122 0x2476, 0x2477, 0x2478, 0x2479, 0x247a, 0x247b, 0x247c, 0x247d,
00123 0x247e, 0x247f, 0x2480, 0x2481, 0x2482, 0x00b9, 0x00b2, 0x00b3,
00124 0x2074, 0x207f, 0x2081, 0x2082, 0x2083, 0x2084,
00125 /* 0x2a */
00126 0x3041, 0x3042, 0x3043, 0x3044, 0x3045, 0x3046, 0x3047, 0x3048,
00127 0x3049, 0x304a, 0x304b, 0x304c, 0x304d, 0x304e, 0x304f, 0x3050,
00128 0x3051, 0x3052, 0x3053, 0x3054, 0x3055, 0x3056, 0x3057, 0x3058,
00129 0x3059, 0x305a, 0x305b, 0x305c, 0x305d, 0x305e, 0x305f, 0x3060,
00130 0x3061, 0x3062, 0x3063, 0x3064, 0x3065, 0x3066, 0x3067, 0x3068,
00131 0x3069, 0x306a, 0x306b, 0x306c, 0x306d, 0x306e, 0x306f, 0x3070,
00132 0x3071, 0x3072, 0x3073, 0x3074, 0x3075, 0x3076, 0x3077, 0x3078,
00133 0x3079, 0x307a, 0x307b, 0x307c, 0x307d, 0x307e, 0x307f, 0x3080,
00134 0x3081, 0x3082, 0x3083, 0x3084, 0x3085, 0x3086, 0x3087, 0x3088,
00135 0x3089, 0x308a, 0x308b, 0x308c, 0x308d, 0x308e, 0x308f, 0x3090,
00136 0x3091, 0x3092, 0x3093, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00137 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00138 /* 0x2b */
00139 0x30a1, 0x30a2, 0x30a3, 0x30a4, 0x30a5, 0x30a6, 0x30a7, 0x30a8,
00140 0x30a9, 0x30aa, 0x30ab, 0x30ac, 0x30ad, 0x30ae, 0x30af, 0x30b0,
00141 0x30b1, 0x30b2, 0x30b3, 0x30b4, 0x30b5, 0x30b6, 0x30b7, 0x30b8,
00142 0x30b9, 0x30ba, 0x30bb, 0x30bc, 0x30bd, 0x30be, 0x30bf, 0x30c0,
00143 0x30c1, 0x30c2, 0x30c3, 0x30c4, 0x30c5, 0x30c6, 0x30c7, 0x30c8,
00144 0x30c9, 0x30ca, 0x30cb, 0x30cc, 0x30cd, 0x30ce, 0x30cf, 0x30d0,
00145 0x30d1, 0x30d2, 0x30d3, 0x30d4, 0x30d5, 0x30d6, 0x30d7, 0x30d8,
00146 0x30d9, 0x30da, 0x30db, 0x30dc, 0x30dd, 0x30de, 0x30df, 0x30e0,
00147 0x30e1, 0x30e2, 0x30e3, 0x30e4, 0x30e5, 0x30e6, 0x30e7, 0x30e8,
00148 0x30e9, 0x30ea, 0x30eb, 0x30ec, 0x30ed, 0x30ee, 0x30ef, 0x30f0,
00149 0x30f1, 0x30f2, 0x30f3, 0x30f4, 0x30f5, 0x30f6, 0xffff, 0xffff,
00150 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00151 /* 0x2c */
00152 0x0410, 0x0411, 0x0412, 0x0413, 0x0414, 0x0415, 0x0401, 0x0416,
00153 0x0417, 0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e,
00154 0x041f, 0x0420, 0x0421, 0x0422, 0x0423, 0x0424, 0x0425, 0x0426,
00155 0x0427, 0x0428, 0x0429, 0x042a, 0x042b, 0x042c, 0x042d, 0x042e,
00156 0x042f, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00157 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff, 0xffff,
00158 0x0430, 0x0431, 0x0432, 0x0433, 0x0434, 0x0435, 0x0451, 0x0436,
00159 0x0437, 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e,
00160 0x043f, 0x0440, 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446,
00161 0x0447, 0x0448, 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e,
00162 0x044f,
00163 };
```

```
00164 static const unsigned short ksc5601_2uni_page30[2350] = {
00165     /* 0x30 */
00166     0xac00, 0xac01, 0xac04, 0xac07, 0xac08, 0xac09, 0xac0a, 0xac10,
00167     0xac11, 0xac12, 0xac13, 0xac14, 0xac15, 0xac16, 0xac17, 0xac19,
00168     0xac1a, 0xac1b, 0xac1c, 0xac1d, 0xac20, 0xac24, 0xac2c, 0xac2d,
00169     0xac2f, 0xac30, 0xac31, 0xac38, 0xac39, 0xac3c, 0xac40, 0xac4b,
00170     0xac4d, 0xac54, 0xac58, 0xac5c, 0xac70, 0xac71, 0xac74, 0xac77,
00171     0xac78, 0xac7a, 0xac80, 0xac81, 0xac83, 0xac84, 0xac85, 0xac86,
00172     0xac89, 0xac8a, 0xac8b, 0xac8c, 0xac90, 0xac94, 0xac9c, 0xac9d,
00173     0xac9f, 0xaca0, 0xaca1, 0xaca8, 0xaca9, 0xaca, 0xacac, 0xacaf,
00174     0xacb0, 0xacb8, 0xacb9, 0xacbb, 0xacbc, 0xacbd, 0xaccl, 0xacc4,
00175     0xacc8, 0xacc, 0xaccd5, 0xacd7, 0xace0, 0xace1, 0xace4, 0xace7,
00176     0xace8, 0xace, 0xacec, 0xacef, 0xacf0, 0xacf1, 0xacf3, 0xacf5,
00177     0xacf6, 0xacfc, 0xacfd, 0xad00, 0xad04, 0xad06,
00178     /* 0x31 */
00179     0xad0c, 0xad0d, 0xad0f, 0xad11, 0xad18, 0xad1c, 0xad20, 0xad29,
00180     0xad2c, 0xad2d, 0xad34, 0xad35, 0xad38, 0xad3c, 0xad44, 0xad45,
00181     0xad47, 0xad49, 0xad50, 0xad54, 0xad58, 0xad61, 0xad63, 0xad6c,
00182     0xad6d, 0xad70, 0xad73, 0xad74, 0xad75, 0xad76, 0xad7b, 0xad7c,
00183     0xad7d, 0xad7f, 0xad81, 0xad82, 0xad88, 0xad89, 0xad8c, 0xad90,
00184     0xad9c, 0xad9d, 0xada4, 0xadab7, 0xadac0, 0xadcl, 0xadcc4, 0xadc8,
00185     0xadd0, 0xadd1, 0xadd3, 0xaddc, 0xade0, 0xade4, 0xadf8, 0xadf9,
00186     0xadfc, 0xadff, 0xae00, 0xae01, 0xae08, 0xae09, 0xae0b, 0xae0d,
00187     0xae14, 0xae30, 0xae31, 0xae34, 0xae37, 0xae38, 0xae3a, 0xae40,
00188     0xae41, 0xae43, 0xae45, 0xae46, 0xae4a, 0xae4c, 0xae4d, 0xae4e,
00189     0xae50, 0xae54, 0xae56, 0xae5c, 0xae5d, 0xae5f, 0xae60, 0xae61,
00190     0xae65, 0xae68, 0xae69, 0xae6c, 0xae70, 0xae78,
00191     /* 0x32 */
00192     0xae79, 0xae7b, 0xae7c, 0xae7d, 0xae84, 0xae85, 0xae8c, 0xaebc,
00193     0xaebd, 0xaebe, 0xaec0, 0xaec4, 0xaecc, 0xaecd, 0xaecf, 0xaed0,
00194     0xaed1, 0xaed8, 0xaed9, 0xaedc, 0xae, 0xaeeb, 0xaeed, 0xaef4,
00195     0xaef8, 0xaefc, 0xaf07, 0xaf08, 0xaf0d, 0xaf10, 0xaf2c, 0xaf2d,
00196     0xaf30, 0xaf32, 0xaf34, 0xaf3c, 0xaf3d, 0xaf3f, 0xaf41, 0xaf42,
00197     0xaf43, 0xaf48, 0xaf49, 0xaf50, 0xaf5c, 0xaf5d, 0xaf64, 0xaf65,
00198     0xaf79, 0xaf80, 0xaf84, 0xaf88, 0xaf90, 0xaf91, 0xaf95, 0xaf9c,
00199     0xafb8, 0xafb9, 0xafbc, 0xafc0, 0xafc7, 0xafc8, 0xafc9, 0xafcb,
00200     0xafcd, 0xafce, 0xafd4, 0xafdc, 0xaf, 0xaf, 0xaf, 0xaf,
00201     0xaff4, 0xaff8, 0xb000, 0xb001, 0xb004, 0xb00c, 0xb010, 0xb014,
00202     0xb01c, 0xb01d, 0xb028, 0xb044, 0xb045, 0xb048, 0xb04a, 0xb04c,
00203     0xb04e, 0xb053, 0xb054, 0xb055, 0xb057, 0xb059,
00204     /* 0x33 */
00205     0xb05d, 0xb07c, 0xb07d, 0xb080, 0xb084, 0xb08c, 0xb08d, 0xb08f,
00206     0xb091, 0xb098, 0xb099, 0xb09a, 0xb09c, 0xb09f, 0xb0a0, 0xb0a1,
00207     0xb0a2, 0xb0a8, 0xb0a9, 0xb0ab, 0xb0ac, 0xb0ad, 0xb0ae, 0xb0af,
00208     0xb0b1, 0xb0b3, 0xb0b4, 0xb0b5, 0xb0b8, 0xb0bc, 0xb0c4, 0xb0c5,
00209     0xb0c7, 0xb0c8, 0xb0c9, 0xb0d0, 0xb0d1, 0xb0d4, 0xb0d8, 0xb0e0,
00210     0xb0e5, 0xb108, 0xb109, 0xb10b, 0xb10c, 0xb110, 0xb112, 0xb113,
00211     0xb118, 0xb119, 0xb11b, 0xb11c, 0xb11d, 0xb123, 0xb124, 0xb125,
00212     0xb128, 0xb12c, 0xb134, 0xb135, 0xb137, 0xb138, 0xb139, 0xb140,
00213     0xb141, 0xb144, 0xb148, 0xb150, 0xb151, 0xb154, 0xb155, 0xb158,
00214     0xb15c, 0xb160, 0xb178, 0xb179, 0xb17c, 0xb180, 0xb182, 0xb188,
00215     0xb189, 0xb18b, 0xb18d, 0xb192, 0xb193, 0xb194, 0xb198, 0xb19c,
00216     0xb1a8, 0xb1cc, 0xb1d0, 0xb1d4, 0xb1dc, 0xb1dd,
00217     /* 0x34 */
00218     0xb1df, 0xb1e8, 0xb1e9, 0xb1ec, 0xb1f0, 0xb1f9, 0xb1fb, 0xb1fd,
00219     0xb204, 0xb205, 0xb208, 0xb20b, 0xb20c, 0xb214, 0xb215, 0xb217,
00220     0xb219, 0xb220, 0xb234, 0xb23c, 0xb258, 0xb25c, 0xb260, 0xb268,
00221     0xb269, 0xb274, 0xb275, 0xb27c, 0xb284, 0xb285, 0xb289, 0xb290,
00222     0xb291, 0xb294, 0xb298, 0xb299, 0xb29a, 0xb2a0, 0xb2a1, 0xb2a3,
00223     0xb2a5, 0xb2a6, 0xb2aa, 0xb2ac, 0xb2b0, 0xb2b4, 0xb2c8, 0xb2c9,
00224     0xb2cc, 0xb2d0, 0xb2d2, 0xb2d8, 0xb2d9, 0xb2db, 0xb2dd, 0xb2e2,
00225     0xb2e4, 0xb2e5, 0xb2e6, 0xb2e8, 0xb2eb, 0xb2ec, 0xb2ed, 0xb2ee,
00226     0xb2ef, 0xb2f3, 0xb2f4, 0xb2f5, 0xb2f7, 0xb2f8, 0xb2f9, 0xb2fa,
00227     0xb2fb, 0xb2ff, 0xb300, 0xb301, 0xb304, 0xb308, 0xb310, 0xb311,
00228     0xb313, 0xb314, 0xb315, 0xb31c, 0xb354, 0xb355, 0xb356, 0xb358,
00229     0xb35b, 0xb35c, 0xb35e, 0xb35f, 0xb364, 0xb365,
00230     /* 0x35 */
00231     0xb367, 0xb369, 0xb36b, 0xb36e, 0xb370, 0xb371, 0xb374, 0xb378,
00232     0xb380, 0xb381, 0xb383, 0xb384, 0xb385, 0xb38c, 0xb390, 0xb394,
00233     0xb3a0, 0xb3a1, 0xb3a8, 0xb3ac, 0xb3c4, 0xb3c5, 0xb3c8, 0xb3cb,
00234     0xb3cc, 0xb3ce, 0xb3d0, 0xb3d4, 0xb3d5, 0xb3d7, 0xb3d9, 0xb3db,
00235     0xb3dd, 0xb3e0, 0xb3e4, 0xb3e8, 0xb3fc, 0xb410, 0xb418, 0xb41c,
00236     0xb420, 0xb428, 0xb429, 0xb42b, 0xb434, 0xb450, 0xb451, 0xb454,
00237     0xb458, 0xb460, 0xb461, 0xb463, 0xb465, 0xb46c, 0xb480, 0xb488,
00238     0xb49d, 0xb4a4, 0xb4a8, 0xb4ac, 0xb4b5, 0xb4b7, 0xb4b9, 0xb4c0,
00239     0xb4c4, 0xb4c8, 0xb4d0, 0xb4d5, 0xb4dc, 0xb4dd, 0xb4e0, 0xb4e3,
00240     0xb4e4, 0xb4e6, 0xb4ec, 0xb4ed, 0xb4ef, 0xb4f1, 0xb4f8, 0xb514,
00241     0xb515, 0xb518, 0xb51b, 0xb51c, 0xb524, 0xb525, 0xb527, 0xb528,
00242     0xb529, 0xb52a, 0xb530, 0xb531, 0xb534, 0xb538,
00243     /* 0x36 */
00244     0xb540, 0xb541, 0xb543, 0xb544, 0xb545, 0xb54b, 0xb54c, 0xb54d,
00245     0xb550, 0xb554, 0xb55c, 0xb55d, 0xb55f, 0xb560, 0xb561, 0xb5a0,
00246     0xb5a1, 0xb5a4, 0xb5a8, 0xb5aa, 0xb5ab, 0xb5b0, 0xb5b1, 0xb5b3,
00247     0xb5b4, 0xb5b5, 0xb5bb, 0xb5bc, 0xb5bd, 0xb5c0, 0xb5c4, 0xb5cc,
00248     0xb5cd, 0xb5cf, 0xb5d0, 0xb5d1, 0xb5d8, 0xb5e8, 0xb610, 0xb611,
00249     0xb614, 0xb618, 0xb625, 0xb62c, 0xb634, 0xb648, 0xb664, 0xb668,
00250     0xb69c, 0xb69d, 0xb6a0, 0xb6a4, 0xb6ab, 0xb6ac, 0xb6b1, 0xb6d4,
```

```
00251 0xb6f0, 0xb6f4, 0xb6f8, 0xb700, 0xb701, 0xb705, 0xb728, 0xb729,
00252 0xb72c, 0xb72f, 0xb730, 0xb738, 0xb739, 0xb73b, 0xb744, 0xb748,
00253 0xb74c, 0xb754, 0xb755, 0xb760, 0xb764, 0xb768, 0xb770, 0xb771,
00254 0xb773, 0xb775, 0xb77c, 0xb77d, 0xb780, 0xb784, 0xb78c, 0xb78d,
00255 0xb78f, 0xb790, 0xb791, 0xb792, 0xb796, 0xb797,
00256 /* 0x37 */
00257 0xb798, 0xb799, 0xb79c, 0xb7a0, 0xb7a8, 0xb7a9, 0xb7ab, 0xb7ac,
00258 0xb7ad, 0xb7b4, 0xb7b5, 0xb7b8, 0xb7c7, 0xb7c9, 0xb7ec, 0xb7ed,
00259 0xb7f0, 0xb7f4, 0xb7fc, 0xb7fd, 0xb7ff, 0xb800, 0xb801, 0xb807,
00260 0xb808, 0xb809, 0xb80c, 0xb810, 0xb818, 0xb819, 0xb81b, 0xb81d,
00261 0xb824, 0xb825, 0xb828, 0xb82c, 0xb834, 0xb835, 0xb837, 0xb838,
00262 0xb839, 0xb840, 0xb844, 0xb851, 0xb853, 0xb85c, 0xb85d, 0xb860,
00263 0xb864, 0xb86c, 0xb86d, 0xb86f, 0xb871, 0xb878, 0xb87c, 0xb88d,
00264 0xb8a8, 0xb8b0, 0xb8b4, 0xb8b8, 0xb8c0, 0xb8c1, 0xb8c3, 0xb8c5,
00265 0xb8cc, 0xb8d0, 0xb8d4, 0xb8dd, 0xb8df, 0xb8e1, 0xb8e8, 0xb8e9,
00266 0xb8ec, 0xb8f0, 0xb8f8, 0xb8f9, 0xb8fb, 0xb8fd, 0xb904, 0xb918,
00267 0xb920, 0xb93c, 0xb93d, 0xb940, 0xb944, 0xb94c, 0xb94f, 0xb951,
00268 0xb958, 0xb959, 0xb95c, 0xb960, 0xb968, 0xb969,
00269 /* 0x38 */
00270 0xb96b, 0xb96d, 0xb974, 0xb975, 0xb978, 0xb97c, 0xb984, 0xb985,
00271 0xb987, 0xb989, 0xb98a, 0xb98d, 0xb98e, 0xb9ac, 0xb9ad, 0xb9b0,
00272 0xb9b4, 0xb9bc, 0xb9bd, 0xb9bf, 0xb9c1, 0xb9c8, 0xb9c9, 0xb9cc,
00273 0xb9ce, 0xb9cf, 0xb9d0, 0xb9d1, 0xb9d2, 0xb9d8, 0xb9d9, 0xb9db,
00274 0xb9dd, 0xb9de, 0xb9e1, 0xb9e3, 0xb9e4, 0xb9e5, 0xb9e8, 0xb9ec,
00275 0xb9f4, 0xb9f5, 0xb9f7, 0xb9f8, 0xb9f9, 0xb9fa, 0xba00, 0xba01,
00276 0xba08, 0xba15, 0xba38, 0xba39, 0xba3c, 0xba40, 0xba42, 0xba48,
00277 0xba49, 0xba4b, 0xba4b, 0xba4d, 0xba4e, 0xba53, 0xba54, 0xba55, 0xba58,
00278 0xba5c, 0xba64, 0xba65, 0xba67, 0xba68, 0xba69, 0xba70, 0xba71,
00279 0xba74, 0xba78, 0xba83, 0xba84, 0xba85, 0xba87, 0xba8c, 0xbaa8,
00280 0xbaa9, 0xbaaab, 0bbaac, 0bab0, 0bab2, 0bab8, 0bab9, 0babbb,
00281 0xbabd, 0bac4, 0bac8, 0bad8, 0bad9, 0baf,
00282 /* 0x39 */
00283 0xbb00, 0xbb04, 0xbb0d, 0xbb0f, 0xbb11, 0xbb18, 0xbb1c, 0xbb20,
00284 0xbb29, 0xbb2b, 0xbb34, 0xbb35, 0xbb36, 0xbb38, 0xbb3b, 0xbb3c,
00285 0xbb3d, 0xbb3e, 0xbb44, 0xbb45, 0xbb47, 0xbb49, 0xbb4d, 0xbb4f,
00286 0xbb50, 0xbb54, 0xbb58, 0xbb61, 0xbb63, 0xbb6c, 0xbb88, 0xbb8c,
00287 0xbb90, 0xbba4, 0xbba8, 0bbac, 0bbb4, 0bbb7, 0bbc0, 0bbc4,
00288 0bbc8, 0bbd0, 0bbd3, 0bbf8, 0bbf9, 0bbfc, 0bbff, 0bbc0,
00289 0xbc02, 0xbc08, 0xbc09, 0xbc0b, 0xbc0c, 0xbc0d, 0xbc0f, 0xbc11,
00290 0xbc14, 0xbc15, 0xbc16, 0xbc17, 0xbc18, 0xbc1b, 0xbc1c, 0xbc1d,
00291 0xbc1e, 0xbc1f, 0xbc24, 0xbc25, 0xbc27, 0xbc29, 0xbc2d, 0xbc30,
00292 0xbc31, 0xbc34, 0xbc38, 0xbc40, 0xbc41, 0xbc43, 0xbc44, 0xbc45,
00293 0xbc49, 0xbc4c, 0xbc4d, 0xbc50, 0xbc5d, 0xbc84, 0xbc85, 0xbc88,
00294 0xbc8b, 0xbc8c, 0xbc8e, 0bc94, 0bc95, 0bc97,
00295 /* 0x3a */
00296 0xbc99, 0xbc9a, 0xbca0, 0xbca1, 0xbca4, 0xbca7, 0xbca8, 0xbcb0,
00297 0xbcb1, 0xbcb3, 0xbcb4, 0xbcb5, 0xbcbc, 0xbcbd, 0bcc0, 0bcc4,
00298 0bccd, 0bccf, 0bcd0, 0bcd1, 0bcd5, 0bcd8, 0bcd, 0bcf4,
00299 0bcf5, 0bcf6, 0bcf8, 0bcfc, 0bd04, 0bd05, 0bd07, 0bd09,
00300 0xbd10, 0xbd14, 0xbd24, 0xbd2c, 0xbd40, 0xbd48, 0xbd49, 0xbd4c,
00301 0xbd50, 0xbd58, 0xbd59, 0xbd64, 0xbd68, 0xbd80, 0xbd81, 0xbd84,
00302 0xbd87, 0xbd88, 0xbd89, 0xbd8a, 0xbd90, 0xbd91, 0xbd93, 0xbd95,
00303 0xbd99, 0xbd9a, 0xbd9c, 0xbda4, 0xbd0, 0xbd8, 0bdd4, 0bdd5,
00304 0xbdd8, 0bddc, 0bde9, 0bdf0, 0bdf4, 0bdf8, 0be00, 0be03,
00305 0xbe05, 0xbe0c, 0xbe0d, 0xbe10, 0xbe14, 0xbe1c, 0xbe1d, 0xbe1f,
00306 0xbe44, 0xbe45, 0xbe48, 0xbe4c, 0xbe4e, 0xbe54, 0xbe55, 0xbe57,
00307 0xbe59, 0xbe5a, 0xbe5b, 0xbe60, 0xbe61, 0xbe64,
00308 /* 0x3b */
00309 0xbe68, 0xbe6a, 0xbe70, 0xbe71, 0xbe73, 0xbe74, 0xbe75, 0xbe7b,
00310 0xbe7c, 0xbe7d, 0xbe80, 0xbe84, 0xbe8c, 0xbe8d, 0xbe8f, 0xbe90,
00311 0xbe91, 0xbe98, 0xbe99, 0bea8, 0bed0, 0bed1, 0bed4, 0bed7,
00312 0bed8, 0bee0, 0bee3, 0bee4, 0bee5, 0bee, 0bf01, 0bf08,
00313 0xbf09, 0xbf18, 0xbf19, 0xbf1b, 0xbf1c, 0xbf1d, 0xbf40, 0xbf41,
00314 0xbf44, 0xbf48, 0xbf50, 0xbf51, 0xbf55, 0xbf94, 0xbf, 0bfc5,
00315 0xbfcc, 0bffd, 0bffd0, 0bffd4, 0bffd, 0bffe1, 0xc03c,
00316 0xc051, 0xc058, 0xc05c, 0xc060, 0xc068, 0xc069, 0xc090, 0xc091,
00317 0xc094, 0xc098, 0xc0a0, 0xc0a1, 0xc0a3, 0xc0a5, 0xc0ac, 0xc0ad,
00318 0xc0af, 0xc0b0, 0xc0b3, 0xc0b5, 0xc0b6, 0xc0bc, 0xc0bd,
00319 0xc0bf, 0xc0c0, 0xc0c1, 0xc0c5, 0xc0c8, 0xc0c9, 0xc0cc, 0xc0d0,
00320 0xc0d8, 0xc0d9, 0xc0db, 0xc0dc, 0xc0dd, 0xc0e4,
00321 /* 0x3c */
00322 0xc0e5, 0xc0e8, 0xc0ec, 0xc0f4, 0xc0f5, 0xc0f7, 0xc0f9, 0xc100,
00323 0xc104, 0xc108, 0xc110, 0xc115, 0xc11c, 0xc11d, 0xc11e, 0xc11f,
00324 0xc120, 0xc123, 0xc124, 0xc126, 0xc127, 0xc12c, 0xc12d, 0xc12f,
00325 0xc130, 0xc131, 0xc136, 0xc138, 0xc139, 0xc13c, 0xc140, 0xc148,
00326 0xc149, 0xc14b, 0xc14c, 0xc14d, 0xc154, 0xc155, 0xc158, 0xc15c,
00327 0xc164, 0xc165, 0xc167, 0xc168, 0xc169, 0xc170, 0xc174, 0xc178,
00328 0xc185, 0xc18c, 0xc18d, 0xc18e, 0xc190, 0xc194, 0xc196, 0xc19c,
00329 0xc19d, 0xc19f, 0xc1a1, 0xc1a5, 0xc1a8, 0xc1a9, 0xc1ac, 0xc1b0,
00330 0xc1bd, 0xc1c4, 0xc1c8, 0xc1cc, 0xc1d4, 0xc1d7, 0xc1d8, 0xc1e0,
00331 0xc1e4, 0xc1e8, 0xc1f0, 0xc1f1, 0xc1f3, 0xc1fc, 0xc1fd, 0xc200,
00332 0xc204, 0xc20c, 0xc20d, 0xc20f, 0xc211, 0xc218, 0xc219, 0xc21c,
00333 0xc21f, 0xc220, 0xc228, 0xc229, 0xc22b, 0xc22d,
00334 /* 0x3d */
00335 0xc22f, 0xc231, 0xc232, 0xc234, 0xc248, 0xc250, 0xc251, 0xc254,
00336 0xc258, 0xc260, 0xc265, 0xc26c, 0xc26d, 0xc270, 0xc274, 0xc27c,
00337 0xc27d, 0xc27f, 0xc281, 0xc288, 0xc289, 0xc290, 0xc298, 0xc29b,
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00338 0xc29d, 0xc2a4, 0xc2a5, 0xc2a8, 0xc2ac, 0xc2ad, 0xc2b4, 0xc2b5,
00339 0xc2b7, 0xc2b9, 0xc2dc, 0xc2dd, 0xc2e0, 0xc2e3, 0xc2e4, 0xc2eb,
00340 0xc2ec, 0xc2ed, 0xc2ef, 0xc2f1, 0xc2f6, 0xc2f8, 0xc2f9, 0xc2fb,
00341 0xc2fc, 0xc300, 0xc308, 0xc309, 0xc30c, 0xc30d, 0xc313, 0xc314,
00342 0xc315, 0xc318, 0xc31c, 0xc324, 0xc325, 0xc328, 0xc329, 0xc345,
00343 0xc368, 0xc369, 0xc36c, 0xc370, 0xc372, 0xc378, 0xc379, 0xc37c,
00344 0xc37d, 0xc384, 0xc388, 0xc38c, 0xc3c0, 0xc3d8, 0xc3d9, 0xc3dc,
00345 0xc3df, 0xc3e0, 0xc3e2, 0xc3e8, 0xc3e9, 0xc3ed, 0xc3f4, 0xc3f5,
00346 0xc3f8, 0xc408, 0xc410, 0xc424, 0xc42c, 0xc430,
00347 /* 0x3e */
00348 0xc434, 0xc43c, 0xc43d, 0xc448, 0xc464, 0xc465, 0xc468, 0xc46c,
00349 0xc474, 0xc475, 0xc479, 0xc480, 0xc494, 0xc49c, 0xc4b8, 0xc4bc,
00350 0xc4e9, 0xc4f0, 0xc4f1, 0xc4f4, 0xc4f8, 0xc4fa, 0xc4ff, 0xc500,
00351 0xc501, 0xc50c, 0xc510, 0xc514, 0xc51c, 0xc528, 0xc529, 0xc52c,
00352 0xc530, 0xc538, 0xc539, 0xc53b, 0xc53d, 0xc544, 0xc545, 0xc548,
00353 0xc549, 0xc54a, 0xc54c, 0xc54d, 0xc54e, 0xc553, 0xc554, 0xc555,
00354 0xc557, 0xc558, 0xc559, 0xc55d, 0xc55e, 0xc560, 0xc561, 0xc564,
00355 0xc568, 0xc570, 0xc571, 0xc573, 0xc574, 0xc575, 0xc57c, 0xc57d,
00356 0xc580, 0xc584, 0xc587, 0xc58c, 0xc58d, 0xc58f, 0xc591, 0xc595,
00357 0xc597, 0xc598, 0xc59c, 0xc5a0, 0xc5a9, 0xc5b4, 0xc5b5, 0xc5b8,
00358 0xc5b9, 0xc5bb, 0xc5bc, 0xc5bd, 0xc5be, 0xc5c4, 0xc5c5, 0xc5c6,
00359 0xc5c7, 0xc5c8, 0xc5c9, 0xc5ca, 0xc5cc, 0xc5ce,
00360 /* 0x3f */
00361 0xc5d0, 0xc5d1, 0xc5d4, 0xc5d8, 0xc5e0, 0xc5e1, 0xc5e3, 0xc5e5,
00362 0xc5ec, 0xc5ed, 0xc5ee, 0xc5f0, 0xc5f4, 0xc5f6, 0xc5f7, 0xc5fc,
00363 0xc5fd, 0xc5fe, 0xc5ff, 0xc600, 0xc601, 0xc605, 0xc606, 0xc607,
00364 0xc608, 0xc60c, 0xc610, 0xc618, 0xc619, 0xc61b, 0xc61c, 0xc624,
00365 0xc625, 0xc628, 0xc62c, 0xc62d, 0xc62e, 0xc630, 0xc633, 0xc634,
00366 0xc635, 0xc637, 0xc639, 0xc63b, 0xc640, 0xc641, 0xc644, 0xc648,
00367 0xc650, 0xc651, 0xc653, 0xc654, 0xc655, 0xc65c, 0xc65d, 0xc660,
00368 0xc66c, 0xc66f, 0xc671, 0xc678, 0xc679, 0xc67c, 0xc680, 0xc688,
00369 0xc689, 0xc68b, 0xc68d, 0xc694, 0xc695, 0xc698, 0xc69c, 0xc6a4,
00370 0xc6a5, 0xc6a7, 0xc6a9, 0xc6b0, 0xc6b1, 0xc6b4, 0xc6b8, 0xc6b9,
00371 0xc6ba, 0xc6c0, 0xc6c1, 0xc6c3, 0xc6c5, 0xc6cc, 0xc6cd, 0xc6d0,
00372 0xc6d4, 0xc6dc, 0xc6dd, 0xc6e0, 0xc6e1, 0xc6e8,
00373 /* 0x40 */
00374 0xc6e9, 0xc6ec, 0xc6f0, 0xc6f8, 0xc6f9, 0xc6fd, 0xc704, 0xc705,
00375 0xc708, 0xc70c, 0xc714, 0xc715, 0xc717, 0xc719, 0xc720, 0xc721,
00376 0xc724, 0xc728, 0xc730, 0xc731, 0xc733, 0xc735, 0xc737, 0xc73c,
00377 0xc73d, 0xc740, 0xc744, 0xc74a, 0xc74c, 0xc74d, 0xc74f, 0xc751,
00378 0xc752, 0xc753, 0xc754, 0xc755, 0xc756, 0xc757, 0xc758, 0xc75c,
00379 0xc760, 0xc768, 0xc76b, 0xc774, 0xc775, 0xc778, 0xc77c, 0xc77d,
00380 0xc77e, 0xc783, 0xc784, 0xc785, 0xc787, 0xc788, 0xc789, 0xc78a,
00381 0xc78e, 0xc790, 0xc791, 0xc794, 0xc796, 0xc797, 0xc798, 0xc79a,
00382 0xc7a0, 0xc7a1, 0xc7a3, 0xc7a4, 0xc7a5, 0xc7a6, 0xc7ac, 0xc7ad,
00383 0xc7b0, 0xc7b4, 0xc7bc, 0xc7bd, 0xc7bf, 0xc7c0, 0xc7c1, 0xc7c8,
00384 0xc7c9, 0xc7cc, 0xc7ce, 0xc7d0, 0xc7d8, 0xc7dd, 0xc7e4, 0xc7e8,
00385 0xc7ec, 0xc800, 0xc801, 0xc804, 0xc808,
00386 /* 0x41 */
00387 0xc810, 0xc811, 0xc813, 0xc815, 0xc816, 0xc81c, 0xc81d, 0xc820,
00388 0xc824, 0xc82c, 0xc82d, 0xc82f, 0xc831, 0xc838, 0xc83c, 0xc840,
00389 0xc848, 0xc849, 0xc84c, 0xc84d, 0xc854, 0xc870, 0xc871, 0xc874,
00390 0xc878, 0xc87a, 0xc880, 0xc881, 0xc883, 0xc885, 0xc886, 0xc887,
00391 0xc88b, 0xc88c, 0xc88d, 0xc894, 0xc89d, 0xc89f, 0xc8a1, 0xc8a8,
00392 0xc8bc, 0xc8bd, 0xc8c4, 0xc8c8, 0xc8cc, 0xc8d4, 0xc8d5, 0xc8d7,
00393 0xc8d9, 0xc8e0, 0xc8e1, 0xc8e4, 0xc8f5, 0xc8fc, 0xc8fd, 0xc900,
00394 0xc904, 0xc905, 0xc90c, 0xc90d, 0xc90f, 0xc911, 0xc918,
00395 0xc92c, 0xc934, 0xc950, 0xc951, 0xc954, 0xc958, 0xc960, 0xc961,
00396 0xc963, 0xc96c, 0xc970, 0xc974, 0xc97c, 0xc988, 0xc989, 0xc98c,
00397 0xc990, 0xc998, 0xc999, 0xc99b, 0xc99d, 0xc9c0, 0xc9c1, 0xc9c4,
00398 0xc9c7, 0xc9c8, 0xc9ca, 0xc9d0, 0xc9d1, 0xc9d3,
00399 /* 0x42 */
00400 0xc9d5, 0xc9d6, 0xc9d9, 0xc9da, 0xc9dc, 0xc9dd, 0xc9e0, 0xc9e2,
00401 0xc9e4, 0xc9e7, 0xc9ec, 0xc9ed, 0xc9ef, 0xc9f0, 0xc9f1, 0xc9f8,
00402 0xc9f9, 0xc9fc, 0xca00, 0xca08, 0xca09, 0xca0b, 0xca0c, 0xca0d,
00403 0xca14, 0xca18, 0xca29, 0xca4c, 0xca4d, 0xca50, 0xca54, 0xca5c,
00404 0xca5d, 0xca5f, 0xca60, 0xca61, 0xca68, 0xca7d, 0xca84, 0xca98,
00405 0xcabc, 0xcabc, 0xcac0, 0xcac4, 0xcacc, 0xcacd, 0xcacf, 0xcad1,
00406 0xcad3, 0xcad8, 0xcad9, 0xcae0, 0xcaec, 0xcaf4, 0xcb08, 0xcb10,
00407 0xcb14, 0xcb18, 0xcb20, 0xcb21, 0xcb41, 0xcb48, 0xcb49, 0xcb4c,
00408 0xcb50, 0xcb58, 0xcb59, 0xcb5d, 0xcb64, 0xcb78, 0xcb79, 0xcb9c,
00409 0xcbb8, 0xcbbd, 0xcbe4, 0xcbe7, 0xcbe9, 0xcc0c, 0xcc0d, 0xcc10,
00410 0xcc14, 0xcc1c, 0xcc1d, 0xcc21, 0xcc22, 0xcc27, 0xcc28, 0xcc29,
00411 0xcc2c, 0xcc2e, 0xcc30, 0xcc38, 0xcc39, 0xcc3b,
00412 /* 0x43 */
00413 0xcc3c, 0xcc3d, 0xcc3e, 0xcc44, 0xcc45, 0xcc48, 0xcc4c, 0xcc54,
00414 0xcc55, 0xcc57, 0xcc58, 0xcc59, 0xcc60, 0xcc64, 0xcc66, 0xcc68,
00415 0xcc70, 0xcc75, 0xcc98, 0xcc99, 0xcc9c, 0xccea, 0xccea, 0xccea,
00416 0xccab, 0xccac, 0xccad, 0xccb4, 0xccb5, 0xccb8, 0xccbc, 0xcccd,
00417 0xccc5, 0xccc7, 0xccc9, 0xcccd, 0xccd0, 0xccd4, 0xcce4, 0xccec, 0xccf0,
00418 0xcd01, 0xcd08, 0xcd09, 0xcd0c, 0xcd10, 0xcd18, 0xcd19, 0xcd1b,
00419 0xcd1d, 0xcd24, 0xcd28, 0xcd2c, 0xcd39, 0xcd5c, 0xcd60, 0xcd64,
00420 0xcd6c, 0xcd6d, 0xcd6f, 0xcd71, 0xcd78, 0xcd88, 0xcd94, 0xcd95,
00421 0xcd98, 0xcd9c, 0xcda4, 0xcda5, 0xcda7, 0xcda9, 0xcdb0, 0xcdbc,
00422 0xcdcc, 0xcdcd, 0xcde8, 0xcdec, 0xcdf0, 0xcdf8, 0xcdf9, 0xcdfb,
00423 0xcdfd, 0xce04, 0xce08, 0xce0c, 0xce14, 0xce19, 0xce20, 0xce21,
00424 0xce24, 0xce28, 0xce30, 0xce31, 0xce33, 0xce35,

```

```

00425  /* 0x44 */
00426  0xce58, 0xce59, 0xce5c, 0xce5f, 0xce60, 0xce61, 0xce68, 0xce69,
00427  0xce6b, 0xce6d, 0xce74, 0xce75, 0xce78, 0xce7c, 0xce84, 0xce85,
00428  0xce87, 0xce89, 0xce90, 0xce91, 0xce94, 0xce98, 0xcea0, 0xcea1,
00429  0xcea3, 0xcea4, 0xcea5, 0xceac, 0xcead, 0xcec1, 0xcee4, 0xcee5,
00430  0xcee8, 0xceeb, 0xceec, 0xcef4, 0xcef5, 0xcef7, 0xcef8, 0xcef9,
00431  0xcf00, 0xcf01, 0xcf04, 0xcf08, 0xcf10, 0xcf11, 0xcf13, 0xcf15,
00432  0xcf1c, 0xcf20, 0xcf24, 0xcf2c, 0xcf2d, 0xcf2f, 0xcf30, 0xcf31,
00433  0xcf38, 0xcf54, 0xcf55, 0xcf58, 0xcf5c, 0xcf64, 0xcf65, 0xcf67,
00434  0xcf69, 0xcf70, 0xcf71, 0xcf74, 0xcf78, 0xcf80, 0xcf85, 0xcf8c,
00435  0xcfa1, 0xcfa8, 0xcfb0, 0xcfc4, 0xcfe0, 0xcfe1, 0xcfe4, 0xcfe8,
00436  0xcff0, 0xcff1, 0xcff3, 0xcff5, 0xcffc, 0xd000, 0xd004, 0xd011,
00437  0xd018, 0xd02d, 0xd034, 0xd035, 0xd038, 0xd03c,
00438  /* 0x45 */
00439  0xd044, 0xd045, 0xd047, 0xd049, 0xd050, 0xd054, 0xd058, 0xd060,
00440  0xd06c, 0xd06d, 0xd070, 0xd074, 0xd07c, 0xd07d, 0xd081, 0xd0a4,
00441  0xd0a5, 0xd0a8, 0xd0ac, 0xd0b4, 0xd0b5, 0xd0b7, 0xd0b9, 0xd0c0,
00442  0xd0c1, 0xd0c4, 0xd0c8, 0xd0c9, 0xd0d0, 0xd0d1, 0xd0d3, 0xd0d4,
00443  0xd0d5, 0xd0dc, 0xd0dd, 0xd0e0, 0xd0e4, 0xd0ec, 0xd0ed, 0xd0ef,
00444  0xd0f0, 0xd0f1, 0xd0f8, 0xd10d, 0xd130, 0xd131, 0xd134, 0xd138,
00445  0xd13a, 0xd140, 0xd14c, 0xd141, 0xd143, 0xd144, 0xd145, 0xd14c, 0xd14d,
00446  0xd150, 0xd154, 0xd15c, 0xd15d, 0xd15f, 0xd161, 0xd168, 0xd16c,
00447  0xd17c, 0xd184, 0xd188, 0xd1a0, 0xd1a1, 0xd1a4, 0xd1a8, 0xd1b0,
00448  0xd1b1, 0xd1b3, 0xd1b5, 0xd1ba, 0xd1bc, 0xd1c0, 0xd1d8, 0xd1f4,
00449  0xd1f8, 0xd207, 0xd209, 0xd210, 0xd22c, 0xd22d, 0xd230, 0xd234,
00450  0xd23c, 0xd23d, 0xd23f, 0xd241, 0xd248, 0xd25c,
00451  /* 0x46 */
00452  0xd264, 0xd280, 0xd281, 0xd284, 0xd288, 0xd290, 0xd291, 0xd295,
00453  0xd29c, 0xd2a0, 0xd2a4, 0xd2ac, 0xd2b1, 0xd2b8, 0xd2b9, 0xd2bc,
00454  0xd2bf, 0xd2c0, 0xd2c2, 0xd2c8, 0xd2c9, 0xd2cb, 0xd2d4, 0xd2d8,
00455  0xd2dc, 0xd2e4, 0xd2e5, 0xd2f0, 0xd2f1, 0xd2f4, 0xd2f8, 0xd300,
00456  0xd301, 0xd303, 0xd305, 0xd30c, 0xd30d, 0xd30e, 0xd310, 0xd314,
00457  0xd316, 0xd31c, 0xd31d, 0xd31f, 0xd320, 0xd321, 0xd325, 0xd328,
00458  0xd329, 0xd32c, 0xd330, 0xd338, 0xd339, 0xd33b, 0xd33c, 0xd33d,
00459  0xd344, 0xd345, 0xd37c, 0xd37d, 0xd380, 0xd384, 0xd38c, 0xd38d,
00460  0xd38f, 0xd390, 0xd391, 0xd398, 0xd399, 0xd39c, 0xd3a0, 0xd3a8,
00461  0xd3a9, 0xd3ab, 0xd3ad, 0xd3b4, 0xd3b8, 0xd3bc, 0xd3c4, 0xd3c5,
00462  0xd3c8, 0xd3c9, 0xd3d0, 0xd3d8, 0xd3e1, 0xd3e3, 0xd3ec, 0xd3ed,
00463  0xd3f0, 0xd3f4, 0xd3fc, 0xd3fd, 0xd3ff, 0xd401,
00464  /* 0x47 */
00465  0xd408, 0xd41d, 0xd440, 0xd444, 0xd45c, 0xd460, 0xd464, 0xd46d,
00466  0xd46f, 0xd478, 0xd479, 0xd47c, 0xd47f, 0xd480, 0xd482, 0xd488,
00467  0xd489, 0xd48b, 0xd48d, 0xd494, 0xd4a9, 0xd4cc, 0xd4d0, 0xd4d4,
00468  0xd4dc, 0xd4df, 0xd4e8, 0xd4ec, 0xd4f0, 0xd4f8, 0xd4fb, 0xd4fd,
00469  0xd504, 0xd508, 0xd50c, 0xd514, 0xd515, 0xd517, 0xd53c, 0xd53d,
00470  0xd540, 0xd544, 0xd54c, 0xd54d, 0xd54f, 0xd551, 0xd558, 0xd559,
00471  0xd55c, 0xd560, 0xd565, 0xd568, 0xd569, 0xd56b, 0xd56d, 0xd574,
00472  0xd575, 0xd578, 0xd57c, 0xd584, 0xd585, 0xd587, 0xd588, 0xd589,
00473  0xd590, 0xd5a5, 0xd5c8, 0xd5c9, 0xd5cc, 0xd5d0, 0xd5d2, 0xd5d8,
00474  0xd5d9, 0xd5db, 0xd5dd, 0xd5e4, 0xd5e5, 0xd5e8, 0xd5ec, 0xd5f4,
00475  0xd5f5, 0xd5f7, 0xd5f9, 0xd600, 0xd601, 0xd604, 0xd608, 0xd610,
00476  0xd611, 0xd613, 0xd614, 0xd615, 0xd61c, 0xd620,
00477  /* 0x48 */
00478  0xd624, 0xd62d, 0xd638, 0xd639, 0xd63c, 0xd640, 0xd645, 0xd648,
00479  0xd649, 0xd64b, 0xd64d, 0xd651, 0xd654, 0xd655, 0xd658, 0xd65c,
00480  0xd667, 0xd669, 0xd670, 0xd671, 0xd674, 0xd683, 0xd685, 0xd68c,
00481  0xd68d, 0xd690, 0xd694, 0xd69d, 0xd69f, 0xd6a1, 0xd6a8, 0xd6ac,
00482  0xd6b0, 0xd6b9, 0xd6bb, 0xd6c4, 0xd6c5, 0xd6c8, 0xd6cc, 0xd6d1,
00483  0xd6d4, 0xd6d7, 0xd6d9, 0xd6e0, 0xd6e4, 0xd6e8, 0xd6f0, 0xd6f5,
00484  0xd6fc, 0xd6fd, 0xd700, 0xd704, 0xd711, 0xd718, 0xd719, 0xd71c,
00485  0xd720, 0xd728, 0xd729, 0xd72b, 0xd72d, 0xd734, 0xd735, 0xd738,
00486  0xd73c, 0xd744, 0xd747, 0xd749, 0xd750, 0xd751, 0xd754, 0xd756,
00487  0xd757, 0xd758, 0xd759, 0xd760, 0xd761, 0xd763, 0xd765, 0xd769,
00488  0xd76c, 0xd770, 0xd774, 0xd77c, 0xd77d, 0xd781, 0xd788, 0xd789,
00489  0xd78c, 0xd790, 0xd798, 0xd799, 0xd79b, 0xd79d,
00490 };
00491 static const unsigned short ksc5601_2uni_page4a[4888] = {
00492  /* 0x4a */
00493  0x4f3d, 0x4f73, 0x5047, 0x50f9, 0x52a0, 0x53ef, 0x5475, 0x54e5,
00494  0x5609, 0x5ac1, 0x5bb6, 0x6687, 0x67b6, 0x67b7, 0x67ef, 0x6b4c,
00495  0x73c2, 0x75c2, 0x7a3c, 0x82db, 0x8304, 0x8857, 0x8888, 0x8a36,
00496  0x8cc8, 0x8dcf, 0x8efb, 0x8fe6, 0x99d5, 0x523b, 0x5374, 0x5404,
00497  0x606a, 0x6164, 0x6bbc, 0x73cf, 0x811a, 0x89ba, 0x89d2, 0x95a3,
00498  0x4f83, 0x520a, 0x58be, 0x5978, 0x59e6, 0x5e72, 0x5e79, 0x61c7,
00499  0x63c0, 0x6746, 0x67ec, 0x687f, 0x6f97, 0x764e, 0x770b, 0x78f5,
00500  0x7a08, 0x7aff, 0x7c21, 0x809d, 0x826e, 0x8271, 0x8aeb, 0x9593,
00501  0x4e6b, 0x559d, 0x66f7, 0x6e34, 0x78a3, 0x7aed, 0x845b, 0x8910,
00502  0x874e, 0x97a8, 0x52d8, 0x574e, 0x582a, 0x5d4c, 0x611f, 0x61be,
00503  0x6221, 0x6562, 0x67d1, 0x6a44, 0x6e1b, 0x7518, 0x75b3, 0x76e3,
00504  0x77b0, 0x7d3a, 0x90af, 0x9451, 0x9452, 0x9f95,
00505  /* 0x4b */
00506  0x5323, 0x5cac, 0x7532, 0x80db, 0x9240, 0x9598, 0x525b, 0x5808,
00507  0x59dc, 0x5ca1, 0x5d17, 0x5eb7, 0x5f3a, 0x5f4a, 0x6177, 0x6c5f,
00508  0x757a, 0x7586, 0x7ce0, 0x7d73, 0x7db1, 0x7f8c, 0x8154, 0x8221,
00509  0x8591, 0x8941, 0x8b1b, 0x92fc, 0x964d, 0x9c47, 0x4ecb, 0x4ef7,
00510  0x500b, 0x51f1, 0x584f, 0x6137, 0x613e, 0x6168, 0x6539, 0x69ea,
00511  0x6f11, 0x75a5, 0x7686, 0x76d6, 0x7b87, 0x82a5, 0x84cb, 0xf900,

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```
00512 0x93a7, 0x958b, 0x5580, 0x5ba2, 0x5751, 0xf901, 0x7cb3, 0x7fb9,
00513 0x91b5, 0x5028, 0x53bb, 0x5c45, 0x5de8, 0x62d2, 0x636e, 0x64da,
00514 0x64e7, 0x6e20, 0x70ac, 0x795b, 0x8ddd, 0x8e1e, 0xf902, 0x907d,
00515 0x9245, 0x92f8, 0x4e7e, 0x4ef6, 0x5065, 0x5dfe, 0x5efa, 0x6106,
00516 0x6957, 0x8171, 0x8654, 0x8e47, 0x9375, 0x9a2b, 0x4e5e, 0x5091,
00517 0x6770, 0x6840, 0x5109, 0x528d, 0x5292, 0x6aa2,
00518 /* 0x4c */
00519 0x77bc, 0x9210, 0x9ed4, 0x52ab, 0x602f, 0x8ff2, 0x5048, 0x61a9,
00520 0x63ed, 0x64ca, 0x683c, 0x6a84, 0x6fc0, 0x8188, 0x89a1, 0x9694,
00521 0x5805, 0x727d, 0x72ac, 0x7504, 0x7d79, 0x7e6d, 0x80a9, 0x898b,
00522 0x8b74, 0x9063, 0x9d51, 0x6289, 0x6c7a, 0x6f54, 0x7d50, 0x7f3a,
00523 0x8a23, 0x517c, 0x614a, 0x7b9d, 0x8b19, 0x9257, 0x938c, 0x4eac,
00524 0x4fd3, 0x501e, 0x50be, 0x5106, 0x52c1, 0x52cd, 0x537f, 0x5770,
00525 0x5883, 0x5e9a, 0x5f91, 0x6176, 0x61ac, 0x64ce, 0x656c, 0x666f,
00526 0x66bb, 0x66f4, 0x6897, 0x6d87, 0x7085, 0x70f1, 0x749f, 0x74a5,
00527 0x74ca, 0x75d9, 0x786c, 0x78ec, 0x7adf, 0x7af6, 0x7d45, 0x7d93,
00528 0x8015, 0x803f, 0x811b, 0x8396, 0x8b66, 0x8f15, 0x9015, 0x93e1,
00529 0x9803, 0x9838, 0x9a5a, 0x9be8, 0x4fc2, 0x5553, 0x583a, 0x5951,
00530 0x5b63, 0x5c46, 0x60b8, 0x6212, 0x6842, 0x68b0,
00531 /* 0x4d */
00532 0x68e8, 0x6eaa, 0x754c, 0x7678, 0x78ce, 0x7a3d, 0x7cfb, 0x7e6b,
00533 0x7e7c, 0x8a08, 0x8aa1, 0x8c3f, 0x968e, 0x9dc4, 0x53e4, 0x53e9,
00534 0x544a, 0x5471, 0x56fa, 0x59d1, 0x5b64, 0x5c3b, 0x5ead, 0x62f7,
00535 0x6537, 0x6545, 0x6572, 0x66a0, 0x67af, 0x69c1, 0x6cbd, 0x75fc,
00536 0x7690, 0x777e, 0x7a3f, 0x7f94, 0x8003, 0x80a1, 0x818f, 0x82e6,
00537 0x82fd, 0x83f0, 0x85c1, 0x8831, 0x88b4, 0x8aa5, 0xf903, 0x8f9c,
00538 0x932e, 0x96c7, 0x9867, 0x9ad8, 0x9f13, 0x54ed, 0x659b, 0x66f2,
00539 0x688f, 0x7a40, 0x8c37, 0x9d60, 0x56f0, 0x5764, 0x5d11, 0x6606,
00540 0x68b1, 0x68cd, 0x6efe, 0x7428, 0x889e, 0x9be4, 0x6c68, 0xf904,
00541 0x9aa8, 0x4f9b, 0x516c, 0x5171, 0x529f, 0x5b54, 0x5de5, 0x6050,
00542 0x606d, 0x62f1, 0x63a7, 0x653b, 0x73d9, 0x7a7a, 0x86a3, 0x8ca2,
00543 0x978f, 0x4e32, 0x5be1, 0x6208, 0x679c, 0x74dc,
00544 /* 0x4e */
00545 0x79d1, 0x83d3, 0x8a87, 0x8ab2, 0x8de8, 0x904e, 0x934b, 0x9846,
00546 0x5ed3, 0x69e8, 0x85ff, 0x90ed, 0xf905, 0x51a0, 0x5b98, 0x5bec,
00547 0x6163, 0x68fa, 0x6b3e, 0x704c, 0x742f, 0x74d8, 0x7ba1, 0x7f50,
00548 0x83c5, 0x89c0, 0x8cab, 0x95dc, 0x9928, 0x522e, 0x605d, 0x62ec,
00549 0x9002, 0x4f8a, 0x5149, 0x5321, 0x58d9, 0x5ee3, 0x66e0, 0x6d38,
00550 0x709a, 0x72c2, 0x73d6, 0x7b50, 0x80f1, 0x945b, 0x5366, 0x639b,
00551 0x7f6b, 0x4e56, 0x5080, 0x584a, 0x58de, 0x602a, 0x6127, 0x62d0,
00552 0x69d0, 0x9b41, 0x5b8f, 0x7d18, 0x80b1, 0x8f5f, 0x4ea4, 0x50d1,
00553 0x54ac, 0x55ac, 0x5b0c, 0x5da0, 0x5de7, 0x652a, 0x654e, 0x6821,
00554 0x6a4b, 0x72e1, 0x768e, 0x77ef, 0x7d5e, 0x7ff9, 0x81a0, 0x854e,
00555 0x86df, 0x8f03, 0x8f4e, 0x90ca, 0x9903, 0x9a55, 0x9bab, 0x4e18,
00556 0x4e45, 0x4e5d, 0x4ec7, 0x4ff1, 0x5177, 0x52fe,
00557 /* 0x4f */
00558 0x5340, 0x53e3, 0x53e5, 0x548e, 0x5614, 0x5775, 0x57a2, 0x5bc7,
00559 0x5d87, 0x5ed0, 0x61fc, 0x62d8, 0x6551, 0x67b8, 0x67e9, 0x69cb,
00560 0x6b50, 0x6bc6, 0x6bec, 0x6c42, 0x6e9d, 0x7078, 0x72d7, 0x7396,
00561 0x7403, 0x77bf, 0x77e9, 0x7a76, 0x7d7f, 0x8009, 0x81fc, 0x8205,
00562 0x820a, 0x82df, 0x8862, 0x8b33, 0x8cfc, 0x8ec0, 0x9011, 0x90b1,
00563 0x9264, 0x92b6, 0x99d2, 0x9a45, 0x9ce9, 0x9dd7, 0x9f9c, 0x570b,
00564 0x5c40, 0x83ca, 0x97a0, 0x97ab, 0x9eb4, 0x541b, 0x7a98, 0x7fa4,
00565 0x88d9, 0x8ecd, 0x90e1, 0x5800, 0x5c48, 0x6398, 0x7a9f, 0x5bae,
00566 0x5f13, 0x7a79, 0x7aae, 0x828e, 0x8eac, 0x5026, 0x5238, 0x52f8,
00567 0x5377, 0x5708, 0x62f3, 0x6372, 0x6b0a, 0x6dc3, 0x7737, 0x53a5,
00568 0x7357, 0x8568, 0x8e76, 0x95d5, 0x673a, 0x6ac3, 0x6f70, 0x8a6d,
00569 0x8ecc, 0x994b, 0xf906, 0x6677, 0x6b78, 0x8cb4,
00570 /* 0x50 */
00571 0x9b3c, 0xf907, 0x53eb, 0x572d, 0x594e, 0x63c6, 0x69fb, 0x73ea,
00572 0x7845, 0x7aba, 0x7ac5, 0x7cfe, 0x8475, 0x898f, 0x8d73, 0x9035,
00573 0x95a8, 0x52fb, 0x5747, 0x7547, 0x7b60, 0x83cc, 0x921e, 0xf908,
00574 0x6a58, 0x514b, 0x524b, 0x5287, 0x621f, 0x68d8, 0x6975, 0x9699,
00575 0x50c5, 0x52a4, 0x52e4, 0x61c3, 0x65a4, 0x6839, 0x69ff, 0x747e,
00576 0x7b4b, 0x82b9, 0x83eb, 0x89b2, 0x8b39, 0x8fd1, 0x9949, 0xf909,
00577 0x4eca, 0x5997, 0x64d2, 0x6611, 0x6a8e, 0x7434, 0x7981, 0x79bd,
00578 0x82a9, 0x887e, 0x887f, 0x895f, 0xf90a, 0x9326, 0x4f0b, 0x53ca,
00579 0x6025, 0x6271, 0x6c72, 0x7d1a, 0x7d66, 0x4e98, 0x5162, 0x77dc,
00580 0x80af, 0x4f01, 0x4f0e, 0x5176, 0x5180, 0x55dc, 0x5668, 0x573b,
00581 0x57fa, 0x57fc, 0x5914, 0x5947, 0x5993, 0x5bc4, 0x5c90, 0x5d0e,
00582 0x5df1, 0x5e7e, 0x5fcc, 0x6280, 0x65d7, 0x65e3,
00583 /* 0x51 */
00584 0x671e, 0x671f, 0x675e, 0x68cb, 0x68c4, 0x6a5f, 0x6b3a, 0x6c23,
00585 0x6c7d, 0x6c82, 0x6dc7, 0x7398, 0x7426, 0x742a, 0x7482, 0x74a3,
00586 0x7578, 0x757f, 0x7881, 0x78ef, 0x7941, 0x7947, 0x7948, 0x797a,
00587 0x7b95, 0x7d00, 0x7dba, 0x7f88, 0x8006, 0x802d, 0x808c, 0x8a18,
00588 0x8b4f, 0x8c48, 0x8d77, 0x9321, 0x9324, 0x98e2, 0x9951, 0x9a0e,
00589 0x9a0f, 0x9a65, 0x9e92, 0x7dca, 0x4f76, 0x5409, 0x62ee, 0x6854,
00590 0x91d1, 0x55ab, 0x513a, 0xf90b, 0xf90c, 0x5a1c, 0x61e6, 0xf90d,
00591 0x62cf, 0x62ff, 0xf90e, 0xf90f, 0xf910, 0xf911, 0xf912, 0xf913,
00592 0x90a3, 0xf914, 0xf915, 0xf916, 0xf917, 0xf918, 0x8afe, 0xf919,
00593 0xf91a, 0xf91b, 0xf91c, 0x6696, 0xf91d, 0x7156, 0xf91e, 0xf91f,
00594 0x96e3, 0xf920, 0x634f, 0x637a, 0x5357, 0xf921, 0x678f, 0x6960,
00595 0x6e73, 0xf922, 0x7537, 0xf923, 0xf924, 0xf925,
00596 /* 0x52 */
00597 0x7d0d, 0xf926, 0xf927, 0x8872, 0x56ca, 0x5a18, 0xf928, 0xf929,
00598 0xf92a, 0xf92b, 0xf92c, 0x4e43, 0xf92d, 0x5167, 0x5948, 0x67f0,
```

```
00599 0x8010, 0xf92e, 0x5973, 0x5e74, 0x649a, 0x79ca, 0x5ff5, 0x606c,
00600 0x62c8, 0x637f, 0x5be7, 0x5bd7, 0x52aa, 0xf92f, 0x5974, 0x5f29,
00601 0x6012, 0xf930, 0xf931, 0xf932, 0x7459, 0xf933, 0xf934, 0xf935,
00602 0xf936, 0xf937, 0xf938, 0x99d1, 0xf939, 0xf93a, 0xf93b, 0xf93c,
00603 0xf93d, 0xf93e, 0xf93f, 0xf940, 0xf941, 0xf942, 0xf943, 0x6fc3,
00604 0xf944, 0xf945, 0x81bf, 0x8fb2, 0x60f1, 0xf946, 0xf947, 0x8166,
00605 0xf948, 0xf949, 0x5c3f, 0xf94a, 0xf94b, 0xf94c, 0xf94d, 0xf94e,
00606 0xf94f, 0xf950, 0xf951, 0x5ae9, 0x8a25, 0x677b, 0x7d10, 0xf952,
00607 0xf953, 0xf954, 0xf955, 0xf956, 0xf957, 0x80fd, 0xf958, 0xf959,
00608 0x5c3c, 0x6ce5, 0x533f, 0x6eba, 0x591a, 0x8336,
00609 /* 0x53 */
00610 0x4e39, 0x4eb6, 0x4f46, 0x55ae, 0x5718, 0x58c7, 0x5f56, 0x65b7,
00611 0x65e6, 0x6a80, 0x6bb5, 0x6e4d, 0x77ed, 0x7aef, 0x7c1e, 0x7dde,
00612 0x86cb, 0x8892, 0x9132, 0x935b, 0x64bb, 0x6f6e, 0x737a, 0x75b8,
00613 0x9054, 0x5556, 0x574d, 0x61ba, 0x64d4, 0x66c7, 0x6de1, 0x6e5b,
00614 0x6fd6, 0x6fb9, 0x75f0, 0x8043, 0x81bd, 0x8541, 0x8983, 0x8ac7,
00615 0x8b5a, 0x931f, 0x6c93, 0x7553, 0x7b54, 0x8e0f, 0x905d, 0x5510,
00616 0x5802, 0x5858, 0x5e62, 0x6207, 0x649e, 0x68e0, 0x7576, 0x7cd6,
00617 0x87b3, 0x9ee8, 0x4ee3, 0x5788, 0x576e, 0x5927, 0x5c0d, 0x5cb1,
00618 0x5e36, 0x5f85, 0x6234, 0x64e1, 0x73b3, 0x81fa, 0x888b, 0x8cb8,
00619 0x968a, 0x9edb, 0x5b85, 0x5fb7, 0x60b3, 0x5012, 0x5200, 0x5230,
00620 0x5716, 0x5835, 0x5857, 0x5c0e, 0x5c60, 0x5cf6, 0x5d8b, 0x5ea6,
00621 0x5f92, 0x60bc, 0x6311, 0x6389, 0x6417, 0x6843,
00622 /* 0x54 */
00623 0x68f9, 0x6ac2, 0x6dd8, 0x6e21, 0x6ed4, 0x6fe4, 0x71fe, 0x76dc,
00624 0x7779, 0x79b1, 0x7a3b, 0x8404, 0x89a9, 0x8ced, 0x8df3, 0x8e48,
00625 0x9003, 0x9014, 0x9053, 0x90fd, 0x934d, 0x9676, 0x97cd, 0x6bd2,
00626 0x7006, 0x7258, 0x72a2, 0x7368, 0x7763, 0x79bf, 0x7be4, 0x7e9b,
00627 0x8b80, 0x58a9, 0x60c7, 0x6566, 0x65fd, 0x66be, 0x6c8c, 0x711e,
00628 0x71c9, 0x8c5a, 0x9813, 0x4e6d, 0x7a81, 0x4edd, 0x51ac, 0x51cd,
00629 0x52d5, 0x540c, 0x61a7, 0x6771, 0x6850, 0x68df, 0x6d1e, 0x6f7c,
00630 0x75bc, 0x77b3, 0x7ae5, 0x80f4, 0x8463, 0x9285, 0x515c, 0x6597,
00631 0x675c, 0x679d, 0x75d8, 0x7ac7, 0x8373, 0xf95a, 0x8c46, 0x9017,
00632 0x982d, 0x5c6f, 0x81c0, 0x829a, 0x9041, 0x906f, 0x920d, 0x5f97,
00633 0x5d9d, 0x6a59, 0x71c8, 0x767b, 0x7b49, 0x85e4, 0x8b04, 0x9127,
00634 0x9a30, 0x5587, 0x61f6, 0xf95b, 0x7669, 0x7f85,
00635 /* 0x55 */
00636 0x863f, 0x87ba, 0x88f8, 0x908f, 0xf95c, 0x6d1b, 0x70d9, 0x73de,
00637 0x7d61, 0x843d, 0xf95d, 0x916a, 0x99f1, 0xf95e, 0x4e82, 0x5375,
00638 0x6b04, 0x6b12, 0x703e, 0x721b, 0x862d, 0x9e1e, 0x524c, 0x8fa3,
00639 0x5d50, 0x64e5, 0x652c, 0x6b16, 0x6feb, 0x7c43, 0x7e9c, 0x85cd,
00640 0x8964, 0x89bd, 0x62c9, 0x81d8, 0x881f, 0x5eca, 0x6717, 0x6d6a,
00641 0x72fc, 0x7405, 0x746f, 0x8782, 0x90de, 0x4f86, 0x5d0d, 0x5fa0,
00642 0x840a, 0x51b7, 0x63a0, 0x7565, 0x4eae, 0x5006, 0x5169, 0x51c9,
00643 0x6881, 0x6a11, 0x7cae, 0x7cb1, 0x7ce7, 0x826f, 0x8ad2, 0x8f1b,
00644 0x91cf, 0x4fb6, 0x5137, 0x52f5, 0x5442, 0x5eec, 0x616e, 0x623e,
00645 0x65c5, 0x6ada, 0x6ffe, 0x792a, 0x85dc, 0x8823, 0x95ad, 0x9a62,
00646 0x9a6a, 0x9e97, 0x9ece, 0x529b, 0x66c6, 0x6b77, 0x701d, 0x792b,
00647 0x8f62, 0x9742, 0x6190, 0x6200, 0x6523, 0x6f23,
00648 /* 0x56 */
00649 0x7149, 0x7489, 0x7df4, 0x806f, 0x84ee, 0x8f26, 0x9023, 0x934a,
00650 0x51bd, 0x5217, 0x52a3, 0x6d0c, 0x70c8, 0x88c2, 0x5ec9, 0x6582,
00651 0x6bae, 0x6fc2, 0x7c3e, 0x7375, 0x4ee4, 0x4f36, 0x56f9, 0xf95f,
00652 0x5cba, 0x5dba, 0x601c, 0x73b2, 0x7b2d, 0x7f9a, 0x7fce, 0x8046,
00653 0x901e, 0x9234, 0x96f6, 0x9748, 0x9818, 0x9f61, 0x4f8b, 0x6fa7,
00654 0x79ae, 0x91b4, 0x96b7, 0x52de, 0xf960, 0x6488, 0x64c4, 0x6ad3,
00655 0x6f5e, 0x7018, 0x7210, 0x76e7, 0x8001, 0x8606, 0x865c, 0x8def,
00656 0x8f05, 0x9732, 0x9b6f, 0x9dfa, 0x9e75, 0x788c, 0x797f, 0x7da0,
00657 0x83c9, 0x9304, 0x9e7f, 0x9e93, 0x8ad6, 0x58df, 0x5f04, 0x6727,
00658 0x7027, 0x74cf, 0x7c60, 0x807e, 0x5121, 0x7028, 0x7262, 0x78ca,
00659 0x8cc2, 0x8cda, 0x8cf4, 0x96f7, 0x4e86, 0x50da, 0x5bee, 0x5ed6,
00660 0x6599, 0x71ce, 0x7642, 0x77ad, 0x804a, 0x84fc,
00661 /* 0x57 */
00662 0x907c, 0x9b27, 0x9f8d, 0x58d8, 0x5a41, 0x5c62, 0x6a13, 0x6dda,
00663 0x6f0f, 0x763b, 0x7d2f, 0x7e37, 0x851e, 0x8938, 0x93e4, 0x964b,
00664 0x5289, 0x65d2, 0x67f3, 0x69b4, 0x6d41, 0x6e9c, 0x700f, 0x7409,
00665 0x7460, 0x7559, 0x7624, 0x786b, 0x8b2c, 0x985e, 0x516d, 0x622e,
00666 0x9678, 0x4f96, 0x502b, 0x5d19, 0x6dea, 0x7db8, 0x8f2a, 0x5f8b,
00667 0x6144, 0x6817, 0xf961, 0x9686, 0x52d2, 0x808b, 0x51dc, 0x51cc,
00668 0x695e, 0x7a1c, 0x7dbe, 0x83f1, 0x9675, 0x4fda, 0x5229, 0x5398,
00669 0x540f, 0x550e, 0x5c65, 0x60a7, 0x674e, 0x68a8, 0x6d6c, 0x7281,
00670 0x72f8, 0x7406, 0x7483, 0xf962, 0x75e2, 0x7c6c, 0x7f79, 0x7fb8,
00671 0x8389, 0x88cf, 0x88e1, 0x91cc, 0x91d0, 0x96e2, 0x9bc9, 0x541d,
00672 0x6f7e, 0x71d0, 0x7498, 0x85fa, 0x8eaa, 0x96a3, 0x9c57, 0x9e9f,
00673 0x6797, 0x6dcb, 0x7433, 0x81e8, 0x9716, 0x782c,
00674 /* 0x58 */
00675 0x7acb, 0x7b20, 0x7c92, 0x6469, 0x746a, 0x75f2, 0x78bc, 0x78e8,
00676 0x99ac, 0x9b54, 0x9ebb, 0x5bde, 0x5e55, 0x6f20, 0x819c, 0x83ab,
00677 0x9088, 0x4e07, 0x534d, 0x5a29, 0x5dd2, 0x5f4e, 0x6162, 0x633d,
00678 0x6669, 0x66ff, 0x6eff, 0x6f2b, 0x7063, 0x779e, 0x842c, 0x8513,
00679 0x883b, 0x8f13, 0x9945, 0x9c3b, 0x551c, 0x62b9, 0x672b, 0x6cab,
00680 0x8309, 0x896a, 0x977a, 0x4ea1, 0x5984, 0x5fd8, 0x5fd9, 0x671b,
00681 0x7db2, 0x7f54, 0x8292, 0x832b, 0x83bd, 0x8f1e, 0x9099, 0x57cb,
00682 0x59b9, 0x5a92, 0x5bd0, 0x6627, 0x679a, 0x6885, 0x6bcf, 0x7164,
00683 0x7f75, 0x8cb7, 0x8ce3, 0x9081, 0x9b45, 0x8108, 0x8c8a, 0x964c,
00684 0x9a40, 0x9ea5, 0x5b5f, 0x6c13, 0x731b, 0x76f2, 0x76df, 0x840c,
00685 0x51aa, 0x8993, 0x514d, 0x5195, 0x52c9, 0x68c9, 0x6c94, 0x7704,
```

```
00686 0x7720, 0x7dbf, 0x7dec, 0x9762, 0x9eb5, 0x6ec5,
00687 /* 0x59 */
00688 0x8511, 0x51a5, 0x540d, 0x547d, 0x660e, 0x669d, 0x6927, 0x6e9f,
00689 0x76bf, 0x7791, 0x8317, 0x84c2, 0x879f, 0x9169, 0x9298, 0x9cf4,
00690 0x8882, 0x4fae, 0x5192, 0x52df, 0x59c6, 0x5e3d, 0x6155, 0x6478,
00691 0x6479, 0x66ae, 0x67d0, 0x6a21, 0x6bcd, 0x6bdb, 0x725f, 0x7261,
00692 0x7441, 0x7738, 0x77db, 0x8017, 0x82bc, 0x8305, 0x8b00, 0x8b28,
00693 0x8c8c, 0x6728, 0x6c90, 0x7267, 0x76ee, 0x7766, 0x7a46, 0x9da9,
00694 0x6b7f, 0x6c92, 0x5922, 0x6726, 0x8499, 0x536f, 0x5893, 0x5999,
00695 0x5edf, 0x63cf, 0x6634, 0x6773, 0x6e3a, 0x732b, 0x7ad7, 0x82d7,
00696 0x9328, 0x52d9, 0x5deb, 0x61ae, 0x61cb, 0x620a, 0x62c7, 0x64ab,
00697 0x65e0, 0x6959, 0x6b66, 0x6bcb, 0x7121, 0x73f7, 0x755d, 0x7e46,
00698 0x821e, 0x8302, 0x856a, 0x8aa3, 0x8cbf, 0x9727, 0x9d61, 0x58a8,
00699 0x9ed8, 0x5011, 0x520e, 0x543b, 0x554f, 0x6587,
00700 /* 0x5a */
00701 0x6c76, 0x7d0a, 0x7d0b, 0x805e, 0x868a, 0x9580, 0x96ef, 0x52ff,
00702 0x6c95, 0x7269, 0x5473, 0x5a9a, 0x5c3e, 0x5d4b, 0x5f4c, 0x5fae,
00703 0x672a, 0x68b6, 0x6963, 0x6e3c, 0x6e44, 0x7709, 0x7c73, 0x7f8e,
00704 0x8587, 0x8b0e, 0x8ff7, 0x9761, 0x9ef4, 0x5cb7, 0x60b6, 0x610d,
00705 0x61ab, 0x654f, 0x65fb, 0x65fc, 0x6c11, 0x6cef, 0x739f, 0x73c9,
00706 0x7de1, 0x9594, 0x5bc6, 0x871c, 0x8b10, 0x525d, 0x535a, 0x62cd,
00707 0x640f, 0x64b2, 0x6734, 0x6a38, 0x6cca, 0x73c0, 0x749e, 0x7b94,
00708 0x7c95, 0x7e1b, 0x818a, 0x8236, 0x8584, 0x8feb, 0x96f9, 0x99c1,
00709 0x4f34, 0x534a, 0x53cd, 0x53db, 0x62cc, 0x642c, 0x6500, 0x6591,
00710 0x69c3, 0x6cee, 0x6f58, 0x73ed, 0x7554, 0x7622, 0x76e4, 0x76fc,
00711 0x78d0, 0x78fb, 0x792c, 0x7d46, 0x822c, 0x87e0, 0x8fd4, 0x9812,
00712 0x98ef, 0x52c3, 0x62d4, 0x64a5, 0x6e24, 0x6f51,
00713 /* 0x5b */
00714 0x767c, 0x8dcb, 0x91b1, 0x9262, 0x9aee, 0x9b43, 0x5023, 0x508d,
00715 0x574a, 0x59a8, 0x5c28, 0x5e47, 0x5f77, 0x623f, 0x653e, 0x65b9,
00716 0x65c1, 0x6609, 0x678b, 0x699c, 0x6ec2, 0x78c5, 0x7d21, 0x80aa,
00717 0x8180, 0x822b, 0x82b3, 0x84a1, 0x868c, 0x8a2a, 0x8b17, 0x90a6,
00718 0x9632, 0x9f90, 0x500d, 0x4ff3, 0xf963, 0x57f9, 0x5f98, 0x62cd,
00719 0x6392, 0x676f, 0x6e43, 0x7119, 0x76c3, 0x80cc, 0x80da, 0x88f4,
00720 0x88f5, 0x8919, 0x8ce0, 0x8f29, 0x914d, 0x966a, 0x4f2f, 0x4f70,
00721 0x5e1b, 0x67cf, 0x6822, 0x767d, 0x767e, 0x9b44, 0x5e61, 0x6a0a,
00722 0x7169, 0x71d4, 0x756a, 0xf964, 0x7e41, 0x8543, 0x85e9, 0x98dc,
00723 0x4f10, 0x7b4f, 0x7f70, 0x95a5, 0x51e1, 0x5e06, 0x68b5, 0x6c3e,
00724 0x6c4e, 0x6cdb, 0x72af, 0x7bc4, 0x8303, 0x6cd5, 0x743a, 0x50fb,
00725 0x5288, 0x58c1, 0x64d8, 0x6a97, 0x74a7, 0x7656,
00726 /* 0x5c */
00727 0x78a7, 0x8617, 0x95e2, 0x9739, 0xf965, 0x535e, 0x5f01, 0x8b8a,
00728 0x8fa8, 0x8faf, 0x908a, 0x5225, 0x77a5, 0x9c49, 0x9f08, 0x4e19,
00729 0x5002, 0x5175, 0x5c5b, 0x5e77, 0x661e, 0x663a, 0x67c4, 0x68c5,
00730 0x70b3, 0x7501, 0x75c5, 0x79c9, 0x7add, 0x8f27, 0x9920, 0x9a08,
00731 0x4fdd, 0x5821, 0x5831, 0x5bf6, 0x666e, 0x6b65, 0x6d11, 0x6e7a,
00732 0x6f7d, 0x73e4, 0x752b, 0x83e9, 0x88dc, 0x8913, 0x8b5c, 0x8f14,
00733 0x4f0f, 0x50d5, 0x5310, 0x535c, 0x5b93, 0x5fa9, 0x670d, 0x798f,
00734 0x8179, 0x832f, 0x8514, 0x8907, 0x8986, 0x8f39, 0x8f3b, 0x99a5,
00735 0x9c12, 0x672c, 0x4e76, 0x4ff8, 0x5949, 0x5c01, 0x5cef, 0x5cf0,
00736 0x6367, 0x68d2, 0x70fd, 0x71a2, 0x742b, 0x7e2b, 0x84ec, 0x8702,
00737 0x9022, 0x92d2, 0x9cf3, 0x4e0d, 0x4ed8, 0x4fef, 0x5085, 0x5256,
00738 0x526f, 0x5426, 0x5490, 0x57e0, 0x592b, 0x5a66,
00739 /* 0x5d */
00740 0x5b5a, 0x5b75, 0x5bcc, 0x5e9c, 0xf966, 0x6276, 0x6577, 0x65a7,
00741 0x6d6e, 0x6ea5, 0x7236, 0x7b26, 0x7c3f, 0x7f36, 0x8150, 0x8151,
00742 0x819a, 0x8240, 0x8299, 0x83a9, 0x8a03, 0x8ca0, 0x8ce6, 0x8cfb,
00743 0x8d74, 0x8dba, 0x90e8, 0x91dc, 0x961c, 0x9644, 0x99d9, 0x9ce7,
00744 0x5317, 0x5206, 0x5429, 0x5674, 0x58b3, 0x5954, 0x596e, 0x5fff,
00745 0x61a4, 0x626e, 0x6610, 0x6c7e, 0x711a, 0x76c6, 0x7c89, 0x7cde,
00746 0x7d1b, 0x82ac, 0x8cc1, 0x96f0, 0xf967, 0x4f5b, 0x5f17, 0x5f7f,
00747 0x62c2, 0x5d29, 0x670b, 0x68da, 0x787c, 0x7e43, 0x9d6c, 0x4e15,
00748 0x5099, 0x5315, 0x532a, 0x5351, 0x5983, 0x5a62, 0x5e87, 0x60b2,
00749 0x618a, 0x6249, 0x6279, 0x6590, 0x6787, 0x69a7, 0x6bd4, 0x6bd6,
00750 0x6bd7, 0x6bd8, 0x6cb8, 0xf968, 0x7435, 0x75fa, 0x7812, 0x7891,
00751 0x79d5, 0x79d8, 0x7c83, 0x7dcb, 0x7fe1, 0x80a5,
00752 /* 0x5e */
00753 0x813e, 0x81c2, 0x83f2, 0x871a, 0x88e8, 0x8ab9, 0x8b6c, 0x8cbb,
00754 0x9119, 0x975e, 0x98db, 0x9f3b, 0x56ac, 0x5b2a, 0x5f6c, 0x658c,
00755 0x6ab3, 0x6baf, 0x6d5c, 0x6ff1, 0x7015, 0x725d, 0x73ad, 0x8ca7,
00756 0x8cd3, 0x983b, 0x6191, 0x6c37, 0x8058, 0x9a01, 0x4e4d, 0x4e8b,
00757 0x4e9b, 0x4ed5, 0x4f3a, 0x4f3c, 0x4f7f, 0x4fdf, 0x50ff, 0x53f2,
00758 0x53f8, 0x5506, 0x55e3, 0x56db, 0x58eb, 0x5962, 0x5a11, 0x5beb,
00759 0x5bfa, 0x5c04, 0x5df3, 0x5e2b, 0x5f99, 0x601d, 0x6368, 0x659c,
00760 0x65af, 0x67f6, 0x67fb, 0x68ad, 0x6b7b, 0x6c99, 0x6cd7, 0x6e23,
00761 0x7009, 0x7345, 0x7802, 0x793e, 0x7940, 0x7960, 0x79c1, 0x7be9,
00762 0x7d17, 0x7d72, 0x8086, 0x820d, 0x838e, 0x84d1, 0x86c7, 0x88df,
00763 0x8a50, 0x8a5e, 0x8b1d, 0x8cdc, 0x8d66, 0x8fad, 0x90aa, 0x98fc,
00764 0x99df, 0x9e9d, 0x524a, 0xf969, 0x6714, 0xf96a,
00765 /* 0x5f */
00766 0x5098, 0x522a, 0x5c71, 0x6563, 0x6c55, 0x73ca, 0x7523, 0x759d,
00767 0x7b97, 0x849c, 0x9178, 0x9730, 0x4e77, 0x6492, 0x6bba, 0x715e,
00768 0x85a9, 0x4e09, 0xf96b, 0x6749, 0x68ee, 0x6e17, 0x829f, 0x8518,
00769 0x886b, 0x63f7, 0x6f81, 0x9212, 0x98af, 0x4e0a, 0x50b7, 0x50cf,
00770 0x511f, 0x5546, 0x55aa, 0x5617, 0x5b40, 0x5c19, 0x5ce0, 0x5e38,
00771 0x5e8a, 0x5ea0, 0x5ec2, 0x60f3, 0x6851, 0x6a61, 0x6e58, 0x723d,
00772 0x7240, 0x72c0, 0x76f8, 0x7965, 0x7bb1, 0x7fd4, 0x88f3, 0x89f4,
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00774 0xf96c, 0x7a61, 0x7d22, 0x8272, 0x7272, 0x751f, 0x7525, 0xf96d,
00775 0x7b19, 0x5885, 0x58fb, 0x5dbc, 0x5e8f, 0x5eb6, 0x5f90, 0x6055,
00776 0x6292, 0x637f, 0x654d, 0x6691, 0x66d9, 0x66f8, 0x6816, 0x68f2,
00777 0x7280, 0x745e, 0x7b6e, 0x7d6e, 0x7dd6, 0x7f72,
00778 /* 0x60 */
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00780 0x9f20, 0x5915, 0x596d, 0x5e2d, 0x60dc, 0x6614, 0x6673, 0x6790,
00781 0x6c50, 0x6dc5, 0x6f5f, 0x77f3, 0x78a9, 0x84c6, 0x91cb, 0x932b,
00782 0x4ed9, 0x50ca, 0x5148, 0x5584, 0x5b0b, 0x5ba3, 0x6247, 0x657e,
00783 0x65cb, 0x6e32, 0x717d, 0x7401, 0x7444, 0x7487, 0x74bf, 0x766c,
00784 0x79aa, 0x7dda, 0x7e55, 0x7fa8, 0x817a, 0x81b3, 0x8239, 0x861a,
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00786 0x5368, 0x5c51, 0x6954, 0x6cc4, 0x6d29, 0x6e2b, 0x820c, 0x859b,
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00788 0x7e96, 0x87fe, 0x8d0d, 0x9583, 0x965d, 0x651d, 0x6d89, 0x71ee,
00789 0xf96e, 0x57ce, 0x59d3, 0x5bac, 0x6027, 0x60fa, 0x6210, 0x661f,
00790 0x665f, 0x7329, 0x73f9, 0x76db, 0x7701, 0x7b6c,
00791 /* 0x61 */
00792 0x8056, 0x8072, 0x8165, 0x8aa0, 0x9192, 0x4e16, 0x52e2, 0x6b72,
00793 0x6d17, 0x7a05, 0x7b39, 0x7d30, 0xf96f, 0x8cb0, 0x53ec, 0x562f,
00794 0x5851, 0x5bb5, 0x5c0f, 0x5c11, 0x5de2, 0x6240, 0x6383, 0x6414,
00795 0x662d, 0x68b3, 0x6cbc, 0x6d88, 0x6eaf, 0x701f, 0x70a4, 0x71d2,
00796 0x7526, 0x758f, 0x758e, 0x7619, 0x7b11, 0x7be0, 0x7c2b, 0x7d20,
00797 0x7d39, 0x852c, 0x856d, 0x8607, 0x8a34, 0x900d, 0x9061, 0x90b5,
00798 0x92b7, 0x97f6, 0x9a37, 0x4fd7, 0x5c6c, 0x675f, 0x6d91, 0x7c9f,
00799 0x7e8c, 0x8b16, 0x8d16, 0x901f, 0x5b6b, 0x5dfd, 0x640d, 0x84c0,
00800 0x905c, 0x98e1, 0x7387, 0x5b8b, 0x609a, 0x677e, 0x6dde, 0x8a1f,
00801 0x8aa6, 0x9001, 0x980c, 0x5237, 0xf970, 0x7051, 0x788e, 0x9396,
00802 0x8870, 0x91d7, 0x4fee, 0x53d7, 0x55fd, 0x56da, 0x5782, 0x58fd,
00803 0x5ac2, 0x5b88, 0x5cab, 0x5cc0, 0x5e25, 0x6101,
00804 /* 0x62 */
00805 0x620d, 0x624b, 0x6388, 0x641c, 0x6536, 0x6578, 0x6a39, 0x6b8a,
00806 0x6c34, 0x6d19, 0x6f31, 0x71e7, 0x72e9, 0x7378, 0x7407, 0x74b2,
00807 0x7626, 0x7761, 0x79c0, 0x7a57, 0x7aea, 0x7cb9, 0x7d8f, 0x7dac,
00808 0x7e61, 0x7f9e, 0x8129, 0x8331, 0x8490, 0x84da, 0x85ea, 0x8896,
00809 0x8ab0, 0x8b90, 0x8f38, 0x9042, 0x9083, 0x916c, 0x9296, 0x92b9,
00810 0x968b, 0x96a7, 0x96a8, 0x96d6, 0x9700, 0x9808, 0x9996, 0x9ad3,
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00812 0x719f, 0x7421, 0x74b9, 0x8085, 0x83fd, 0x5de1, 0x5f87, 0x5faa,
00813 0x6042, 0x65ec, 0x6812, 0x696f, 0x6a53, 0x6b89, 0x6d35, 0x6df3,
00814 0x73ec, 0x76fe, 0x77ac, 0x7b4d, 0x7d14, 0x8123, 0x821c, 0x8340,
00815 0x84f4, 0x8563, 0x8a62, 0x8ac4, 0x9187, 0x931e, 0x9806, 0x99b4,
00816 0x620c, 0x8853, 0x8ff0, 0x9265, 0x5d07, 0x5d27,
00817 /* 0x63 */
00818 0x5d69, 0x745f, 0x819d, 0x8768, 0x6fd5, 0x62fe, 0x7fd2, 0x8936,
00819 0x8972, 0x4e1e, 0x4e58, 0x50e7, 0x52dd, 0x5347, 0x627f, 0x6607,
00820 0x7e69, 0x8805, 0x965e, 0x4f8d, 0x5319, 0x5636, 0x59cb, 0x5aa4,
00821 0x5c38, 0x5c4e, 0x5c4d, 0x5e02, 0x5f11, 0x6043, 0x65bd, 0x662f,
00822 0x6642, 0x67be, 0x67f4, 0x731c, 0x77e2, 0x793a, 0x7fc5, 0x8494,
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00824 0x5bd4, 0x5f0f, 0x606f, 0x62ed, 0x690d, 0x6b96, 0x6e5c, 0x7184,
00825 0x7bd2, 0x8755, 0x8b58, 0x8efe, 0x98df, 0x98fe, 0x4f38, 0x4f81,
00826 0x4fe1, 0x547b, 0x5a20, 0x5bb8, 0x613c, 0x65b0, 0x6668, 0x71fc,
00827 0x7533, 0x795e, 0x7d33, 0x814e, 0x81e3, 0x8398, 0x85aa, 0x85ce,
00828 0x8703, 0x8a0a, 0x8eab, 0x8f9b, 0xf971, 0x8fc5, 0x9311, 0x5ba4,
00829 0x5be6, 0x6089, 0x5be9, 0x5c0b, 0x5fc3, 0x6c81,
00830 /* 0x64 */
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00832 0xf973, 0x96d9, 0x6c0f, 0x4e9e, 0x4fc4, 0x5152, 0x555e, 0x5a25,
00833 0x5ce8, 0x6211, 0x7259, 0x82bd, 0x83aa, 0x86fe, 0x8859, 0x8a1d,
00834 0x963f, 0x96c5, 0x9913, 0x9d09, 0x9d5d, 0x580a, 0x5cb3, 0x5dbd,
00835 0x5e44, 0x60e1, 0x6115, 0x63e1, 0x6a02, 0x6e25, 0x9102, 0x9354,
00836 0x984e, 0x9c10, 0x9f77, 0x5b89, 0x5cb8, 0x6309, 0x664f, 0x6848,
00837 0x773c, 0x96c1, 0x978d, 0x9854, 0x9b9f, 0x65a1, 0x8b01, 0x8ecb,
00838 0x95bc, 0x5535, 0x5ca9, 0x5dd6, 0x5eb5, 0x6697, 0x764c, 0x83f4,
00839 0x95c7, 0x58d3, 0x62bc, 0x72ce, 0x9d28, 0x4ef0, 0x592e, 0x600f,
00840 0x663b, 0x6b83, 0x79e7, 0x9d26, 0x5393, 0x54c0, 0x57c3, 0x5d16,
00841 0x611b, 0x66d6, 0x6daf, 0x788d, 0x827e, 0x9698, 0x9744, 0x5384,
00842 0x627c, 0x6396, 0x6db2, 0x7e0a, 0x814b, 0x984d,
00843 /* 0x65 */
00844 0x6afb, 0x7f4c, 0x9daf, 0x9e1a, 0x4e5f, 0x503b, 0x51b6, 0x591c,
00845 0x60f9, 0x63f6, 0x6930, 0x723a, 0x8036, 0xf974, 0x91ce, 0x5f31,
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00848 0x6518, 0x656d, 0x6698, 0xf97a, 0x694a, 0x6a23, 0x6d0b, 0x7001,
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00850 0x8944, 0xf97d, 0x8b93, 0x91c0, 0x967d, 0xf97e, 0x990a, 0x5704,
00851 0x5fa1, 0x65bc, 0x6f01, 0x7600, 0x79a6, 0x8a9e, 0x99ad, 0x9b5a,
00852 0x9f6c, 0x5104, 0x61b6, 0x6291, 0x6a8d, 0x81c6, 0x5043, 0x5830,
00853 0x5f66, 0x7109, 0x8a00, 0x8afa, 0x5b7c, 0x8616, 0x4ffa, 0x513c,
00854 0x56b4, 0x5944, 0x63a9, 0x6df9, 0x5daa, 0x696d, 0x5186, 0x4e88,
00855 0x4f59, 0xf97f, 0xf980, 0xf981, 0x5982, 0xf982,
00856 /* 0x66 */
00857 0xf983, 0x6b5f, 0x6c5d, 0xf984, 0x74b5, 0x7916, 0xf985, 0x8207,
00858 0x8245, 0x8339, 0x8f3f, 0x8f5d, 0xf986, 0x9918, 0xf987, 0xf988,
00859 0xf989, 0x4ea6, 0xf98a, 0x57df, 0x5f79, 0x6613, 0xf98b, 0xf98c,

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00861 0x59f8, 0x5a1f, 0x5bb4, 0xf98e, 0x5ef6, 0xf98f, 0xf990, 0x6350,
00862 0x633b, 0xf991, 0x693d, 0x6c87, 0x6cbf, 0x6d8e, 0x6d93, 0x6df5,
00863 0x6f14, 0xf992, 0x70df, 0x7136, 0x7159, 0xf993, 0x71c3, 0x71d5,
00864 0xf994, 0x784f, 0x786f, 0xf995, 0x7b75, 0x7de3, 0xf996, 0x7e2f,
00865 0xf997, 0x884d, 0x8edf, 0xf998, 0xf999, 0xf99a, 0x925b, 0xf99b,
00866 0x9cf6, 0xf99c, 0xf99d, 0xf99e, 0x6085, 0x6d85, 0xf99f, 0x71b1,
00867 0xf9a0, 0xf9a1, 0x95b1, 0x53ad, 0xf9a2, 0xf9a3, 0xf9a4, 0x67d3,
00868 0xf9a5, 0x708e, 0x7130, 0x7430, 0x8276, 0x82d2,
00869 /* 0x67 */
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00874 0xf9ae, 0x74d4, 0x76c8, 0x7a4e, 0x7e93, 0xf9af, 0xf9b0, 0x82f1,
00875 0x8a60, 0x8fce, 0xf9b1, 0x9348, 0xf9b2, 0x9719, 0xf9b3, 0xf9b4,
00876 0x4e42, 0x502a, 0xf9b5, 0x5208, 0x53e1, 0x66f3, 0x6c6d, 0x6fca,
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00878 0x8a63, 0x8b7d, 0x8c6b, 0xf9b7, 0x92b3, 0xf9b8, 0x9713, 0x9810,
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00880 0x5862, 0x58ba, 0x5967, 0x5a1b, 0x5be4, 0x609f, 0xf9b9, 0x61ca,
00881 0x6556, 0x65ff, 0x6664, 0x68a7, 0x6c5a, 0x6fb3,
00882 /* 0x68 */
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00885 0x7a69, 0x7e15, 0x860a, 0x5140, 0x58c5, 0x64c1, 0x74ee, 0x7515,
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00887 0x7aaa, 0x81e5, 0x86d9, 0x8778, 0x8a1b, 0x5a49, 0x5b8c, 0x5b9b,
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00889 0x7feb, 0x8118, 0x8155, 0x839e, 0x8c4c, 0x962e, 0x9811, 0x66f0,
00890 0x5f80, 0x65fa, 0x6789, 0x6c6a, 0x738b, 0x502d, 0x5a03, 0x6b6a,
00891 0x77ee, 0x5916, 0x5d6c, 0x5dcd, 0x7325, 0x754f, 0xf9ba, 0xf9bb,
00892 0x50e5, 0x51f9, 0x582f, 0x592d, 0x5996, 0x59da, 0x5be5, 0xf9bc,
00893 0xf9bd, 0x5da2, 0x62d7, 0x6416, 0x6493, 0x64fe, 0xf9be, 0x66dc,
00894 0xf9bf, 0x6a48, 0xf9c0, 0x71ff, 0x7464, 0xf9c1,
00895 /* 0x69 */
00896 0x7a88, 0x7aaf, 0x7e47, 0x7e5e, 0x8000, 0x8170, 0xf9c2, 0x87ef,
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00898 0x6d74, 0x7fe1f, 0x8925, 0x8fb1, 0x4fd1, 0x50ad, 0x5197, 0x52c7,
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00903 0x65f4, 0x725b, 0x7397, 0x7440, 0x76c2, 0x7950, 0x7991, 0x79b9,
00904 0x7d06, 0x7fbd, 0x828b, 0x85d5, 0x865e, 0x8fc2, 0x9047, 0x90f5,
00905 0x91ea, 0x9685, 0x96e8, 0x96e9, 0x52d6, 0x5f67, 0x65ed, 0x6631,
00906 0x682f, 0x715c, 0x7a36, 0x90c1, 0x980a, 0x4e91, 0xf9c5, 0x6a52,
00907 0x6b9e, 0x6f90, 0x7189, 0x8018, 0x82b8, 0x8553,
00908 /* 0x6a */
00909 0x904b, 0x9695, 0x96f2, 0x97fb, 0x851a, 0x9b31, 0x4e90, 0x718a,
00910 0x96c4, 0x5143, 0x539f, 0x54e1, 0x5713, 0x5712, 0x57a3, 0x5a9b,
00911 0x5ac4, 0x5bc3, 0x6028, 0x613f, 0x63f4, 0x6c85, 0x6d39, 0x6e72,
00912 0x6e90, 0x7230, 0x733f, 0x7457, 0x82d1, 0x8881, 0x8f45, 0x9060,
00913 0xf9c6, 0x9662, 0xf9d0, 0x9858, 0x9d1b, 0x6708, 0x8d8a, 0x925e, 0x4f4d,
00914 0x5049, 0x50de, 0x5371, 0x570d, 0x59d4, 0x5a01, 0x5c09, 0x6170,
00915 0x6690, 0x6e2d, 0x7232, 0x744b, 0x7def, 0x80c3, 0x840e, 0x8466,
00916 0x853f, 0x875f, 0x885b, 0x8918, 0x8b02, 0x9055, 0x97cb, 0x9b4f,
00917 0x4e73, 0x4f91, 0x5112, 0x516a, 0xf9c7, 0x552f, 0x55a9, 0x5b7a,
00918 0x5ba5, 0x5e7c, 0x5e7d, 0x5ebe, 0x60a0, 0x60df, 0x6108, 0x6109,
00919 0x63c4, 0x6538, 0x6709, 0xf9c8, 0x67d4, 0x67da, 0xf9c9, 0x6961,
00920 0x6962, 0x6cb9, 0x6d27, 0xf9ca, 0x6e38, 0xf9cb,
00921 /* 0x6b */
00922 0x6fe1, 0x7336, 0x7337, 0xf9cc, 0x745c, 0x7531, 0xf9cd, 0x7652,
00923 0xf9ce, 0xf9cf, 0x7dad, 0x81fe, 0x8438, 0x88d5, 0x8a98, 0x8adb,
00924 0x8aed, 0x8e30, 0x8e42, 0x904a, 0x903e, 0x907a, 0x9149, 0x91c9,
00925 0x936e, 0xf9d0, 0xf9d1, 0x5809, 0xf9d2, 0x6bd3, 0x8089, 0x80b2,
00926 0xf9d3, 0xf9d4, 0x5141, 0x596b, 0x5c39, 0xf9d5, 0xf9d6, 0x6f64,
00927 0x73a7, 0x80e4, 0x8d07, 0xf9d7, 0x9217, 0x958f, 0xf9d8, 0xf9d9,
00928 0xf9da, 0xf9db, 0x807f, 0x620e, 0x701c, 0x7d68, 0x878d, 0xf9dc,
00929 0x57a0, 0x6069, 0x6147, 0x6bb7, 0x8abe, 0x9280, 0x96b1, 0x4e59,
00930 0x541f, 0x6deb, 0x852d, 0x9670, 0x97f3, 0x98ee, 0x63d6, 0x6ce3,
00931 0x9091, 0x51dd, 0x61c9, 0x81ba, 0x9df9, 0x4f9d, 0x501a, 0x5100,
00932 0x5b9c, 0x610f, 0x61ff, 0x64ec, 0x6905, 0x6bc5, 0x7591, 0x77e3,
00933 0x7fa9, 0x8264, 0x858f, 0x87fb, 0x8863, 0x8abc,
00934 /* 0x6c */
00935 0x8b70, 0x91ab, 0x4e8c, 0x4ee5, 0x4f0a, 0xf9dd, 0xf9de, 0x5937,
00936 0x59e8, 0xf9df, 0x5df2, 0x5f1b, 0x5f5b, 0x6021, 0xf9e0, 0xf9e1,
00937 0xf9e2, 0xf9e3, 0x723e, 0x73e5, 0xf9e4, 0x7570, 0x75cd, 0xf9e5,
00938 0x79fb, 0xf9e6, 0x800c, 0x8033, 0x8084, 0x82e1, 0x8351, 0xf9e7,
00939 0xf9e8, 0x8cb3, 0x8cb3, 0x9087, 0xf9e9, 0xf9ea, 0x98f4, 0x990c,
00940 0xf9eb, 0xf9ec, 0x7037, 0x76ca, 0x7fca, 0x7fcc, 0x7ffc, 0x8b1a,
00941 0x4eba, 0x4ec1, 0x5203, 0x5370, 0xf9ed, 0x54bd, 0x56e0, 0x59fb,
00942 0x5bc5, 0x5f15, 0x5fcd, 0x6e6e, 0xf9ee, 0xf9ef, 0x7d6a, 0x8335,
00943 0xf9f0, 0x8693, 0x8a8d, 0xf9f1, 0x976d, 0x9777, 0xf9f2, 0xf9f3,
00944 0x4e00, 0x4f5a, 0x4f7e, 0x58f9, 0x6e55, 0x6ea2, 0x9038, 0x93b0,
00945 0x99b9, 0x4efb, 0x58ec, 0x598a, 0x59d9, 0x6041, 0xf9f4, 0xf9f5,
00946 0x7a14, 0xf9f6, 0x834f, 0x8cc3, 0x5165, 0x5344,
```

```
00947 /* 0x6d */
00948 0xf9f7, 0xf9f8, 0xf9f9, 0x4ecd, 0x5269, 0x5b55, 0x82bf, 0x4ed4,
00949 0x523a, 0x54a8, 0x59c9, 0x59ff, 0x5b50, 0x5b57, 0x5b5c, 0x6063,
00950 0x6148, 0x6ecb, 0x7099, 0x716e, 0x7386, 0x74f7, 0x75b5, 0x78c1,
00951 0x7d2b, 0x8005, 0x81ea, 0x8328, 0x8517, 0x85c9, 0x8aee, 0x8cc7,
00952 0x96cc, 0x4f5c, 0x52fa, 0x56bc, 0x65ab, 0x6628, 0x707c, 0x70b8,
00953 0x7235, 0x7dbd, 0x828d, 0x914c, 0x96c0, 0x9d72, 0x5b71, 0x68e7,
00954 0x6b98, 0x6f7a, 0x76de, 0x5c91, 0x66ab, 0x6f5b, 0x7bb4, 0x7c2a,
00955 0x8836, 0x96dc, 0x4e08, 0x4ed7, 0x5320, 0x5834, 0x58bb, 0x58ef,
00956 0x596c, 0x5c07, 0x5e33, 0x5e84, 0x5f35, 0x638c, 0x66b2, 0x6756,
00957 0x6a1f, 0x6aa3, 0x6b0c, 0x6f3f, 0x7246, 0xf9fa, 0x7350, 0x748b,
00958 0x7ae0, 0x7ca7, 0x8178, 0x81df, 0x81e7, 0x838a, 0x846c, 0x8523,
00959 0x8594, 0x85cf, 0x88dd, 0x8d13, 0x91ac, 0x9577,
00960 /* 0x6e */
00961 0x969c, 0x518d, 0x54c9, 0x5728, 0x5bb0, 0x624d, 0x6750, 0x683d,
00962 0x6893, 0x6e3d, 0x6ed3, 0x707d, 0x7e21, 0x88c1, 0x8ca1, 0x8f09,
00963 0x9f4b, 0x9f4e, 0x722d, 0x7b8f, 0x8acd, 0x931a, 0x4f47, 0x4f4e,
00964 0x5132, 0x5480, 0x59d0, 0x5e95, 0x62b5, 0x6775, 0x696e, 0x6a17,
00965 0x6cae, 0x6e1a, 0x72d9, 0x732a, 0x75bd, 0x7bb8, 0x7d35, 0x82e7,
00966 0x83f9, 0x8457, 0x85f7, 0x8a5b, 0x8caf, 0x8e87, 0x9019, 0x90b8,
00967 0x96ce, 0x9f2b, 0x52e3, 0x540a, 0x5ae1, 0x5bc2, 0x6458, 0x6575,
00968 0x6ef4, 0x72c4, 0xf9fb, 0x7684, 0x7a4d, 0x7b1b, 0x7c4d, 0x7e3e,
00969 0x7fdf, 0x837b, 0x8b2b, 0x8cca, 0x8d64, 0x8de1, 0x8e5f, 0x8fea,
00970 0x8ff9, 0x9069, 0x93d1, 0x4f43, 0x4f7a, 0x50b3, 0x5168, 0x5178,
00971 0x524d, 0x526a, 0x5861, 0x587c, 0x5960, 0x5c08, 0x5c55, 0x5edb,
00972 0x609b, 0x6230, 0x6813, 0x6bbf, 0x6c08, 0x6fb1,
00973 /* 0x6f */
00974 0x714e, 0x7420, 0x7530, 0x7538, 0x7551, 0x7672, 0x7b4c, 0x7b8b,
00975 0x7bad, 0x7bc6, 0x7e8f, 0x8a6e, 0x8f3e, 0x8f49, 0x923f, 0x9293,
00976 0x9322, 0x942b, 0x96fb, 0x985a, 0x986b, 0x991e, 0x5207, 0x622a,
00977 0x6298, 0x6d59, 0x7664, 0x7aca, 0x7bc0, 0x7d76, 0x5360, 0x5cbe,
00978 0x5e97, 0x6f38, 0x70b9, 0x7c98, 0x9711, 0x9b8e, 0x9ede, 0x63a5,
00979 0x647a, 0x8776, 0x4e01, 0x4e95, 0x4ead, 0x505c, 0x5075, 0x5448,
00980 0x59c3, 0x5b9a, 0x5e40, 0x5ead, 0x5ef7, 0x5f81, 0x60c5, 0x633a,
00981 0x653f, 0x6574, 0x65cc, 0x6676, 0x6678, 0x67fe, 0x6968, 0x6a89,
00982 0x6b63, 0x6c40, 0x6dc0, 0x6de8, 0x6e1f, 0x6e5e, 0x701e, 0x70a1,
00983 0x738e, 0x73fd, 0x753a, 0x775b, 0x7887, 0x798e, 0x7a0b, 0x7a7d,
00984 0x7cbe, 0x7d8e, 0x8247, 0x8a02, 0x8aea, 0x8c9e, 0x912d, 0x914a,
00985 0x91d8, 0x9266, 0x92cc, 0x9320, 0x9706, 0x9756,
00986 /* 0x70 */
00987 0x975c, 0x9802, 0x9f0e, 0x5236, 0x5291, 0x557c, 0x5824, 0x5e1d,
00988 0x5f1f, 0x608c, 0x63d0, 0x68af, 0x6fdf, 0x796d, 0x7b2c, 0x81cd,
00989 0x85ba, 0x88fd, 0x8af8, 0x8e44, 0x918d, 0x9664, 0x969b, 0x973d,
00990 0x984c, 0x9f4a, 0x4fce, 0x5146, 0x51cb, 0x52a9, 0x5632, 0x5f14,
00991 0x5f6b, 0x63aa, 0x664c, 0x65e9, 0x6641, 0x66fa, 0x66f9, 0x671d,
00992 0x689d, 0x68d7, 0x69fd, 0x6f15, 0x6f6e, 0x7167, 0x71e5, 0x722a,
00993 0x74aa, 0x773a, 0x7956, 0x795a, 0x79df, 0x7a20, 0x7a95, 0x7c97,
00994 0x7cdf, 0x7d44, 0x7e70, 0x8087, 0x85fb, 0x86a4, 0x8a54, 0x8abf,
00995 0x8d99, 0x8e81, 0x9020, 0x906d, 0x91e3, 0x963b, 0x96d5, 0x9ce5,
00996 0x65cf, 0x7c07, 0x8db3, 0x93c3, 0x5b58, 0x5c0a, 0x5352, 0x62d9,
00997 0x731d, 0x5027, 0x5b97, 0x5f9e, 0x60b0, 0x616b, 0x68d5, 0x6dd9,
00998 0x742e, 0x7a2e, 0x7d42, 0x7d9c, 0x7e31, 0x816b,
00999 /* 0x71 */
01000 0x8e2a, 0x8e35, 0x937e, 0x9418, 0x4f50, 0x5750, 0x5de6, 0x5ea7,
01001 0x632b, 0x7f6a, 0x4e3b, 0x4f4f, 0x4f8f, 0x505a, 0x59dd, 0x80c4,
01002 0x546a, 0x5468, 0x55fe, 0x594f, 0x5b99, 0x5d5d, 0x5eda, 0x665d,
01003 0x6731, 0x67f1, 0x682a, 0x6ce8, 0x6d32, 0x6e4a, 0x6f8d, 0x70b7,
01004 0x73e0, 0x7587, 0x7c4c, 0x7d02, 0x7d2c, 0x7da2, 0x821f, 0x86db,
01005 0x8a3b, 0x8a85, 0x8d70, 0x8e8a, 0x8f33, 0x9031, 0x914e, 0x9152,
01006 0x9444, 0x99d0, 0x7af9, 0x7ca5, 0x4fca, 0x5101, 0x51c6, 0x57c8,
01007 0x5bef, 0x5cfd, 0x6659, 0x6a3d, 0x6d5a, 0x6e96, 0x6fec, 0x710c,
01008 0x756f, 0x7ae3, 0x8822, 0x9021, 0x9075, 0x96cb, 0x99ff, 0x8301,
01009 0x4e2d, 0x4ef2, 0x8846, 0x91cd, 0x537d, 0x6adb, 0x696b, 0x6c41,
01010 0x847a, 0x589e, 0x618e, 0x66fe, 0x62ef, 0x70dd, 0x7511, 0x75c7,
01011 0x7e52, 0x84b8, 0x8b49, 0x8d08, 0x4e4b, 0x53ea,
01012 /* 0x72 */
01013 0x54ab, 0x5730, 0x5740, 0x5fd7, 0x6301, 0x6307, 0x646f, 0x652f,
01014 0x65e8, 0x667a, 0x679d, 0x67b3, 0x6b62, 0x6c60, 0x6c9a, 0x6f2c,
01015 0x77e5, 0x7825, 0x7949, 0x7957, 0x7d19, 0x80a2, 0x8102, 0x81f3,
01016 0x829d, 0x82b7, 0x8718, 0x8a8c, 0xf9fc, 0x8d04, 0x8db6, 0x9072,
01017 0x76f4, 0x7a19, 0x7a37, 0x7e54, 0x8077, 0x5507, 0x55d4, 0x5875,
01018 0x632f, 0x6422, 0x6649, 0x664b, 0x686d, 0x699b, 0x6b84, 0x6d25,
01019 0x6eb1, 0x73cd, 0x7468, 0x74a1, 0x755b, 0x75b9, 0x76e1, 0x771e,
01020 0x778b, 0x79e6, 0x7e09, 0x7e1d, 0x81fb, 0x852f, 0x8897, 0x8a3a,
01021 0x8cd1, 0x8eeb, 0x8fb0, 0x9032, 0x93ad, 0x9663, 0x9673, 0x9707,
01022 0x4f84, 0x53f1, 0x59ea, 0x5ac9, 0x5e19, 0x684e, 0x74c6, 0x75be,
01023 0x79e9, 0x7a92, 0x81a3, 0x86ed, 0x8cea, 0x8dcc, 0x8fed, 0x659f,
01024 0x6715, 0xf9fd, 0x57f7, 0x6f57, 0x7ddd, 0x8f2f,
01025 /* 0x73 */
01026 0x93f6, 0x96c6, 0x5fb5, 0x61f2, 0x6f84, 0x4e14, 0x4f98, 0x501f,
01027 0x53c9, 0x55df, 0x5d6f, 0x5dee, 0x6b21, 0x6b64, 0x78cb, 0x7b9a,
01028 0xf9fe, 0x8e49, 0x8eca, 0x906e, 0x6349, 0x643e, 0x7740, 0x7a84,
01029 0x932f, 0x947f, 0x9f6a, 0x9f6a, 0x64b0, 0x6faf, 0x71e6, 0x74a8, 0x74da,
01030 0x7ac4, 0x7c12, 0x7e82, 0x7cb2, 0x7e98, 0x8b9a, 0x8d0a, 0x947d,
01031 0x9910, 0x994c, 0x5239, 0x5bdf, 0x64e6, 0x672d, 0x7d2e, 0x50ed,
01032 0x53c3, 0x5879, 0x6158, 0x6159, 0x61fa, 0x65ac, 0x7ad9, 0x8b92,
01033 0x8b96, 0x5009, 0x5021, 0x5275, 0x5531, 0x5a3c, 0x5ee0, 0x5f70,
```

```
01034 0x6134, 0x655e, 0x660c, 0x6636, 0x66a2, 0x69cd, 0x6ec4, 0x6f32,
01035 0x7316, 0x7621, 0x7a93, 0x8139, 0x8259, 0x83d6, 0x84bc, 0x50b5,
01036 0x57f0, 0x5bc0, 0x5be8, 0x5f69, 0x63a1, 0x7826, 0x7db5, 0x83dc,
01037 0x8521, 0x91c7, 0x91f5, 0x518a, 0x67f5, 0x7b56,
01038 /* 0x74 */
01039 0x8cac, 0x51c4, 0x59bb, 0x60bd, 0x8655, 0x501c, 0xf9ff, 0x5254,
01040 0x5c3a, 0x617d, 0x621a, 0x62d3, 0x64f2, 0x65a5, 0x6ecc, 0x7620,
01041 0x810a, 0x8e60, 0x965f, 0x96bb, 0x4edf, 0x5343, 0x5598, 0x5929,
01042 0x5ddd, 0x64c5, 0x6cc9, 0x6dfa, 0x7394, 0x7a7f, 0x821b, 0x85a6,
01043 0x8ce4, 0x8e10, 0x9077, 0x91e7, 0x95e1, 0x9621, 0x97c6, 0x51f8,
01044 0x54f2, 0x5586, 0x5fb9, 0x64a4, 0x6f88, 0x7db4, 0x8f1f, 0x8fd4,
01045 0x9435, 0x50c9, 0x5c16, 0x6cbe, 0x6dfb, 0x751b, 0x77bb, 0x7c3d,
01046 0x7c64, 0x8a79, 0x8ac2, 0x581e, 0x59be, 0x5e16, 0x6377, 0x7252,
01047 0x758a, 0x776b, 0x8adc, 0x8cbe, 0x8f12, 0x5ef3, 0x6674, 0x6df8,
01048 0x807d, 0x83c1, 0x8acb, 0x9751, 0x9bd6, 0xfa00, 0x5243, 0x66ff,
01049 0x6d95, 0x6eef, 0x7de0, 0x8ae6, 0x902e, 0x905e, 0x9ad4, 0x521d,
01050 0x527f, 0x54e8, 0x6194, 0x6284, 0x62db, 0x68a2,
01051 /* 0x75 */
01052 0x6912, 0x695a, 0x6a35, 0x7092, 0x7126, 0x785d, 0x7901, 0x790e,
01053 0x79d2, 0x7a0d, 0x8096, 0x8278, 0x82d5, 0x8349, 0x8549, 0x8c82,
01054 0x8d85, 0x9162, 0x918b, 0x91ae, 0x4fc3, 0x56d1, 0x71ed, 0x77d7,
01055 0x8700, 0x89f8, 0x5bf8, 0x5fd6, 0x6751, 0x90a8, 0x53e2, 0x585a,
01056 0x5bf5, 0x60a4, 0x6181, 0x6460, 0x7e3d, 0x8070, 0x8525, 0x9283,
01057 0x64ae, 0x50ac, 0x5d14, 0x6700, 0x589c, 0x62bd, 0x63a8, 0x690e,
01058 0x6978, 0x6a1e, 0x6e6b, 0x76ba, 0x79cb, 0x82bb, 0x8429, 0x8acf,
01059 0x8da8, 0x8ff4, 0x9112, 0x914b, 0x919c, 0x9310, 0x9318, 0x939a,
01060 0x96db, 0x9a36, 0x9c0d, 0x4e11, 0x755c, 0x795d, 0x7afa, 0x7b51,
01061 0x7bc9, 0x7e2e, 0x84c4, 0x8e59, 0x8e74, 0x8ef8, 0x9010, 0x6625,
01062 0x693f, 0x7443, 0x51fa, 0x672e, 0x9edc, 0x5145, 0x5fe0, 0x6c96,
01063 0x87f2, 0x885d, 0x8877, 0x60b4, 0x81b5, 0x8403,
01064 /* 0x76 */
01065 0x8d05, 0x53d6, 0x5439, 0x5634, 0x5a36, 0x5c31, 0x708a, 0x7fe0,
01066 0x805a, 0x8106, 0x81ed, 0x8da3, 0x9189, 0x9a5f, 0x9df2, 0x5074,
01067 0x4ec4, 0x53a0, 0x60fb, 0x6e2c, 0x5c64, 0x4f88, 0x5024, 0x55e4,
01068 0x5cd9, 0x5e5f, 0x6065, 0x6894, 0x6cbb, 0x6dc4, 0x71be, 0x75d4,
01069 0x75f4, 0x7661, 0x7a1a, 0x7a49, 0x7dc7, 0x7dfb, 0x7f6e, 0x81f4,
01070 0x86a9, 0x8f1c, 0x96c9, 0x99b3, 0x9f52, 0x5247, 0x52c5, 0x98ed,
01071 0x89aa, 0x4e03, 0x67d2, 0x6f06, 0x4fb5, 0x5be2, 0x6795, 0x6c88,
01072 0x6d78, 0x741b, 0x7827, 0x91dd, 0x937c, 0x87c4, 0x79e4, 0x7a31,
01073 0x5feb, 0x4ed6, 0x54a4, 0x553e, 0x58ae, 0x59a5, 0x60f0, 0x6253,
01074 0x62d6, 0x6736, 0x6955, 0x8235, 0x9640, 0x99b1, 0x99dd, 0x502c,
01075 0x5353, 0x5544, 0x577c, 0xfa01, 0x6258, 0xfa02, 0x64e2, 0x666b,
01076 0x67dd, 0x6fc1, 0x6fef, 0x7422, 0x7438, 0x8a17,
01077 /* 0x77 */
01078 0x9438, 0x5451, 0x5606, 0x5766, 0x5f48, 0x619a, 0x6b4e, 0x7058,
01079 0x70ad, 0x7dbb, 0x8a95, 0x596a, 0x812b, 0x63a2, 0x7708, 0x803d,
01080 0x8caa, 0x5854, 0x642d, 0x69bb, 0x5b95, 0x5e11, 0x6e6f, 0xfa03,
01081 0x8569, 0x514c, 0x53f0, 0x592a, 0x6020, 0x614b, 0x6b86, 0x6c70,
01082 0x6cf0, 0x7b1e, 0x80ce, 0x82d4, 0x8dc6, 0x90b0, 0x98b1, 0xfa04,
01083 0x64c7, 0x6fa4, 0x6491, 0x6504, 0x514e, 0x5410, 0x571f, 0x8a0e,
01084 0x615f, 0x6876, 0xfa05, 0x75db, 0x7b52, 0x7d71, 0x901a, 0x5806,
01085 0x69cc, 0x817f, 0x892a, 0x9000, 0x9839, 0x5078, 0x5957, 0x59ac,
01086 0x6295, 0x900f, 0x9b2a, 0x615d, 0x7279, 0x95d6, 0x5761, 0x5a46,
01087 0x5df4, 0x628a, 0x64ad, 0x64fa, 0x6777, 0x6ce2, 0x6d3c, 0x722c,
01088 0x7436, 0x7834, 0x7f77, 0x82ad, 0x8ddb, 0x9817, 0x5224, 0x5742,
01089 0x677f, 0x7248, 0x74e3, 0x8ca9, 0x8fa6, 0x9211,
01090 /* 0x78 */
01091 0x962a, 0x516b, 0x53ed, 0x634c, 0x4f69, 0x5504, 0x6096, 0x6557,
01092 0x6c9b, 0x6d7f, 0x724c, 0x72fd, 0x7a17, 0x8987, 0x8c9d, 0x5f6d,
01093 0x6f8e, 0x70f9, 0x81a8, 0x610e, 0x4fbf, 0x504f, 0x6241, 0x7247,
01094 0x7bc7, 0x7de8, 0x7fe9, 0x904d, 0x97ad, 0x9a19, 0x8cb6, 0x576a,
01095 0x5e73, 0x67b0, 0x840d, 0x8a55, 0x5420, 0x5b16, 0x5e63, 0x5ee2,
01096 0x5f0a, 0x6583, 0x80ba, 0x853d, 0x9589, 0x965b, 0x4f48, 0x5305,
01097 0x530d, 0x530f, 0x5486, 0x54fa, 0x5703, 0x5e03, 0x6016, 0x629b,
01098 0x62b1, 0x6355, 0xfa06, 0x6ce1, 0x6d66, 0x75b1, 0x7832, 0x80de,
01099 0x812f, 0x82de, 0x8461, 0x84b2, 0x888d, 0x8912, 0x900b, 0x92ea,
01100 0x98fd, 0x9b91, 0x5e45, 0x66b4, 0x66dd, 0x7011, 0x7206, 0xfa07,
01101 0x4ff5, 0x527d, 0x5f6a, 0x6153, 0x6753, 0x6a19, 0x6f02, 0x74e2,
01102 0x7968, 0x8868, 0x8c79, 0x98c7, 0x98c4, 0x9a43,
01103 /* 0x79 */
01104 0x54c1, 0x7a1f, 0x6953, 0x8af7, 0x8c4a, 0x98a8, 0x99ae, 0x5f7c,
01105 0x62ab, 0x75b2, 0x76ae, 0x88ab, 0x907f, 0x9642, 0x5339, 0x5f3c,
01106 0x5fc5, 0x6ccc, 0x73cc, 0x7562, 0x758b, 0x7b46, 0x82fe, 0x999d,
01107 0x4e4f, 0x903c, 0x4e0b, 0x4f55, 0x53a6, 0x590f, 0x5ec8, 0x6630,
01108 0x6cb3, 0x7455, 0x8377, 0x8766, 0x8cc0, 0x9050, 0x971e, 0x9c15,
01109 0x58d1, 0x5b78, 0x8650, 0x8b14, 0x9db4, 0x5bd2, 0x6068, 0x608d,
01110 0x65f1, 0x6c57, 0x6f22, 0x6fa3, 0x701a, 0x7f55, 0x7ff0, 0x9591,
01111 0x9592, 0x9650, 0x97d3, 0x5272, 0x8f44, 0x51fd, 0x542b, 0x54b8,
01112 0x5563, 0x558a, 0x6abb, 0x6db5, 0x7dd8, 0x8266, 0x929c, 0x9677,
01113 0x9e79, 0x5408, 0x54c8, 0x76d2, 0x86e4, 0x95a4, 0x95d4, 0x965c,
01114 0x4ea2, 0x4f09, 0x59ee, 0x5ae6, 0x5df7, 0x6052, 0x6297, 0x676d,
01115 0x6841, 0x6c86, 0x6e2f, 0x7f38, 0x809b, 0x822a,
01116 /* 0x7a */
01117 0xfa08, 0xfa09, 0x9805, 0x4ea5, 0x5055, 0x54b3, 0x5793, 0x595a,
01118 0x5b69, 0x5bb3, 0x61c8, 0x6977, 0x6d77, 0x7023, 0x87f9, 0x89e3,
01119 0x8a72, 0x8ae7, 0x9082, 0x99ed, 0x9ab8, 0x52be, 0x6838, 0x5016,
01120 0x5e78, 0x674f, 0x8347, 0x884c, 0x4eab, 0x5411, 0x56ae, 0x73e6,
```

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01121 0x9115, 0x97ff, 0x9909, 0x9957, 0x9999, 0x5653, 0x589f, 0x865b,
01122 0x8a31, 0x61b2, 0x6af6, 0x737b, 0x8ed2, 0x6b47, 0x96aa, 0x9a57,
01123 0x5955, 0x7200, 0x8d6b, 0x9769, 0x4fd4, 0x5cf4, 0x5f26, 0x61f8,
01124 0x665b, 0x6ceb, 0x70ab, 0x7384, 0x73b9, 0x73fe, 0x7729, 0x774d,
01125 0x7d43, 0x7d62, 0x7e23, 0x8237, 0x8852, 0xfa0a, 0x8ce2, 0x9249,
01126 0x986f, 0x5b51, 0x7a74, 0x8840, 0x9801, 0x5acc, 0x4fe0, 0x5354,
01127 0x593e, 0x5cfd, 0x633e, 0x6d79, 0x72f9, 0x8105, 0x8107, 0x83a2,
01128 0x92cf, 0x9830, 0x4ea8, 0x5144, 0x5211, 0x578b,
01129 /* 0x7b */
01130 0x5f62, 0x6cc2, 0x6ece, 0x7005, 0x7050, 0x70af, 0x7192, 0x73e9,
01131 0x7469, 0x834a, 0x87a2, 0x8861, 0x9008, 0x90a2, 0x93a3, 0x99a8,
01132 0x516e, 0x5f57, 0x60e0, 0x6167, 0x66b3, 0x8559, 0x8e4a, 0x91af,
01133 0x978b, 0x4e4e, 0x4e92, 0x547c, 0x58d5, 0x58fa, 0x597d, 0x5cb5,
01134 0x5f27, 0x6236, 0x6248, 0x660a, 0x6667, 0x6beb, 0x6d69, 0x6dcf,
01135 0x6e56, 0x6ef8, 0x6f94, 0x6fe0, 0x6fe9, 0x705d, 0x72d0, 0x7425,
01136 0x745a, 0x74e0, 0x7693, 0x795c, 0x7cca, 0x7ele, 0x80e1, 0x82a6,
01137 0x846b, 0x84bf, 0x864e, 0x865f, 0x8774, 0x8b77, 0x8c6a, 0x93ac,
01138 0x9800, 0x9865, 0x60d1, 0x6216, 0x9177, 0x5a5a, 0x660f, 0x6df7,
01139 0x6e3e, 0x743f, 0x9b42, 0x5ffd, 0x60da, 0x7b0f, 0x54c4, 0x5f18,
01140 0x6c5e, 0x6cd3, 0x6d2a, 0x70d8, 0x7d05, 0x8679, 0x8a0c, 0x9d3b,
01141 0x5316, 0x548c, 0x5b05, 0x6a3a, 0x706b, 0x7575,
01142 /* 0x7c */
01143 0x798d, 0x79be, 0x82b1, 0x83ef, 0x8a71, 0x8b41, 0x8ca8, 0x9774,
01144 0xfa0b, 0x64f4, 0x652b, 0x78ba, 0x78bb, 0x7a6b, 0x4e38, 0x559a,
01145 0x5950, 0x5ba6, 0x5e7b, 0x60a3, 0x63db, 0x6b61, 0x6665, 0x6853,
01146 0x6e19, 0x7165, 0x74b0, 0x7d08, 0x9084, 0x9a69, 0x9c25, 0x6d3b,
01147 0x6ed1, 0x733e, 0x8c41, 0x95ca, 0x51f0, 0x5e4c, 0x5fa8, 0x604d,
01148 0x60f6, 0x6130, 0x614c, 0x6643, 0x6644, 0x69a5, 0x6cc1, 0x6e5f,
01149 0x6ec9, 0x6f62, 0x714c, 0x749c, 0x7687, 0x7bc1, 0x7c27, 0x8352,
01150 0x8757, 0x733e, 0x968d, 0x9ec3, 0x532f, 0x56de, 0x5efb, 0x5f8a,
01151 0x6062, 0x6094, 0x61f7, 0x6666, 0x6703, 0x6a9c, 0x6dee, 0x6fae,
01152 0x7070, 0x736a, 0x7e6a, 0x81be, 0x8334, 0x86d4, 0x8aa8, 0x8cc4,
01153 0x5283, 0x7372, 0x5b96, 0x6a6b, 0x9404, 0x54ee, 0x5686, 0x5b5d,
01154 0x6548, 0x6585, 0x66c9, 0x689f, 0x6d8d, 0x6dc6,
01155 /* 0x7d */
01156 0x723b, 0x80b4, 0x9175, 0x9a4d, 0x4faf, 0x5019, 0x539a, 0x540e,
01157 0x543c, 0x5589, 0x55c5, 0x5e3f, 0x5f8c, 0x673d, 0x7166, 0x73dd,
01158 0x9005, 0x52db, 0x52f3, 0x5864, 0x58ce, 0x7104, 0x718f, 0x71fb,
01159 0x85b0, 0x8a13, 0x6688, 0x85a8, 0x55a7, 0x6684, 0x714a, 0x8431,
01160 0x5349, 0x5599, 0x6bc1, 0x5f59, 0x5fbd, 0x63ee, 0x6689, 0x7147,
01161 0x8af1, 0x8f1d, 0x9ebe, 0x4f11, 0x643a, 0x70cb, 0x7566, 0x8667,
01162 0x6064, 0x8b4e, 0x9df8, 0x5147, 0x51f6, 0x5308, 0x6d36, 0x80f8,
01163 0x9ed1, 0x6615, 0x6b23, 0x7098, 0x75d5, 0x5403, 0x5c79, 0x7d07,
01164 0x8a16, 0x6b20, 0x6b3d, 0x6b46, 0x5438, 0x6070, 0x6d3d, 0x7fd5,
01165 0x8208, 0x50d6, 0x51de, 0x559c, 0x566b, 0x56cd, 0x59ec, 0x5b09,
01166 0x5e0c, 0x6199, 0x6198, 0x6231, 0x665e, 0x66e6, 0x7199, 0x71b9,
01167 0x71ba, 0x72a7, 0x79a7, 0x7a00, 0x7fb2, 0x8a70,
01168 };
01169
01170 static int
01171 ksc5601_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
01172 {
01173     unsigned char c1 = (s[0] & 0x7F);
01174     if ((c1 >= 0x21 && c1 <= 0x2c) || (c1 >= 0x30 && c1 <= 0x48) || (c1 >= 0x4a && c1 <= 0x7d)) {
01175         if (n >= 2) {
01176             unsigned char c2 = (s[1] & 0x7F);
01177             if (c2 >= 0x21 && c2 < 0x7f) {
01178                 unsigned int i = 94 * (c1 - 0x21) + (c2 - 0x21);
01179                 unsigned short wc = 0xffff;
01180                 if (i < 1410) {
01181                     if (i < 1115)
01182                         wc = ksc5601_2uni_page21[i];
01183                     else if (i < 3854) {
01184                         if (i < 3760)
01185                             wc = ksc5601_2uni_page30[i-1410];
01186                     } else {
01187                         if (i < 8742)
01188                             wc = ksc5601_2uni_page4a[i-3854];
01189                     }
01190                 } if (wc != 0xffff) {
01191                     *pwc = (ucs4_t) wc;
01192                     return 2;
01193                 }
01194             }
01195             return RET_ILSEQ;
01196         }
01197         return RET_TOOFEW(0);
01198     }
01199     return RET_ILSEQ;
01200 }
01201 #endif /* NEED_TOWC */
01202
01203 #ifndef NEED_TOMB
01204 static const unsigned short ksc5601_2charset[8224] = {
01205     0x222e, 0x2234, 0x2157, 0x2127, 0x2823, 0x2129, 0x2146, 0x213e,
01206     0x2977, 0x2978, 0x2225, 0x2252, 0x2124, 0x222c, 0x2976, 0x282c,
01207     0x2879, 0x2876, 0x287a, 0x222f, 0x2821, 0x2822, 0x213f, 0x282a,

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01208 0x282d, 0x292c, 0x2921, 0x2923, 0x2140, 0x292a, 0x292d, 0x2922,
01209 0x2824, 0x2924, 0x2925, 0x2826, 0x2926, 0x2927, 0x2828, 0x2928,
01210 0x2829, 0x2929, 0x2930, 0x282f, 0x292f, 0x282b, 0x292b, 0x282e,
01211 0x292e, 0x2227, 0x2230, 0x2228, 0x222b, 0x222a, 0x222d, 0x2229,
01212 0x2541, 0x2542, 0x2543, 0x2544, 0x2545, 0x2546, 0x2547, 0x2548,
01213 0x2549, 0x254a, 0x254b, 0x254c, 0x254d, 0x254e, 0x254f, 0x2550,
01214 0x2551, 0x2552, 0x2553, 0x2554, 0x2555, 0x2556, 0x2557, 0x2558,
01215 0x2561, 0x2562, 0x2563, 0x2564, 0x2565, 0x2566, 0x2567, 0x2568,
01216 0x2569, 0x256a, 0x256b, 0x256c, 0x256d, 0x256e, 0x256f, 0x2570,
01217 0x2571, 0x2572, 0x2573, 0x2574, 0x2575, 0x2576, 0x2577, 0x2578,
01218 0x2c27, 0x2c21, 0x2c22, 0x2c23, 0x2c24, 0x2c25, 0x2c26, 0x2c28,
01219 0x2c29, 0x2c2a, 0x2c2b, 0x2c2c, 0x2c2d, 0x2c2e, 0x2c2f, 0x2c30,
01220 0x2c31, 0x2c32, 0x2c33, 0x2c34, 0x2c35, 0x2c36, 0x2c37, 0x2c38,
01221 0x2c39, 0x2c3a, 0x2c3b, 0x2c3c, 0x2c3d, 0x2c3e, 0x2c3f, 0x2c40,
01222 0x2c41, 0x2c51, 0x2c52, 0x2c53, 0x2c54, 0x2c55, 0x2c56, 0x2c58,
01223 0x2c59, 0x2c5a, 0x2c5b, 0x2c5c, 0x2c5d, 0x2c5e, 0x2c5f, 0x2c60,
01224 0x2c61, 0x2c62, 0x2c63, 0x2c64, 0x2c65, 0x2c66, 0x2c67, 0x2c68,
01225 0x2c69, 0x2c6a, 0x2c6b, 0x2c6c, 0x2c6d, 0x2c6e, 0x2c6f, 0x2c70,
01226 0x2c71, 0x2c57, 0x212a, 0x212e, 0x212f, 0x2130, 0x2131, 0x2253,
01227 0x2254, 0x2125, 0x2126, 0x2236, 0x2147, 0x2148, 0x2158, 0x2979,
01228 0x297a, 0x297b, 0x297c, 0x297d, 0x297e, 0x2149, 0x2235, 0x2724,
01229 0x2260, 0x2265, 0x2262, 0x2759, 0x214a, 0x2877, 0x2878, 0x287b,
01230 0x287c, 0x287d, 0x287e, 0x2530, 0x2531, 0x2532, 0x2533, 0x2534,
01231 0x2535, 0x2536, 0x2537, 0x2538, 0x2539, 0x253a, 0x2522, 0x2523,
01232 0x2524, 0x2525, 0x2526, 0x2527, 0x2528, 0x2529, 0x252a, 0x2167,
01233 0x2168, 0x2166, 0x2169, 0x216a, 0x2255, 0x2258, 0x2256, 0x2259,
01234 0x2257, 0x2221, 0x2222, 0x2223, 0x2153, 0x2224, 0x2154, 0x2174,
01235 0x2175, 0x2233, 0x2232, 0x216e, 0x2170, 0x2144, 0x2150, 0x212b,
01236 0x217c, 0x217d, 0x217b, 0x217a, 0x2172, 0x2173, 0x2231, 0x2145,
01237 0x2171, 0x212d, 0x212c, 0x216f, 0x2156, 0x2141, 0x2155, 0x2142, 0x2143,
01238 0x216c, 0x216d, 0x2178, 0x2179, 0x2176, 0x2177, 0x2241, 0x2151,
01239 0x2152, 0x2867, 0x2868, 0x2869, 0x286a, 0x286b, 0x286c, 0x286d,
01240 0x286e, 0x286f, 0x2870, 0x2871, 0x2872, 0x2873, 0x2874, 0x2875,
01241 0x2967, 0x2968, 0x2969, 0x296a, 0x296b, 0x296c, 0x296d, 0x296e,
01242 0x296f, 0x2970, 0x2971, 0x2972, 0x2973, 0x2974, 0x2975, 0x294d,
01243 0x294e, 0x294f, 0x2950, 0x2951, 0x2952, 0x2953, 0x2954, 0x2955,
01244 0x2956, 0x2957, 0x2958, 0x2959, 0x295a, 0x295b, 0x295c, 0x295d,
01245 0x295e, 0x295f, 0x2960, 0x2961, 0x2962, 0x2963, 0x2964, 0x2965,
01246 0x2966, 0x284d, 0x284e, 0x284f, 0x2850, 0x2851, 0x2852, 0x2853,
01247 0x2854, 0x2855, 0x2856, 0x2857, 0x2858, 0x2859, 0x285a, 0x285b,
01248 0x285c, 0x285d, 0x285e, 0x285f, 0x2860, 0x2861, 0x2862, 0x2863,
01249 0x2864, 0x2865, 0x2866, 0x2621, 0x262c, 0x2622, 0x262d, 0x2623,
01250 0x2648, 0x2647, 0x262e, 0x2624, 0x2642, 0x2641, 0x262f, 0x2626,
01251 0x2646, 0x2645, 0x2631, 0x2625, 0x2644, 0x2643, 0x2630, 0x2627,
01252 0x263c, 0x2649, 0x264a, 0x2637, 0x264b, 0x264c, 0x2632, 0x2629,
01253 0x263e, 0x264d, 0x264e, 0x2639, 0x264f, 0x2650, 0x2634, 0x2628,
01254 0x2651, 0x2652, 0x2638, 0x263d, 0x2653, 0x2654, 0x2633, 0x262a,
01255 0x2655, 0x2656, 0x263a, 0x263f, 0x2657, 0x2658, 0x2635, 0x262b,
01256 0x2659, 0x265a, 0x263b, 0x265b, 0x265c, 0x2640, 0x265d, 0x265e,
01257 0x265f, 0x2660, 0x2661, 0x2662, 0x2663, 0x2664, 0x2636, 0x2246,
01258 0x2161, 0x2160, 0x2243, 0x2247, 0x2248, 0x224b, 0x224a, 0x2249,
01259 0x224c, 0x2163, 0x2162, 0x223a, 0x2239, 0x2165, 0x2164, 0x2238,
01260 0x2237, 0x215f, 0x215e, 0x2242, 0x215b, 0x215d, 0x215c, 0x2244,
01261 0x2245, 0x215a, 0x2159, 0x224f, 0x224e, 0x2250, 0x2251, 0x214f,
01262 0x214e, 0x223c, 0x223d, 0x2240, 0x223b, 0x223e, 0x223f, 0x224d,
01263 0x225b, 0x225c, 0x225d, 0x225a, 0x2121, 0x2122, 0x2123, 0x2128,
01264 0x2134, 0x2135, 0x2136, 0x2137, 0x2138, 0x2139, 0x213a, 0x213b,
01265 0x213c, 0x213d, 0x216b, 0x2132, 0x2133, 0x2a21, 0x2a22, 0x2a23,
01266 0x2a24, 0x2a25, 0x2a26, 0x2a27, 0x2a28, 0x2a29, 0x2a2a, 0x2a2b,
01267 0x2a2c, 0x2a2d, 0x2a2e, 0x2a2f, 0x2a30, 0x2a31, 0x2a32, 0x2a33,
01268 0x2a34, 0x2a35, 0x2a36, 0x2a37, 0x2a38, 0x2a39, 0x2a3a, 0x2a3b,
01269 0x2a3c, 0x2a3d, 0x2a3e, 0x2a3f, 0x2a40, 0x2a41, 0x2a42, 0x2a43,
01270 0x2a44, 0x2a45, 0x2a46, 0x2a47, 0x2a48, 0x2a49, 0x2a4a, 0x2a4b,
01271 0x2a4c, 0x2a4d, 0x2a4e, 0x2a4f, 0x2a50, 0x2a51, 0x2a52, 0x2a53,
01272 0x2a54, 0x2a55, 0x2a56, 0x2a57, 0x2a58, 0x2a59, 0x2a5a, 0x2a5b,
01273 0x2a5c, 0x2a5d, 0x2a5e, 0x2a5f, 0x2a60, 0x2a61, 0x2a62, 0x2a63,
01274 0x2a64, 0x2a65, 0x2a66, 0x2a67, 0x2a68, 0x2a69, 0x2a6a, 0x2a6b,
01275 0x2a6c, 0x2a6d, 0x2a6e, 0x2a6f, 0x2a70, 0x2a71, 0x2a72, 0x2a73,
01276 0x2b21, 0x2b22, 0x2b23, 0x2b24, 0x2b25, 0x2b26, 0x2b27, 0x2b28,
01277 0x2b29, 0x2b2a, 0x2b2b, 0x2b2c, 0x2b2d, 0x2b2e, 0x2b2f, 0x2b30,
01278 0x2b31, 0x2b32, 0x2b33, 0x2b34, 0x2b35, 0x2b36, 0x2b37, 0x2b38,
01279 0x2b39, 0x2b3a, 0x2b3b, 0x2b3c, 0x2b3d, 0x2b3e, 0x2b3f, 0x2b40,
01280 0x2b41, 0x2b42, 0x2b43, 0x2b44, 0x2b45, 0x2b46, 0x2b47, 0x2b48,
01281 0x2b49, 0x2b4a, 0x2b4b, 0x2b4c, 0x2b4d, 0x2b4e, 0x2b4f, 0x2b50,
01282 0x2b51, 0x2b52, 0x2b53, 0x2b54, 0x2b55, 0x2b56, 0x2b57, 0x2b58,
01283 0x2b59, 0x2b5a, 0x2b5b, 0x2b5c, 0x2b5d, 0x2b5e, 0x2b5f, 0x2b60,
01284 0x2b61, 0x2b62, 0x2b63, 0x2b64, 0x2b65, 0x2b66, 0x2b67, 0x2b68,
01285 0x2b69, 0x2b6a, 0x2b6b, 0x2b6c, 0x2b6d, 0x2b6e, 0x2b6f, 0x2b70,
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02231 0x2375, 0x2376, 0x2377, 0x2378, 0x2379, 0x237a, 0x237b, 0x237c,
02232 0x237d, 0x2226, 0x214b, 0x214c, 0x217e, 0x237e, 0x214d, 0x235c,
02233 };
02234
02235 static const Summary16 ksc5601_uni2indx_page00[70] = {
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02237 { 0, 0x0000 }, { 0, 0x0000 }, { 0, 0x0000 }, { 0, 0x0000 },
02238 { 0, 0x0000 }, { 0, 0x0000 }, { 0, 0x0000 }, { 0, 0x0000 },
02239 { 0, 0x0000 }, { 0, 0x0000 }, { 0, 0x2592 }, { 6, 0xf7df },
02240 { 20, 0x0040 }, { 21, 0xc181 }, { 26, 0x0040 }, { 27, 0x4181 },
02241 /* 0x0100 */
02242 { 31, 0x0000 }, { 31, 0x0002 }, { 32, 0x00c0 }, { 34, 0x810e },
02243 { 39, 0x0e07 }, { 45, 0x000c }, { 47, 0x00c0 }, { 49, 0x0000 },
02244 { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 },
02245 { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 },
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02248 { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 },
02249 { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 }, { 49, 0x0000 },
02250 { 49, 0x0080 }, { 50, 0x2f01 }, { 56, 0x0000 }, { 56, 0x0000 },
02251 /* 0x0300 */

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02253 { 56, 0x0000 }, { 56, 0x0000 }, { 56, 0x0000 }, { 56, 0x0000 },
02254 { 56, 0x0000 }, { 56, 0xffff }, { 71, 0x03fb }, { 80, 0xffff },
02255 { 95, 0x03fb }, { 104, 0x0000 }, { 104, 0x0000 }, { 104, 0x0000 },
02256 /* 0x0400 */
02257 { 104, 0x0002 }, { 105, 0xffff }, { 121, 0xffff }, { 137, 0xffff },
02258 { 153, 0xffff }, { 169, 0x0002 },
02259 };
02260 static const Summary16 ksc5601_uni2indx_page20[103] = {
02261 /* 0x2000 */
02262 { 170, 0x0000 }, { 170, 0x3320 }, { 175, 0x0063 }, { 179, 0x080d },
02263 { 183, 0x0000 }, { 183, 0x0000 }, { 183, 0x0000 }, { 183, 0x8010 },
02264 { 185, 0x001e }, { 189, 0x0000 }, { 189, 0x0000 }, { 189, 0x0000 },
02265 { 189, 0x0000 }, { 189, 0x0000 }, { 189, 0x0000 }, { 189, 0x0000 },
02266 /* 0x2100 */
02267 { 189, 0x0208 }, { 191, 0x0048 }, { 193, 0x0846 }, { 197, 0x0000 },
02268 { 197, 0x0000 }, { 197, 0x7818 }, { 203, 0x03ff }, { 213, 0x03ff },
02269 { 223, 0x0000 }, { 223, 0x03ff }, { 233, 0x0000 }, { 233, 0x0000 },
02270 { 233, 0x0000 }, { 233, 0x0014 }, { 235, 0x0000 }, { 235, 0x0000 },
02271 /* 0x2200 */
02272 { 235, 0x898d }, { 242, 0x6402 }, { 246, 0x5fa1 }, { 255, 0x3030 },
02273 { 259, 0x0000 }, { 259, 0x0004 }, { 260, 0x0c33 }, { 266, 0x0000 },
02274 { 266, 0x00cc }, { 270, 0x0200 }, { 271, 0x0020 }, { 272, 0x0000 },
02275 { 272, 0x0000 }, { 272, 0x0000 }, { 272, 0x0000 }, { 272, 0x0000 },
02276 /* 0x2300 */
02277 { 272, 0x0000 }, { 272, 0x0004 }, { 273, 0x0000 }, { 273, 0x0000 },
02278 { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 },
02279 { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 },
02280 { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 },
02281 /* 0x2400 */
02282 { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x0000 },
02283 { 273, 0x0000 }, { 273, 0x0000 }, { 273, 0x7fff }, { 288, 0xffff },
02284 { 300, 0x0007 }, { 303, 0xf000 }, { 307, 0xffff }, { 323, 0x003f },
02285 { 329, 0x0000 }, { 329, 0xffff }, { 345, 0x03ff }, { 355, 0x0000 },
02286 /* 0x2500 */
02287 { 355, 0xf00f }, { 363, 0xffff }, { 379, 0xffff }, { 395, 0xffff },
02288 { 411, 0x0fff }, { 423, 0x0000 }, { 423, 0x0000 }, { 423, 0x0000 },
02289 { 423, 0x0000 }, { 423, 0x0004 }, { 424, 0x03fb }, { 433, 0x30cc },
02290 { 439, 0xc9c3 }, { 447, 0x0003 }, { 449, 0x0000 }, { 449, 0x0000 },
02291 /* 0x2600 */
02292 { 449, 0xc060 }, { 453, 0x5000 }, { 455, 0x0000 }, { 455, 0x0000 },
02293 { 455, 0x0005 }, { 457, 0x0000 }, { 457, 0x37bb },
02294 };
02295 static const Summary16 ksc5601_uni2indx_page30[62] = {
02296 /* 0x3000 */
02297 { 468, 0xff0f }, { 480, 0x003b }, { 485, 0x0000 }, { 485, 0x0000 },
02298 { 485, 0xffff }, { 500, 0xffff }, { 516, 0xffff }, { 532, 0xffff },
02299 { 548, 0xffff }, { 564, 0x000f }, { 568, 0xffff }, { 583, 0xffff },
02300 { 599, 0xffff }, { 615, 0xffff }, { 631, 0xffff }, { 647, 0x007f },
02301 /* 0x3100 */
02302 { 654, 0x0000 }, { 654, 0x0000 }, { 654, 0x0000 }, { 654, 0xffff },
02303 { 669, 0xffff }, { 685, 0xffff }, { 701, 0xffff }, { 717, 0xffff },
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02306 /* 0x3200 */
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02311 /* 0x3300 */
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02313 { 806, 0x0000 }, { 806, 0x0000 }, { 806, 0x0000 }, { 806, 0x0000 },
02314 { 806, 0xff1f }, { 819, 0xffff }, { 835, 0xffff }, { 851, 0xffff },
02315 { 867, 0x87ff }, { 879, 0x3949 },
02316 };
02317 static const Summary16 ksc5601_uni2indx_page4e[1306] = {
02318 /* 0x4e00 */
02319 { 886, 0x2f8b }, { 895, 0x4372 }, { 902, 0x2000 }, { 903, 0x0b04 },
02320 { 907, 0xe82c }, { 914, 0xe340 }, { 920, 0x2800 }, { 922, 0x40c8 },
02321 { 926, 0x5944 }, { 932, 0x4937 }, { 940, 0x7976 }, { 950, 0x0440 },
02322 { 952, 0x2c93 }, { 959, 0xa3f0 }, { 967, 0x0038 }, { 970, 0x08c5 },
02323 /* 0x4f00 */
02324 { 975, 0xee02 }, { 982, 0x0003 }, { 984, 0x8000 }, { 985, 0x3550 },
02325 { 991, 0xe1c8 }, { 998, 0x1e23 }, { 1005, 0x8200 }, { 1007, 0xc449 },
02326 { 1013, 0xad5a }, { 1022, 0x2942 }, { 1027, 0xc000 }, { 1029, 0x8060 },
02327 { 1032, 0x461c }, { 1038, 0xa49a }, { 1045, 0xc003 }, { 1049, 0x052a },
02328 /* 0x5000 */
02329 { 1054, 0x2a44 }, { 1059, 0xd646 }, { 1067, 0x3dda }, { 1077, 0x0800 },
02330 { 1078, 0x8388 }, { 1083, 0x1420 }, { 1086, 0x0020 }, { 1087, 0x0170 },
02331 { 1091, 0x2021 }, { 1094, 0x0302 }, { 1097, 0x3000 }, { 1099, 0x40ac },
02332 { 1104, 0x8620 }, { 1108, 0x4462 }, { 1113, 0x20a0 }, { 1116, 0x8a00 },
02333 /* 0x5100 */
02334 { 1119, 0x0253 }, { 1124, 0x8004 }, { 1126, 0x0402 }, { 1128, 0x1484 },
02335 { 1132, 0x7bfb }, { 1145, 0x1004 }, { 1147, 0x7fa4 }, { 1157, 0x11e2 },
02336 { 1163, 0x2441 }, { 1167, 0x00a4 }, { 1170, 0x1421 }, { 1174, 0x20c0 },
02337 { 1177, 0x3a50 }, { 1183, 0x7000 }, { 1186, 0x0002 }, { 1187, 0x2743 },
02338 /* 0x5200 */

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02339 { 1194, 0x45c9 }, { 1201, 0x2082 }, { 1204, 0x4630 }, { 1209, 0x0fc1 },
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02341 { 1234, 0x2388 }, { 1239, 0x8806 }, { 1243, 0x0e19 }, { 1249, 0x4000 },
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02829 /* 0xc000 */
02830 { 6595, 0x0000 }, { 6595, 0x0000 }, { 6595, 0x0000 }, { 6595, 0x1000 },
02831 { 6596, 0x0000 }, { 6596, 0x1102 }, { 6599, 0x0301 }, { 6602, 0x0000 },
02832 { 6602, 0x0000 }, { 6602, 0x0113 }, { 6606, 0xb02b }, { 6613, 0xb079 },
02833 { 6621, 0x1323 }, { 6627, 0x3b01 }, { 6633, 0x1130 }, { 6637, 0x02b0 },
02834 /* 0xc100 */
02835 { 6641, 0x0111 }, { 6644, 0xf021 }, { 6650, 0xb0d9 }, { 6658, 0x1343 },
02836 { 6664, 0x3b01 }, { 6670, 0x1130 }, { 6674, 0x03b0 }, { 6679, 0x0111 },
02837 { 6682, 0x7020 }, { 6686, 0xb051 }, { 6692, 0x1322 }, { 6697, 0x2001 },
02838 { 6699, 0x1110 }, { 6702, 0x0190 }, { 6705, 0x0111 }, { 6708, 0x300b },
02839 /* 0xc200 */
02840 { 6713, 0xb011 }, { 6718, 0x9302 }, { 6723, 0xab01 }, { 6729, 0x0016 },
02841 { 6732, 0x0100 }, { 6733, 0x0113 }, { 6737, 0x3021 }, { 6741, 0xb011 },
02842 { 6746, 0x0302 }, { 6749, 0x2901 }, { 6753, 0x3130 }, { 6758, 0x02b0 },
02843 { 6762, 0x0000 }, { 6762, 0x3000 }, { 6764, 0xb819 }, { 6771, 0x1b42 },
02844 /* 0xc300 */
02845 { 6777, 0x3301 }, { 6782, 0x1138 }, { 6787, 0x0330 }, { 6791, 0x0000 },
02846 { 6791, 0x0020 }, { 6792, 0x0000 }, { 6792, 0x1300 }, { 6795, 0x3305 },
02847 { 6801, 0x1110 }, { 6804, 0x0000 }, { 6804, 0x0000 }, { 6804, 0x0000 },
02848 { 6804, 0x0001 }, { 6805, 0x9300 }, { 6809, 0x2305 }, { 6814, 0x0130 },
02849 /* 0xc400 */
02850 { 6817, 0x0100 }, { 6818, 0x0001 }, { 6819, 0x1010 }, { 6821, 0x3011 },
02851 { 6825, 0x0100 }, { 6826, 0x0000 }, { 6826, 0x1130 }, { 6830, 0x0230 },
02852 { 6833, 0x0001 }, { 6834, 0x1010 }, { 6836, 0x0000 }, { 6836, 0x1100 },
02853 { 6838, 0x0000 }, { 6838, 0x0000 }, { 6838, 0x0200 }, { 6839, 0x8513 },
02854 /* 0xc500 */
02855 { 6845, 0x1003 }, { 6848, 0x1011 }, { 6851, 0x1300 }, { 6854, 0x2b01 },
02856 { 6859, 0x7730 }, { 6867, 0x63b8 }, { 6875, 0x0113 }, { 6879, 0x303b },
02857 { 6886, 0xb091 }, { 6892, 0x11a2 }, { 6897, 0x0201 }, { 6899, 0x7b30 },
02858 { 6907, 0x57f0 }, { 6916, 0x0113 }, { 6920, 0x702b }, { 6927, 0xf0d1 },
02859 /* 0xc600 */
02860 { 6935, 0x11e3 }, { 6942, 0x1b01 }, { 6947, 0x7130 }, { 6953, 0x0ab9 },
```

```

02861 { 6960, 0x0113 }, { 6964, 0x303b }, { 6971, 0x9001 }, { 6974, 0x1302 },
02862 { 6978, 0x2b01 }, { 6983, 0x1130 }, { 6987, 0x02b0 }, { 6991, 0x0713 },
02863 { 6997, 0x302b }, { 7003, 0x3011 }, { 7007, 0x1303 }, { 7012, 0x2301 },
02864 /* 0xc700 */
02865 { 7016, 0x1130 }, { 7020, 0x02b0 }, { 7024, 0x0113 }, { 7028, 0x30ab },
02866 { 7035, 0xb411 }, { 7041, 0x11fe }, { 7050, 0x0901 }, { 7053, 0x7130 },
02867 { 7059, 0x47b8 }, { 7067, 0x05d3 }, { 7074, 0x307b }, { 7082, 0xb011 },
02868 { 7087, 0x5303 }, { 7093, 0x2101 }, { 7096, 0x1110 }, { 7099, 0x0000 },
02869 /* 0xc800 */
02870 { 7099, 0x0513 }, { 7104, 0x306b }, { 7111, 0xb011 }, { 7116, 0x1102 },
02871 { 7119, 0x3301 }, { 7124, 0x0010 }, { 7125, 0x0000 }, { 7125, 0x0513 },
02872 { 7130, 0x38eb }, { 7139, 0xa010 }, { 7142, 0x0102 }, { 7144, 0x3000 },
02873 { 7146, 0x1110 }, { 7149, 0x02b0 }, { 7153, 0x0013 }, { 7156, 0x3020 },
02874 /* 0xc900 */
02875 { 7159, 0xb071 }, { 7166, 0x0102 }, { 7168, 0x1000 }, { 7169, 0x0010 },
02876 { 7170, 0x0000 }, { 7170, 0x0113 }, { 7174, 0x100b }, { 7178, 0x1011 },
02877 { 7181, 0x1300 }, { 7184, 0x2b01 }, { 7189, 0x0000 }, { 7189, 0x0000 },
02878 { 7189, 0x0593 }, { 7195, 0x366b }, { 7204, 0xb095 }, { 7211, 0x1303 },
02879 /* 0xca00 */
02880 { 7216, 0x3b01 }, { 7222, 0x0110 }, { 7224, 0x0200 }, { 7225, 0x0000 },
02881 { 7225, 0x3000 }, { 7227, 0xb011 }, { 7232, 0x0103 }, { 7235, 0x2000 },
02882 { 7236, 0x0010 }, { 7237, 0x0100 }, { 7238, 0x0000 }, { 7238, 0x3000 },
02883 { 7240, 0xb011 }, { 7245, 0x030a }, { 7249, 0x1001 }, { 7251, 0x0010 },
02884 /* 0xcb00 */
02885 { 7252, 0x0100 }, { 7253, 0x0111 }, { 7256, 0x0003 }, { 7258, 0x0000 },
02886 { 7258, 0x1302 }, { 7262, 0x2301 }, { 7266, 0x0010 }, { 7267, 0x0300 },
02887 { 7269, 0x0000 }, { 7269, 0x1000 }, { 7270, 0x0000 }, { 7270, 0x0100 },
02888 { 7271, 0x0000 }, { 7271, 0x0010 }, { 7272, 0x0290 }, { 7275, 0x0000 },
02889 /* 0xcc00 */
02890 { 7275, 0x3000 }, { 7277, 0x3011 }, { 7281, 0x5386 }, { 7288, 0x7b01 },
02891 { 7295, 0x1130 }, { 7299, 0x03b0 }, { 7304, 0x0151 }, { 7308, 0x0021 },
02892 { 7310, 0x0000 }, { 7310, 0x1300 }, { 7313, 0x3b01 }, { 7319, 0x1130 },
02893 { 7323, 0x02b0 }, { 7327, 0x0011 }, { 7329, 0x1010 }, { 7331, 0x0001 },
02894 /* 0xcd00 */
02895 { 7332, 0x1302 }, { 7336, 0x2b01 }, { 7341, 0x1110 }, { 7344, 0x0200 },
02896 { 7345, 0x0000 }, { 7345, 0x1000 }, { 7346, 0xb011 }, { 7351, 0x0102 },
02897 { 7353, 0x0100 }, { 7354, 0x1130 }, { 7358, 0x02b0 }, { 7362, 0x0001 },
02898 { 7363, 0x1010 }, { 7365, 0x0001 }, { 7366, 0x1100 }, { 7368, 0x2b01 },
02899 /* 0xce00 */
02900 { 7373, 0x1110 }, { 7376, 0x0210 }, { 7378, 0x0113 }, { 7382, 0x002b },
02901 { 7386, 0x0000 }, { 7386, 0x9300 }, { 7390, 0x2b03 }, { 7396, 0x1130 },
02902 { 7400, 0x02b0 }, { 7404, 0x0113 }, { 7408, 0x303b }, { 7415, 0x0000 },
02903 { 7415, 0x0002 }, { 7416, 0x0000 }, { 7416, 0x1930 }, { 7421, 0x03b0 },
02904 /* 0xcf00 */
02905 { 7426, 0x0113 }, { 7430, 0x102b }, { 7435, 0xb011 }, { 7440, 0x0103 },
02906 { 7443, 0x0000 }, { 7443, 0x1130 }, { 7447, 0x02b0 }, { 7451, 0x0113 },
02907 { 7455, 0x1021 }, { 7458, 0x0000 }, { 7458, 0x0102 }, { 7460, 0x0001 },
02908 { 7461, 0x0010 }, { 7462, 0x0000 }, { 7462, 0x0113 }, { 7466, 0x102b },
02909 /* 0xd000 */
02910 { 7471, 0x0011 }, { 7473, 0x0102 }, { 7475, 0x2000 }, { 7476, 0x1130 },
02911 { 7480, 0x02b0 }, { 7484, 0x0111 }, { 7487, 0x3001 }, { 7490, 0x3011 },
02912 { 7494, 0x0002 }, { 7495, 0x0000 }, { 7495, 0x1130 }, { 7499, 0x02b0 },
02913 { 7503, 0x0313 }, { 7508, 0x303b }, { 7515, 0xb011 }, { 7520, 0x0103 },
02914 /* 0xd100 */
02915 { 7523, 0x2000 }, { 7524, 0x0000 }, { 7524, 0x0000 }, { 7524, 0x0513 },
02916 { 7529, 0x303b }, { 7536, 0xb011 }, { 7541, 0x1102 }, { 7544, 0x1000 },
02917 { 7545, 0x0110 }, { 7547, 0x0000 }, { 7547, 0x0113 }, { 7551, 0x142b },
02918 { 7557, 0x0001 }, { 7558, 0x0100 }, { 7559, 0x0000 }, { 7559, 0x0110 },
02919 /* 0xd200 */
02920 { 7561, 0x0280 }, { 7563, 0x0001 }, { 7564, 0x3000 }, { 7566, 0xb011 },
02921 { 7571, 0x0102 }, { 7573, 0x1000 }, { 7574, 0x0010 }, { 7575, 0x0000 },
02922 { 7575, 0x0113 }, { 7579, 0x1023 }, { 7583, 0x1011 }, { 7586, 0x9302 },
02923 { 7591, 0x0b05 }, { 7596, 0x1110 }, { 7599, 0x0030 }, { 7601, 0x0113 },
02924 /* 0xd300 */
02925 { 7605, 0x702b }, { 7612, 0xb051 }, { 7618, 0x1323 }, { 7624, 0x3b01 },
02926 { 7630, 0x0030 }, { 7632, 0x0000 }, { 7632, 0x0000 }, { 7632, 0x3000 },
02927 { 7634, 0xb011 }, { 7639, 0x1303 }, { 7644, 0x2b01 }, { 7649, 0x1110 },
02928 { 7652, 0x0330 }, { 7656, 0x0101 }, { 7658, 0x300a }, { 7662, 0xb011 },
02929 /* 0xd400 */
02930 { 7667, 0x0102 }, { 7669, 0x2000 }, { 7670, 0x0000 }, { 7670, 0x0000 },
02931 { 7670, 0x0011 }, { 7672, 0x1000 }, { 7673, 0xa011 }, { 7677, 0x9300 },
02932 { 7681, 0x2b05 }, { 7687, 0x0010 }, { 7688, 0x0200 }, { 7689, 0x0000 },
02933 { 7689, 0x1000 }, { 7690, 0x9011 }, { 7694, 0x1100 }, { 7696, 0x2901 },
02934 /* 0xd500 */
02935 { 7700, 0x1110 }, { 7703, 0x00b0 }, { 7706, 0x0000 }, { 7706, 0x3000 },
02936 { 7708, 0xb011 }, { 7713, 0x1302 }, { 7717, 0x2b21 }, { 7723, 0x1130 },
02937 { 7727, 0x03b0 }, { 7732, 0x0001 }, { 7733, 0x0020 }, { 7734, 0x0000 },
02938 { 7734, 0x1300 }, { 7737, 0x2b05 }, { 7743, 0x1130 }, { 7747, 0x02b0 },
02939 /* 0xd600 */
02940 { 7751, 0x0113 }, { 7755, 0x103b }, { 7761, 0x2011 }, { 7764, 0x1300 },
02941 { 7767, 0x2b21 }, { 7773, 0x1132 }, { 7778, 0x0280 }, { 7780, 0x0013 },
02942 { 7783, 0x3028 }, { 7787, 0xa011 }, { 7791, 0x1102 }, { 7794, 0xa0a1 },
02943 { 7797, 0x1130 }, { 7801, 0x0292 }, { 7805, 0x0111 }, { 7808, 0x3021 },
02944 /* 0xd700 */
02945 { 7812, 0x0011 }, { 7814, 0x1302 }, { 7818, 0x2b01 }, { 7823, 0x1130 },
02946 { 7827, 0x0290 }, { 7830, 0x03d3 }, { 7837, 0x122b }, { 7843, 0x3011 },
02947 { 7847, 0x1302 }, { 7851, 0x2b01 },

```

```

02948 };
02949 static const Summary16 ksc5601_uni2indx_pagef9[17] = {
02950     /* 0xf900 */
02951     { 7856, 0xffff }, { 7872, 0xffff }, { 7888, 0xffff }, { 7904, 0xffff },
02952     { 7920, 0xffff }, { 7936, 0xffff }, { 7952, 0xffff }, { 7968, 0xffff },
02953     { 7984, 0xffff }, { 8000, 0xffff }, { 8016, 0xffff }, { 8032, 0xffff },
02954     { 8048, 0xffff }, { 8064, 0xffff }, { 8080, 0xffff }, { 8096, 0xffff },
02955     /* 0xfa00 */
02956     { 8112, 0x0fff },
02957 };
02958 static const Summary16 ksc5601_uni2indx_pageff[15] = {
02959     /* 0xff00 */
02960     { 8124, 0xfffe }, { 8139, 0xffff }, { 8155, 0xffff }, { 8171, 0xffff },
02961     { 8187, 0xffff }, { 8203, 0x7fff }, { 8218, 0x0000 }, { 8218, 0x0000 },
02962     { 8218, 0x0000 }, { 8218, 0x0000 }, { 8218, 0x0000 }, { 8218, 0x0000 },
02963     { 8218, 0x0000 }, { 8218, 0x0000 }, { 8218, 0x006f },
02964 };
02965
02966 static int
02967 ksc5601_wctomb (conv_t conv, unsigned char *, ucs4_t wc, int n)
02968 {
02969     (void)conv;
02970     if (n >= 2) {
02971         const Summary16 *summary = NULL;
02972         if (wc < 0x0460)
02973             summary = &ksc5601_uni2indx_page00[(wc>4)];
02974         else if (wc >= 0x2000 && wc < 0x2670)
02975             summary = &ksc5601_uni2indx_page20[(wc>4)-0x200];
02976         else if (wc >= 0x3000 && wc < 0x33e0)
02977             summary = &ksc5601_uni2indx_page30[(wc>4)-0x300];
02978         else if (wc >= 0x4e00 && wc < 0x9fa0)
02979             summary = &ksc5601_uni2indx_page4e[(wc>4)-0x4e0];
02980         else if (wc >= 0xac00 && wc < 0xd7a0)
02981             summary = &ksc5601_uni2indx_pageac[(wc>4)-0xac0];
02982         else if (wc >= 0xf900 && wc < 0xfal0)
02983             summary = &ksc5601_uni2indx_pagef9[(wc>4)-0xf90];
02984         else if (wc >= 0xff00 && wc < 0xffff)
02985             summary = &ksc5601_uni2indx_pageff[(wc>4)-0xff0];
02986         if (summary) {
02987             unsigned short used = summary->used;
02988             unsigned int i = wc & 0x0f;
02989             if (used & ((unsigned short) 1 << i)) {
02990                 unsigned short c;
02991                 /* Keep in `used' only the bits 0..i-1. */
02992                 used &= ((unsigned short) 1 << i) - 1;
02993                 /* Add `summary->indx' and the number of bits set in `used'. */
02994                 used = (used & 0x5555) + ((used & 0xaaaa) >> 1);
02995                 used = (used & 0x3333) + ((used & 0xcccc) >> 2);
02996                 used = (used & 0x0f0f) + ((used & 0xf0f0) >> 4);
02997                 used = (used & 0x00ff) + (used >> 8);
02998                 c = ksc5601_2charset[summary->indx + used];
02999                 r[0] = (c >> 8); r[1] = (c & 0xff);
03000                 return 2;
03001             }
03002         }
03003         return RET_ILSEQ;
03004     }
03005     return RET_TOOSMALL;
03006 }
03007 #endif /* NEED_TOMB */

```

13.293 mulelao.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/mulelao.h,v 1.3 2000/11/29 17:40:35 dawes Exp $ */
00002
00003 /*
00004  * MULELAO-1
00005  */
00006
00007 static const unsigned short mulelao_2uni[96] = {
00008     /* 0xa0 */
00009     0x00a0, 0x0e81, 0x0e82, 0xffffd, 0x0e84, 0xffffd, 0xffffd, 0x0e87,
00010     0x0e88, 0xffffd, 0x0e8a, 0xffffd, 0xffffd, 0x0e8d, 0xffffd, 0xffffd,
00011     /* 0xb0 */
00012     0xffffd, 0xffffd, 0xffffd, 0xffffd, 0x0e94, 0x0e95, 0x0e96, 0x0e97,
00013     0xffffd, 0x0e99, 0x0e9a, 0x0e9b, 0x0e9c, 0x0e9d, 0x0e9e, 0x0e9f,
00014     /* 0xc0 */
00015     0xffffd, 0x0ea1, 0x0ea2, 0x0ea3, 0xffffd, 0x0ea5, 0xffffd, 0x0ea7,
00016     0xffffd, 0xffffd, 0x0eaa, 0x0eab, 0xffffd, 0x0ead, 0x0eae, 0x0eaf,
00017     /* 0xd0 */
00018     0x0eb0, 0x0eb1, 0x0eb2, 0x0eb3, 0x0eb4, 0x0eb5, 0x0eb6, 0x0eb7,
00019     0x0eb8, 0x0eb9, 0xffffd, 0x0ebb, 0x0ebc, 0x0ebd, 0xffffd, 0xffffd,
00020     /* 0xe0 */
00021     0x0ec0, 0x0ec1, 0x0ec2, 0x0ec3, 0x0ec4, 0xffffd, 0x0ec6, 0xffffd,
00022     0x0ec8, 0x0ec9, 0x0eca, 0x0ecb, 0x0ecc, 0x0ecd, 0xffffd, 0xffffd,

```

```

00023  /* 0xf0 */
00024  0x0ed0, 0x0ed1, 0x0ed2, 0x0ed3, 0x0ed4, 0x0ed5, 0x0ed6, 0x0ed7,
00025  0x0ed8, 0x0ed9, 0xffff, 0xffff, 0x0edc, 0x0edd, 0xffff, 0xffff,
00026  };
00027
00028  static int
00029  mulelao_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00030  {
00031      unsigned char c = *s;
00032      if (c < 0xa0) {
00033          *pwc = (ucs4_t) c;
00034          return 1;
00035      }
00036      else {
00037          unsigned short wc = mulelao_2uni[c-0xa0];
00038          if (wc != 0xffff) {
00039              *pwc = (ucs4_t) wc;
00040              return 1;
00041          }
00042      }
00043      return RET_ILSEQ;
00044  }
00045
00046  static const unsigned char mulelao_page0e[96] = {
00047      0x00, 0xa1, 0xa2, 0x00, 0xa4, 0x00, 0x00, 0xa7, /* 0x80-0x87 */
00048      0xa8, 0x00, 0xaa, 0x00, 0x00, 0xad, 0x00, 0x00, /* 0x88-0x8f */
00049      0x00, 0x00, 0x00, 0x00, 0xb4, 0xb5, 0xb6, 0xb7, /* 0x90-0x97 */
00050      0x00, 0xb9, 0xba, 0xbb, 0xbc, 0xbd, 0xbe, 0xbf, /* 0x98-0x9f */
00051      0x00, 0xc1, 0xc2, 0xc3, 0x00, 0xc5, 0x00, 0xc7, /* 0xa0-0xa7 */
00052      0x00, 0x00, 0xca, 0xcb, 0x00, 0xcd, 0xce, 0xcf, /* 0xa8-0xaf */
00053      0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0xb0-0xb7 */
00054      0xd8, 0xd9, 0x00, 0xdb, 0xdc, 0xdd, 0x00, 0x00, /* 0xb8-0xbf */
00055      0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0x00, 0xe6, 0x00, /* 0xc0-0xc7 */
00056      0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0x00, 0x00, /* 0xc8-0xcf */
00057      0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0xd0-0xd7 */
00058      0xf8, 0xf9, 0x00, 0x00, 0xfc, 0xfd, 0x00, 0x00, /* 0xd8-0xdf */
00059  };
00060
00061  static int
00062  mulelao_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00063  {
00064      unsigned char c = 0;
00065      if (wc < 0x00a0) {
00066          *r = wc;
00067          return 1;
00068      }
00069      else if (wc == 0x00a0)
00070          c = 0xa0;
00071      else if (wc >= 0x0e80 && wc < 0x0ee0)
00072          c = mulelao_page0e[wc-0x0e80];
00073      if (c != 0) {
00074          *r = c;
00075          return 1;
00076      }
00077      return RET_ILSEQ;
00078  }

```

13.294 tatar_cyr.h

```

00001  /* $XFree86: xc/lib/X11/lcUniConv/tatar_cyr.h,v 1.3 2000/12/04 18:49:42 dawes Exp $ */
00002
00003  /*
00004   * TATAR-CYR
00005   */
00006
00007  static const unsigned short tatar_cyr_2uni[128] = {
00008      /* 0x80 */
00009      0x04d8, 0x0403, 0x201a, 0x0453, 0x201e, 0x2026, 0x2020, 0x2021,
00010      0x20ac, 0x2030, 0x04e8, 0x2039, 0x04ae, 0x0496, 0x04a2, 0x04ba,
00011      /* 0x90 */
00012      0x04d9, 0x2018, 0x2019, 0x201c, 0x201d, 0x2022, 0x2013, 0x2014,
00013      0x98, 0x2122, 0x04e9, 0x203a, 0x04af, 0x0497, 0x04a3, 0x04bb,
00014      /* 0xa0 */
00015      0x00a0, 0x040e, 0x045e, 0x0408, 0x00a4, 0x0490, 0x00a6, 0x00a7,
00016      0x0401, 0x00a9, 0x0404, 0x00ab, 0x00ac, 0x00ad, 0x00ae, 0x0407,
00017      /* 0xb0 */
00018      0x00b0, 0x00b1, 0x0406, 0x0456, 0x0491, 0x00b5, 0x00b6, 0x00b7,
00019      0x0451, 0x2116, 0x0454, 0x00bb, 0x0458, 0x0405, 0x0455, 0x0457,
00020      /* 0xc0 */
00021      0x0410, 0x0411, 0x0412, 0x0413, 0x0414, 0x0415, 0x0416, 0x0417,
00022      0x0418, 0x0419, 0x041a, 0x041b, 0x041c, 0x041d, 0x041e, 0x041f,
00023      /* 0xd0 */
00024      0x0420, 0x0421, 0x0422, 0x0423, 0x0424, 0x0425, 0x0426, 0x0427,
00025      0x0428, 0x0429, 0x042a, 0x042b, 0x042c, 0x042d, 0x042e, 0x042f,
00026      /* 0xe0 */

```

```
00027 0x0430, 0x0431, 0x0432, 0x0433, 0x0434, 0x0435, 0x0436, 0x0437,
00028 0x0438, 0x0439, 0x043a, 0x043b, 0x043c, 0x043d, 0x043e, 0x043f,
00029 /* 0xf0 */
00030 0x0440, 0x0441, 0x0442, 0x0443, 0x0444, 0x0445, 0x0446, 0x0447,
00031 0x0448, 0x0449, 0x044a, 0x044b, 0x044c, 0x044d, 0x044e, 0x044f,
00032 };
00033
00034 static int
00035 tatar_cyr_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00036 {
00037     unsigned char c = *s;
00038     if (c < 0x80)
00039         *pwc = (ucs4_t) c;
00040     else
00041         *pwc = (ucs4_t) tatar_cyr_2uni[c-0x80];
00042     return 1;
00043 }
00044
00045 static const unsigned char tatar_cyr_page00[32] = {
00046     0xa0, 0x00, 0x00, 0x00, 0xa4, 0x00, 0xa6, 0xa7, /* 0xa0-0xa7 */
00047     0x00, 0x00, 0x00, 0x00, 0xab, 0xac, 0xad, 0xae, 0x00, /* 0xa8-0xaf */
00048     0xb0, 0xb1, 0x00, 0x00, 0x00, 0xb5, 0xb6, 0xb7, /* 0xb0-0xb7 */
00049     0x00, 0x00, 0x00, 0xbb, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00050 };
00051 static const unsigned char tatar_cyr_page04[240] = {
00052     0x00, 0xa8, 0x00, 0x81, 0xaa, 0xbd, 0xb2, 0xaf, /* 0x00-0x07 */
00053     0xa3, 0x00, 0x00, 0x00, 0x00, 0x00, 0xa1, 0x00, /* 0x08-0x0f */
00054     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x10-0x17 */
00055     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x18-0x1f */
00056     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0x20-0x27 */
00057     0xd8, 0xd9, 0xda, 0xdb, 0xdc, 0xdd, 0xde, 0xdf, /* 0x28-0x2f */
00058     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0x30-0x37 */
00059     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0x38-0x3f */
00060     0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0x40-0x47 */
00061     0xf8, 0xf9, 0xfa, 0xfb, 0xfc, 0xfd, 0xfe, 0xff, /* 0x48-0x4f */
00062     0x00, 0xb8, 0x00, 0x83, 0xba, 0xbe, 0xb3, 0xbf, /* 0x50-0x57 */
00063     0xbc, 0x00, 0x00, 0x00, 0x00, 0x00, 0xa2, 0x00, /* 0x58-0x5f */
00064     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00065     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00066     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00067     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00068     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00069     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00070     0xa5, 0xb4, 0x00, 0x00, 0x00, 0x00, 0x8d, 0x9d, /* 0x90-0x97 */
00071     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x98-0x9f */
00072     0x00, 0x00, 0x8e, 0x9e, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00073     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x8c, 0x9c, /* 0xa8-0xaf */
00074     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb0-0xb7 */
00075     0x00, 0x00, 0x8f, 0x9f, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00076     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00077     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xc8-0xcf */
00078     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd0-0xd7 */
00079     0x80, 0x90, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xd8-0xdf */
00080     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe0-0xe7 */
00081     0x8a, 0x9a, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xe8-0xef */
00082 };
00083 static const unsigned char tatar_cyr_page20[48] = {
00084     0x00, 0x00, 0x00, 0x96, 0x97, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00085     0x91, 0x92, 0x82, 0x00, 0x93, 0x94, 0x84, 0x00, /* 0x18-0x1f */
00086     0x86, 0x87, 0x95, 0x00, 0x00, 0x00, 0x85, 0x00, /* 0x20-0x27 */
00087     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00088     0x89, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00089     0x00, 0x8b, 0x9b, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00090 };
00091 static const unsigned char tatar_cyr_page21[24] = {
00092     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xb9, 0x00, /* 0x10-0x17 */
00093     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00094     0x00, 0x00, 0x99, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00095 };
00096 static const unsigned char tatar_cyr_page22[1] = {
00097     0xb0, /* 0x16-0x16 */
00098 };
00099
00100 static int
00101 tatar_cyr_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00102 {
00103     unsigned char c = 0;
00104     if (wc < 0x0080) {
00105         *r = wc;
00106         return 1;
00107     }
00108     else if (wc >= 0x00a0 && wc < 0x00bc)
00109         c = tatar_cyr_page00[wc-0x00a0];
00110     else if (wc >= 0x0400 && wc < 0x04ef)
00111         c = tatar_cyr_page04[wc-0x0400];
00112     else if (wc >= 0x2010 && wc < 0x203b)
00113         c = tatar_cyr_page20[wc-0x2010];
00114 }
```

```

00114     else if (wc == 0x20ac)
00115         c = 0x88;
00116     else if (wc >= 0x2110 && wc < 0x2123)
00117         c = tatar_cyr_page21[wc-0x2110];
00118     if (c != 0) {
00119         *r = c;
00120         return 1;
00121     }
00122     return RET_ILSEQ;
00123 }

```

13.295 tcvn.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/tcvn.h,v 1.3 2000/11/29 17:40:35 dawes Exp $ */
00002
00003 /*
00004  * TCVN-5712
00005  */
00006
00007 static const unsigned short tcvn_2uni_1[32] = {
00008     /* 0x00 */
00009     0x0000, 0x00da, 0x1ee4, 0x0003, 0x1eea, 0x1eec, 0x1eee, 0x0007,
00010     0x0008, 0x0009, 0x000a, 0x000b, 0x000c, 0x000d, 0x000e, 0x000f,
00011     /* 0x10 */
00012     0x0010, 0x1ee8, 0x1ef0, 0x1ef2, 0x1ef6, 0x1ef8, 0x00dd, 0x1ef4,
00013     0x0018, 0x0019, 0x001a, 0x001b, 0x001c, 0x001d, 0x001e, 0x001f,
00014 };
00015 static const unsigned short tcvn_2uni_2[128] = {
00016     /* 0x80 */
00017     0x00c0, 0x1ea2, 0x00c3, 0x00c1, 0x1ea0, 0x1eb6, 0x1eac, 0x00c8,
00018     0x1eba, 0x1ebc, 0x00c9, 0x1eb8, 0x1ec6, 0x00cc, 0x1ec8, 0x0128,
00019     /* 0x90 */
00020     0x00cd, 0x1eca, 0x00d2, 0x1ece, 0x00d5, 0x00d3, 0x1ecc, 0x1ed8,
00021     0x1edc, 0x1ede, 0x1ee0, 0x1eda, 0x1ee2, 0x00d9, 0x1ee6, 0x0168,
00022     /* 0xa0 */
00023     0x00a0, 0x0102, 0x00c2, 0x00ca, 0x00d4, 0x01a0, 0x01af, 0x0110,
00024     0x0103, 0x00e2, 0x00ea, 0x00f4, 0x01a1, 0x01b0, 0x0111, 0x1eb0,
00025     /* 0xb0 */
00026     0x0300, 0x0309, 0x0303, 0x0301, 0x0323, 0x00e0, 0x1ea3, 0x00e3,
00027     0x00e1, 0x1ea1, 0x1eb2, 0x1eb1, 0x1eb3, 0x1eb5, 0x1eaf, 0x1eb4,
00028     /* 0xc0 */
00029     0x1eae, 0x1ea6, 0x1ea8, 0x1eaa, 0x1ea4, 0x1ec0, 0x1eb7, 0x1ea7,
00030     0x1ea9, 0x1eab, 0x1ea5, 0x1ead, 0x00e8, 0x1ec2, 0x1ebb, 0x1ebd,
00031     /* 0xd0 */
00032     0x00e9, 0x1eb9, 0x1ec1, 0x1ec3, 0x1ec5, 0x1ebf, 0x1ec7, 0x00ec,
00033     0x1ec9, 0x1ec4, 0x1ebe, 0x1ed2, 0x0129, 0x00ed, 0x1ecb, 0x00f2,
00034     /* 0xe0 */
00035     0x1ed4, 0x1ecf, 0x00f5, 0x00f3, 0x1ecd, 0x1ed3, 0x1ed5, 0x1ed7,
00036     0x1ed1, 0x1ed9, 0x1edd, 0x1edf, 0x1ee1, 0x1edb, 0x1ee3, 0x00f9,
00037     /* 0xf0 */
00038     0x1ed6, 0x1ee7, 0x0169, 0x00fa, 0x1ee5, 0x1eeb, 0x1eed, 0x1eef,
00039     0x1ee9, 0x1ef1, 0x1ef3, 0x1ef7, 0x1ef9, 0x00fd, 0x1ef5, 0x1ed0,
00040 };
00041
00042 static int
00043 tcvn_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00044 {
00045     unsigned char c = *s;
00046     if (c < 0x20)
00047         *pwc = (ucs4_t) tcvn_2uni_1[c];
00048     else if (c < 0x80)
00049         *pwc = (ucs4_t) c;
00050     else
00051         *pwc = (ucs4_t) tcvn_2uni_2[c-0x80];
00052     return 1;
00053 }
00054
00055 static const unsigned char tcvn_page00[96+184] = {
00056     0xa0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00057     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa8-0xaf */
00058     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb0-0xb7 */
00059     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb8-0xbf */
00060     0x80, 0x83, 0xa2, 0x82, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00061     0x87, 0x8a, 0xa3, 0x00, 0x8d, 0x90, 0x00, 0x00, /* 0xc8-0xcf */
00062     0x00, 0x00, 0x92, 0x95, 0xa4, 0x94, 0x00, 0x00, /* 0xd0-0xd7 */
00063     0x00, 0x9d, 0x01, 0x00, 0x00, 0x16, 0x00, 0x00, /* 0xd8-0xdf */
00064     0xb5, 0xb8, 0xa9, 0xb7, 0x00, 0x00, 0x00, 0x00, /* 0xe0-0xe7 */
00065     0xcc, 0xd0, 0xaa, 0x00, 0xd7, 0xdd, 0x00, 0x00, /* 0xe8-0xef */
00066     0x00, 0x00, 0xdf, 0xe3, 0xab, 0xe2, 0x00, 0x00, /* 0xf0-0xf7 */
00067     0x00, 0xef, 0xf3, 0x00, 0x00, 0xfd, 0x00, 0x00, /* 0xf8-0xff */
00068     /* 0x0100 */
00069     0x00, 0x00, 0xa1, 0xa8, 0x00, 0x00, 0x00, 0x00, /* 0x00-0x07 */
00070     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00071     0xa7, 0xae, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00072     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */

```



```

00073 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00074 0x8f, 0xdc, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00075 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00076 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00077 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00078 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00079 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00080 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00081 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00082 0x9f, 0xf2, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00083 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00084 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00085 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00086 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00087 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00088 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x98-0x9f */
00089 0xa5, 0xac, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00090 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xa6, /* 0xa8-0xaf */
00091 0xad, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb0-0xb7 */
00092 };
00093 static const unsigned char tcvn_page03[40] = {
00094 0xb0, 0xb3, 0x00, 0xb2, 0x00, 0x00, 0x00, 0x00, /* 0x00-0x07 */
00095 0x00, 0xb1, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00096 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00097 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00098 0x00, 0x00, 0x00, 0xb4, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00099 };
00100 static const unsigned char tcvn_pagele[96] = {
00101 0x84, 0xb9, 0x81, 0xb6, 0xc4, 0xca, 0xc1, 0xc7, /* 0xa0-0xa7 */
00102 0xc2, 0xc8, 0xc3, 0xc9, 0x86, 0xcb, 0xc0, 0xbe, /* 0xa8-0xaf */
00103 0xaf, 0xbb, 0xba, 0xbc, 0xbf, 0xbd, 0x85, 0xc6, /* 0xb0-0xb7 */
00104 0x8b, 0xd1, 0x88, 0xce, 0x89, 0xcf, 0xda, 0xd5, /* 0xb8-0xbf */
00105 0xc5, 0xd2, 0xcd, 0xd3, 0xd9, 0xd4, 0x8c, 0xd6, /* 0xc0-0xc7 */
00106 0x8e, 0xd8, 0x91, 0xde, 0x96, 0xe4, 0x93, 0xe1, /* 0xc8-0xcf */
00107 0xff, 0xe8, 0xdb, 0xe5, 0xe0, 0xe6, 0xf0, 0xe7, /* 0xd0-0xd7 */
00108 0x97, 0xe9, 0x9b, 0xed, 0x98, 0xea, 0x99, 0xeb, /* 0xd8-0xdf */
00109 0x9a, 0xec, 0x9c, 0xee, 0x02, 0xf4, 0x9e, 0xf1, /* 0xe0-0xe7 */
00110 0x11, 0xf8, 0x04, 0xf5, 0x05, 0xf6, 0x06, 0xf7, /* 0xe8-0xef */
00111 0x12, 0xf9, 0x13, 0xfa, 0x17, 0xfe, 0x14, 0xfb, /* 0xf0-0xf7 */
00112 0x15, 0xfc, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xf8-0xff */
00113 };
00114
00115 static int
00116 tcvn_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00117 {
00118     unsigned char c = 0;
00119     if (wc < 0x0080 && (wc >= 0x0020 || (0x00fe0076 & (1 << wc)) == 0)) {
00120         *r = wc;
00121         return 1;
00122     }
00123     else if (wc >= 0x00a0 && wc < 0x01b8)
00124         c = tcvn_page00[wc-0x00a0];
00125     else if (wc >= 0x0300 && wc < 0x0328)
00126         c = tcvn_page03[wc-0x0300];
00127     else if (wc >= 0x1ea0 && wc < 0x1f00)
00128         c = tcvn_pagele[wc-0x1ea0];
00129     if (c != 0) {
00130         *r = c;
00131         return 1;
00132     }
00133     return RET_ILSEQ;
00134 }

```

13.296 tis620.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/tis620.h,v 1.4 2001/02/09 00:02:54 dawes Exp $ */
00002
00003 /*
00004  * TIS620-0
00005  */
00006
00007 static const unsigned short tis620_2uni[96] = {
00008     /* 0xa0 */
00009     0xfffd, 0x0e01, 0x0e02, 0x0e03, 0x0e04, 0x0e05, 0x0e06, 0x0e07,
00010     0x0e08, 0x0e09, 0x0e0a, 0x0e0b, 0x0e0c, 0x0e0d, 0x0e0e, 0x0e0f,
00011     /* 0xb0 */
00012     0x0e10, 0x0e11, 0x0e12, 0x0e13, 0x0e14, 0x0e15, 0x0e16, 0x0e17,
00013     0x0e18, 0x0e19, 0x0e1a, 0x0e1b, 0x0e1c, 0x0e1d, 0x0e1e, 0x0e1f,
00014     /* 0xc0 */
00015     0x0e20, 0x0e21, 0x0e22, 0x0e23, 0x0e24, 0x0e25, 0x0e26, 0x0e27,
00016     0x0e28, 0x0e29, 0x0e2a, 0x0e2b, 0x0e2c, 0x0e2d, 0x0e2e, 0x0e2f,
00017     /* 0xd0 */
00018     0x0e30, 0x0e31, 0x0e32, 0x0e33, 0x0e34, 0x0e35, 0x0e36, 0x0e37,
00019     0x0e38, 0x0e39, 0x0e3a, 0xffff, 0xffff, 0xffff, 0xffff, 0x0e3f,
00020     /* 0xe0 */

```

```

00021 0x0e40, 0x0e41, 0x0e42, 0x0e43, 0x0e44, 0x0e45, 0x0e46, 0x0e47,
00022 0x0e48, 0x0e49, 0x0e4a, 0x0e4b, 0x0e4c, 0x0e4d, 0x0e4e, 0x0e4f,
00023 /* 0xf0 */
00024 0x0e50, 0x0e51, 0x0e52, 0x0e53, 0x0e54, 0x0e55, 0x0e56, 0x0e57,
00025 0x0e58, 0x0e59, 0x0e5a, 0x0e5b, 0xfffd, 0xfffd, 0xfffd, 0xfffd,
00026 };
00027
00028 static int
00029 tis620_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00030 {
00031     unsigned char c = *s;
00032     if (c < 0x80) {
00033         *pwc = (ucs4_t) c;
00034         return 1;
00035     }
00036     else if (c < 0xa0) {
00037     }
00038     else {
00039         unsigned short wc = tis620_2uni[c-0xa0];
00040         if (wc != 0xffffd) {
00041             *pwc = (ucs4_t) wc;
00042             return 1;
00043         }
00044     }
00045     return RET_ILSEQ;
00046 }
00047
00048 static const unsigned char tis620_page0e[96] = {
00049     0x00, 0xa1, 0xa2, 0xa3, 0xa4, 0xa5, 0xa6, 0xa7, /* 0x00-0x07 */
00050     0xa8, 0xa9, 0xaa, 0xab, 0xac, 0xad, 0xae, 0xaf, /* 0x08-0x0f */
00051     0xb0, 0xb1, 0xb2, 0xb3, 0xb4, 0xb5, 0xb6, 0xb7, /* 0x10-0x17 */
00052     0xb8, 0xb9, 0xba, 0xbb, 0xbc, 0xbd, 0xbe, 0xbf, /* 0x18-0x1f */
00053     0xc0, 0xc1, 0xc2, 0xc3, 0xc4, 0xc5, 0xc6, 0xc7, /* 0x20-0x27 */
00054     0xc8, 0xc9, 0xca, 0xcb, 0xcc, 0xcd, 0xce, 0xcf, /* 0x28-0x2f */
00055     0xd0, 0xd1, 0xd2, 0xd3, 0xd4, 0xd5, 0xd6, 0xd7, /* 0x30-0x37 */
00056     0xd8, 0xd9, 0xda, 0x00, 0x00, 0x00, 0x00, 0x00, 0xdf, /* 0x38-0x3f */
00057     0xe0, 0xe1, 0xe2, 0xe3, 0xe4, 0xe5, 0xe6, 0xe7, /* 0x40-0x47 */
00058     0xe8, 0xe9, 0xea, 0xeb, 0xec, 0xed, 0xee, 0xef, /* 0x48-0x4f */
00059     0xf0, 0xf1, 0xf2, 0xf3, 0xf4, 0xf5, 0xf6, 0xf7, /* 0x50-0x57 */
00060     0xf8, 0xf9, 0xfa, 0xfb, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00061 };
00062
00063 static int
00064 tis620_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00065 {
00066     unsigned char c = 0;
00067     if (wc < 0x0080) {
00068         *r = wc;
00069         return 1;
00070     }
00071     else if (wc >= 0x0e00 && wc < 0x0e60)
00072         c = tis620_page0e[wc-0x0e00];
00073     if (c != 0) {
00074         *r = c;
00075         return 1;
00076     }
00077     return RET_ILSEQ;
00078 }

```

13.297 ucs2be.h

```

00001 /*
00002 * UCS-2BE = UCS-2 big endian
00003 */
00004 /* $XFree86: xc/lib/X11/lcUniConv/ucs2be.h,v 1.1 2000/11/28 17:25:09 dawes Exp $ */
00005
00006 static int
00007 ucs2be_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00008 {
00009     if (n >= 2) {
00010         if (s[0] >= 0xd8 && s[0] < 0xe0) {
00011             return RET_ILSEQ;
00012         } else {
00013             *pwc = (s[0] << 8) + s[1];
00014             return 2;
00015         }
00016     }
00017     return RET_TOOFEW(0);
00018 }
00019
00020 static int
00021 ucs2be_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00022 {
00023     if (wc < 0x10000 && !(wc >= 0xd800 && wc < 0xe000)) {
00024         if (n >= 2) {

```

```

00025     r[0] = (unsigned char) (wc >> 8);
00026     r[1] = (unsigned char) wc;
00027     return 2;
00028 } else
00029     return RET_TOOSMALL;
00030 }
00031 return RET_ILSEQ;
00032 }

```

13.298 utf8.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/utf8.h,v 1.3 2000/11/28 18:50:07 dawes Exp $ */
00002
00003 /*
00004  * UTF-8
00005  */
00006
00007 /* Specification: RFC 2279 */
00008
00009 static int
00010 utf8_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00011 {
00012     unsigned char c = s[0];
00013
00014     if (c < 0x80) {
00015         *pwc = c;
00016         return 1;
00017     } else if (c < 0xc2) {
00018         return RET_ILSEQ;
00019     } else if (c < 0xe0) {
00020         if (n < 2)
00021             return RET_TOOFEW(0);
00022         if (!(s[1] ^ 0x80) < 0x40)
00023             return RET_ILSEQ;
00024         *pwc = ((ucs4_t) (c & 0x1f) << 6)
00025             | (ucs4_t) (s[1] ^ 0x80);
00026         return 2;
00027     } else if (c < 0xf0) {
00028         if (n < 3)
00029             return RET_TOOFEW(0);
00030         if (!(s[1] ^ 0x80) < 0x40 && (s[2] ^ 0x80) < 0x40
00031             && (c >= 0xe1 || s[1] >= 0xa0)))
00032             return RET_ILSEQ;
00033         *pwc = ((ucs4_t) (c & 0x0f) << 12)
00034             | ((ucs4_t) (s[1] ^ 0x80) << 6)
00035             | (ucs4_t) (s[2] ^ 0x80);
00036         return 3;
00037     } else if (c < 0xf8) {
00038         if (n < 4)
00039             return RET_TOOFEW(0);
00040         if (!(s[1] ^ 0x80) < 0x40 && (s[2] ^ 0x80) < 0x40
00041             && (s[3] ^ 0x80) < 0x40
00042             && (c >= 0xf1 || s[1] >= 0x90)))
00043             return RET_ILSEQ;
00044         *pwc = ((ucs4_t) (c & 0x07) << 18)
00045             | ((ucs4_t) (s[1] ^ 0x80) << 12)
00046             | ((ucs4_t) (s[2] ^ 0x80) << 6)
00047             | (ucs4_t) (s[3] ^ 0x80);
00048         return 4;
00049     } else if (c < 0xfc) {
00050         if (n < 5)
00051             return RET_TOOFEW(0);
00052         if (!(s[1] ^ 0x80) < 0x40 && (s[2] ^ 0x80) < 0x40
00053             && (s[3] ^ 0x80) < 0x40 && (s[4] ^ 0x80) < 0x40
00054             && (c >= 0xf9 || s[1] >= 0x88)))
00055             return RET_ILSEQ;
00056         *pwc = ((ucs4_t) (c & 0x03) << 24)
00057             | ((ucs4_t) (s[1] ^ 0x80) << 18)
00058             | ((ucs4_t) (s[2] ^ 0x80) << 12)
00059             | ((ucs4_t) (s[3] ^ 0x80) << 6)
00060             | (ucs4_t) (s[4] ^ 0x80);
00061         return 5;
00062     } else if (c < 0xfe) {
00063         if (n < 6)
00064             return RET_TOOFEW(0);
00065         if (!(s[1] ^ 0x80) < 0x40 && (s[2] ^ 0x80) < 0x40
00066             && (s[3] ^ 0x80) < 0x40 && (s[4] ^ 0x80) < 0x40
00067             && (s[5] ^ 0x80) < 0x40
00068             && (c >= 0xfd || s[1] >= 0x84)))
00069             return RET_ILSEQ;
00070         *pwc = ((ucs4_t) (c & 0x01) << 30)
00071             | ((ucs4_t) (s[1] ^ 0x80) << 24)
00072             | ((ucs4_t) (s[2] ^ 0x80) << 18)
00073             | ((ucs4_t) (s[3] ^ 0x80) << 12)
00074             | ((ucs4_t) (s[4] ^ 0x80) << 6)

```

```

00075     | (ucs4_t) (s[5] ^ 0x80);
00076     return 6;
00077 } else
00078     return RET_ILSEQ;
00079 }
00080
00081 static int
00082 utf8_wctomb (conv_t conv, unsigned char *, ucs4_t wc, int n) /* n == 0 is acceptable */
00083 {
00084     int count;
00085     if (wc < 0x80)
00086         count = 1;
00087     else if (wc < 0x800)
00088         count = 2;
00089     else if (wc < 0x10000)
00090         count = 3;
00091     else if (wc < 0x200000)
00092         count = 4;
00093     else if (wc < 0x4000000)
00094         count = 5;
00095     else if (wc <= 0x7fffffff)
00096         count = 6;
00097     else
00098         return RET_ILSEQ;
00099     if (n < count)
00100         return RET_TOOSMALL;
00101     switch (count) { /* note: code falls through cases! */
00102     case 6: r[5] = 0x80 | (wc & 0x3f); wc = wc >> 6; wc |= 0x4000000;
00103     case 5: r[4] = 0x80 | (wc & 0x3f); wc = wc >> 6; wc |= 0x2000000;
00104     case 4: r[3] = 0x80 | (wc & 0x3f); wc = wc >> 6; wc |= 0x100000;
00105     case 3: r[2] = 0x80 | (wc & 0x3f); wc = wc >> 6; wc |= 0x8000;
00106     case 2: r[1] = 0x80 | (wc & 0x3f); wc = wc >> 6; wc |= 0xc0;
00107     case 1: r[0] = wc;
00108     }
00109     return count;
00110 }

```

13.299 viscii.h

```

00001 /* $XFree86: xc/lib/X11/lcUniConv/viscii.h,v 1.3 2000/11/29 17:40:35 dawes Exp $ */
00002
00003 /*
00004  * VISCI11.1-1
00005  */
00006
00007 /* Specification: RFC 1456 */
00008
00009 static const unsigned short viscii_2uni_1[32] = {
00010     /* 0x00 */
00011     0x0000, 0x0001, 0x1eb2, 0x0003, 0x0004, 0x1eb4, 0x1eaa, 0x0007,
00012     0x0008, 0x0009, 0x000a, 0x000b, 0x000c, 0x000d, 0x000e, 0x000f,
00013     /* 0x10 */
00014     0x0010, 0x0011, 0x0012, 0x0013, 0x1ef6, 0x0015, 0x0016, 0x0017,
00015     0x0018, 0x1ef8, 0x001a, 0x001b, 0x001c, 0x001d, 0x1ef4, 0x001f,
00016 };
00017 static const unsigned short viscii_2uni_2[128] = {
00018     /* 0x80 */
00019     0x1ea0, 0x1eae, 0x1eb0, 0x1eb6, 0x1ea4, 0x1ea6, 0x1ea8, 0x1eac,
00020     0x1ebc, 0x1eb8, 0x1ebe, 0x1ec0, 0x1ec2, 0x1ec4, 0x1ec6, 0x1ed0,
00021     /* 0x90 */
00022     0x1ed2, 0x1ed4, 0x1ed6, 0x1ed8, 0x1ee2, 0x1eda, 0x1edc, 0x1ede,
00023     0x1eca, 0x1ece, 0x1ecc, 0x1ec8, 0x1ee6, 0x0168, 0x1ee4, 0x1ef2,
00024     /* 0xa0 */
00025     0x00d5, 0x1eaf, 0x1eb1, 0x1eb7, 0x1ea5, 0x1ea7, 0x1ea9, 0x1ead,
00026     0x1ebd, 0x1eb9, 0x1ebf, 0x1ec1, 0x1ec3, 0x1ec5, 0x1ec7, 0x1ed1,
00027     /* 0xb0 */
00028     0x1ed3, 0x1ed5, 0x1ed7, 0x1ee0, 0x01a0, 0x1ed9, 0x1edd, 0x1edf,
00029     0x1ecb, 0x1ef0, 0x1ee8, 0x1eea, 0x1eec, 0x01a1, 0x1edb, 0x01af,
00030     /* 0xc0 */
00031     0x00c0, 0x00c1, 0x00c2, 0x00c3, 0x1ea2, 0x0102, 0x1eb3, 0x1eb5,
00032     0x00c8, 0x00c9, 0x00ca, 0x1eba, 0x00cc, 0x00cd, 0x0128, 0x1ef3,
00033     /* 0xd0 */
00034     0x0110, 0x1ee9, 0x00d2, 0x00d3, 0x00d4, 0x1ea1, 0x1ef7, 0x1eeb,
00035     0x1eed, 0x00d9, 0x00da, 0x1ef9, 0x1ef5, 0x00dd, 0x1ee1, 0x01b0,
00036     /* 0xe0 */
00037     0x00e0, 0x00e1, 0x00e2, 0x00e3, 0x1ea3, 0x0103, 0x1eef, 0x1eab,
00038     0x00e8, 0x00e9, 0x00ea, 0x1ebb, 0x00ec, 0x00ed, 0x0129, 0x1ec9,
00039     /* 0xf0 */
00040     0x0111, 0x1ef1, 0x00f2, 0x00f3, 0x00f4, 0x00f5, 0x1ecf, 0x1ecd,
00041     0x1ee5, 0x00f9, 0x00fa, 0x0169, 0x1ee7, 0x00fd, 0x1ee3, 0x1eee,
00042 };
00043
00044 static int
00045 viscii_mbtowc (conv_t conv, ucs4_t *pwc, const unsigned char *s, int n)
00046 {

```

```

00047 unsigned char c = *s;
00048 if (c < 0x20)
00049     *pwc = (ucs4_t) viscii_2uni_1[c];
00050 else if (c < 0x80)
00051     *pwc = (ucs4_t) c;
00052 else
00053     *pwc = (ucs4_t) viscii_2uni_2[c-0x80];
00054 return 1;
00055 }
00056
00057 static const unsigned char viscii_page00[64+184] = {
00058     0xc0, 0xc1, 0xc2, 0xc3, 0x00, 0x00, 0x00, 0x00, /* 0xc0-0xc7 */
00059     0xc8, 0xc9, 0xca, 0x00, 0xcc, 0xcd, 0x00, 0x00, /* 0xc8-0xcf */
00060     0x00, 0x00, 0xd2, 0xd3, 0xd4, 0xa0, 0x00, 0x00, /* 0xd0-0xd7 */
00061     0x00, 0xd9, 0xda, 0x00, 0x00, 0x00, 0xdd, 0x00, /* 0xd8-0xdf */
00062     0xe0, 0xe1, 0xe2, 0xe3, 0x00, 0x00, 0x00, 0x00, /* 0xe0-0xe7 */
00063     0xe8, 0xe9, 0xea, 0x00, 0xec, 0xed, 0x00, 0x00, /* 0xe8-0xef */
00064     0x00, 0x00, 0xf2, 0xf3, 0xf4, 0xf5, 0x00, 0x00, /* 0xf0-0xf7 */
00065     0x00, 0xf9, 0xfa, 0x00, 0x00, 0xfd, 0x00, 0x00, /* 0xf8-0xff */
00066     /* 0x0100 */
00067     0x00, 0x00, 0xc5, 0xe5, 0x00, 0x00, 0x00, 0x00, /* 0x00-0x07 */
00068     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x08-0x0f */
00069     0xd0, 0xf0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x10-0x17 */
00070     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x18-0x1f */
00071     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x20-0x27 */
00072     0xce, 0xee, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x28-0x2f */
00073     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x30-0x37 */
00074     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x38-0x3f */
00075     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x40-0x47 */
00076     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x48-0x4f */
00077     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x50-0x57 */
00078     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x58-0x5f */
00079     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x60-0x67 */
00080     0x9d, 0xfb, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x68-0x6f */
00081     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x70-0x77 */
00082     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x78-0x7f */
00083     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x80-0x87 */
00084     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x88-0x8f */
00085     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x90-0x97 */
00086     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0x98-0x9f */
00087     0xb4, 0xbd, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xa0-0xa7 */
00088     0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xbf, /* 0xa8-0xaf */
00089     0xdf, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xb0-0xb7 */
00090 };
00091 static const unsigned char viscii_pagele[96] = {
00092     0x80, 0xd5, 0xc4, 0xe4, 0x84, 0xa4, 0x85, 0xa5, /* 0xa0-0xa7 */
00093     0x86, 0xa6, 0x06, 0xe7, 0x87, 0xa7, 0x81, 0xa1, /* 0xa8-0xaf */
00094     0x82, 0xa2, 0x02, 0xc6, 0x05, 0xc7, 0x83, 0xa3, /* 0xb0-0xb7 */
00095     0x89, 0xa9, 0xcb, 0xeb, 0x88, 0xa8, 0x8a, 0xaa, /* 0xb8-0xbf */
00096     0x8b, 0xab, 0x8c, 0xac, 0x8d, 0xad, 0x8e, 0xae, /* 0xc0-0xc7 */
00097     0x9b, 0xef, 0x98, 0xb8, 0x9a, 0xf7, 0x99, 0xf6, /* 0xc8-0xcf */
00098     0x8f, 0xaf, 0x90, 0xb0, 0x91, 0xb1, 0x92, 0xb2, /* 0xd0-0xd7 */
00099     0x93, 0xb5, 0x95, 0xbe, 0x96, 0xb6, 0x97, 0xb7, /* 0xd8-0xdf */
00100     0xb3, 0xde, 0x94, 0xfe, 0x9e, 0xf8, 0x9c, 0xfc, /* 0xe0-0xe7 */
00101     0xba, 0xd1, 0xbb, 0xd7, 0xbc, 0xd8, 0xff, 0xe6, /* 0xe8-0xef */
00102     0xb9, 0xf1, 0x9f, 0xcf, 0x1e, 0xdc, 0x14, 0xd6, /* 0xf0-0xf7 */
00103     0x19, 0xdb, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 0xf8-0xff */
00104 };
00105
00106 static int
00107 viscii_wctomb (conv_t conv, unsigned char *r, ucs4_t wc, int n)
00108 {
00109     unsigned char c = 0;
00110     if (wc < 0x0080 && (wc >= 0x0020 || (0x42100064 & (1 << wc)) == 0)) {
00111         *r = wc;
00112         return 1;
00113     }
00114     else if (wc >= 0x00c0 && wc < 0x01b8)
00115         c = viscii_page00[wc-0x00c0];
00116     else if (wc >= 0x1lea0 && wc < 0x1f00)
00117         c = viscii_pagele[wc-0x1ea0];
00118     if (c != 0) {
00119         *r = c;
00120         return 1;
00121     }
00122     return RET_ILSEQ;
00123 }

```

13.300 mk_wcwidth.c

```

00001 /*
00002  * FLTK: Important!
00003  * This file should remain as close to Markus Kuhn's original source
00004  * as possible for easy checking for changes later, however unlikely.
00005  * All customisations to work with FLTK shall be annotated!

```

```

00006 */
00007
00008 /*
00009  * This is an implementation of wwidth() and wcswidth() (defined in
00010  * IEEE Std 1002.1-2001) for Unicode.
00011  *
00012  * http://www.opengroup.org/onlinepubs/007904975/functions/wcwidth.html
00013  * http://www.opengroup.org/onlinepubs/007904975/functions/wcswidth.html
00014  *
00015  * In fixed-width output devices, Latin characters all occupy a single
00016  * "cell" position of equal width, whereas ideographic CJK characters
00017  * occupy two such cells. Interoperability between terminal-line
00018  * applications and (teletype-style) character terminals using the
00019  * UTF-8 encoding requires agreement on which character should advance
00020  * the cursor by how many cell positions. No established formal
00021  * standards exist at present on which Unicode character shall occupy
00022  * how many cell positions on character terminals. These routines are
00023  * a first attempt of defining such behavior based on simple rules
00024  * applied to data provided by the Unicode Consortium.
00025  *
00026  * For some graphical characters, the Unicode standard explicitly
00027  * defines a character-cell width via the definition of the East Asian
00028  * FullWidth (F), Wide (W), Half-width (H), and Narrow (Na) classes.
00029  * In all these cases, there is no ambiguity about which width a
00030  * terminal shall use. For characters in the East Asian Ambiguous (A)
00031  * class, the width choice depends purely on a preference of backward
00032  * compatibility with either historic CJK or Western practice.
00033  * Choosing single-width for these characters is easy to justify as
00034  * the appropriate long-term solution, as the CJK practice of
00035  * displaying these characters as double-width comes from historic
00036  * implementation simplicity (8-bit encoded characters were displayed
00037  * single-width and 16-bit ones double-width, even for Greek,
00038  * Cyrillic, etc.) and not any typographic considerations.
00039  *
00040  * Much less clear is the choice of width for the Not East Asian
00041  * (Neutral) class. Existing practice does not dictate a width for any
00042  * of these characters. It would nevertheless make sense
00043  * typographically to allocate two character cells to characters such
00044  * as for instance EM SPACE or VOLUME INTEGRAL, which cannot be
00045  * represented adequately with a single-width glyph. The following
00046  * routines at present merely assign a single-cell width to all
00047  * neutral characters, in the interest of simplicity. This is not
00048  * entirely satisfactory and should be reconsidered before
00049  * establishing a formal standard in this area. At the moment, the
00050  * decision which Not East Asian (Neutral) characters should be
00051  * represented by double-width glyphs cannot yet be answered by
00052  * applying a simple rule from the Unicode database content. Setting
00053  * up a proper standard for the behavior of UTF-8 character terminals
00054  * will require a careful analysis not only of each Unicode character,
00055  * but also of each presentation form, something the author of these
00056  * routines has avoided to do so far.
00057  *
00058  * http://www.unicode.org/unicode/reports/tr11/
00059  *
00060  * Markus Kuhn -- 2007-05-26 (Unicode 5.0)
00061  *
00062  * Permission to use, copy, modify, and distribute this software
00063  * for any purpose and without fee is hereby granted. The author
00064  * disclaims all warranties with regard to this software.
00065  *
00066  * Latest version: http://www.cl.cam.ac.uk/~mgk25/ucs/wcwidth.c
00067  */
00068
00069 /*
00070  * FLTK - avoid possible problems on systems with 32-bit wchar_t.
00071  *      Don't include wchar.h, and change wchar_t to unsigned int.
00072  *      Can we guarantee sizeof(unsigned int) >= 4 ?
00073  */
00074 #if 0
00075 #include <wchar.h>
00076 #endif
00077
00078 struct interval {
00079     unsigned int first;
00080     unsigned int last;
00081 };
00082
00083 /* auxiliary function for binary search in interval table */
00084 /*
00085  * FLTK: was
00086  static int bisearch(wchar_t ucs, const struct interval *table, int max) {
00087  */
00088  static int bisearch(unsigned int ucs, const struct interval *table, int max) {
00089     int min = 0;
00090     int mid;
00091
00092     if (ucs < table[0].first || ucs > table[max].last)

```

```

00093     return 0;
00094     while (max >= min) {
00095         mid = (min + max) / 2;
00096         if (ucs > table[mid].last)
00097             min = mid + 1;
00098         else if (ucs < table[mid].first)
00099             max = mid - 1;
00100         else
00101             return 1;
00102     }
00103
00104     return 0;
00105 }
00106
00107
00108 /* The following two functions define the column width of an ISO 10646
00109 * character as follows:
00110 *
00111 * - The null character (U+0000) has a column width of 0.
00112 *
00113 * - Other C0/C1 control characters and DEL will lead to a return
00114 *   value of -1.
00115 *
00116 * - Non-spacing and enclosing combining characters (general
00117 *   category code Mn or Me in the Unicode database) have a
00118 *   column width of 0.
00119 *
00120 * - SOFT HYPHEN (U+00AD) has a column width of 1.
00121 *
00122 * - Other format characters (general category code Cf in the Unicode
00123 *   database) and ZERO WIDTH SPACE (U+200B) have a column width of 0.
00124 *
00125 * - Hangul Jamo medial vowels and final consonants (U+1160-U+11FF)
00126 *   have a column width of 0.
00127 *
00128 * - Spacing characters in the East Asian Wide (W) or East Asian
00129 *   Full-width (F) category as defined in Unicode Technical
00130 *   Report #11 have a column width of 2.
00131 *
00132 * - All remaining characters (including all printable
00133 *   ISO 8859-1 and WGL4 characters, Unicode control characters,
00134 *   etc.) have a column width of 1.
00135 *
00136 * This implementation assumes that wchar_t characters are encoded
00137 * in ISO 10646.
00138 */
00139
00140 /*
00141 * FLTK: was
00142 int mk_wcwidth(wchar_t ucs)
00143 */
00144 int mk_wcwidth(unsigned int ucs)
00145 {
00146     /* sorted list of non-overlapping intervals of non-spacing characters */
00147     /* generated by "uniset +cat=Me +cat=Mn +cat=Cf -00AD +1160-11FF +200B c" */
00148     static const struct interval combining[] = {
00149         { 0x0300, 0x036F }, { 0x0483, 0x0486 }, { 0x0488, 0x0489 },
00150         { 0x0591, 0x05BD }, { 0x05BF, 0x05BF }, { 0x05C1, 0x05C2 },
00151         { 0x05C4, 0x05C5 }, { 0x05C7, 0x05C7 }, { 0x0600, 0x0603 },
00152         { 0x0610, 0x0615 }, { 0x064B, 0x065E }, { 0x0670, 0x0670 },
00153         { 0x06D6, 0x06E4 }, { 0x06E7, 0x06E8 }, { 0x06EA, 0x06ED },
00154         { 0x070F, 0x070F }, { 0x0711, 0x0711 }, { 0x0730, 0x074A },
00155         { 0x07A6, 0x07B0 }, { 0x07EB, 0x07F3 }, { 0x0901, 0x0902 },
00156         { 0x093C, 0x093C }, { 0x0941, 0x0948 }, { 0x094D, 0x094D },
00157         { 0x0951, 0x0954 }, { 0x0962, 0x0963 }, { 0x0981, 0x0981 },
00158         { 0x09BC, 0x09BC }, { 0x09C1, 0x09C4 }, { 0x09CD, 0x09CD },
00159         { 0x09E2, 0x09E3 }, { 0x0A01, 0x0A02 }, { 0x0A3C, 0x0A3C },
00160         { 0x0A41, 0x0A42 }, { 0x0A47, 0x0A48 }, { 0x0A4B, 0x0A4D },
00161         { 0x0A70, 0x0A71 }, { 0x0A81, 0x0A82 }, { 0x0ABC, 0x0ABC },
00162         { 0x0AC1, 0x0AC5 }, { 0x0AC7, 0x0AC8 }, { 0x0ACD, 0x0ACD },
00163         { 0x0AE2, 0x0AE3 }, { 0x0B01, 0x0B01 }, { 0x0B3C, 0x0B3C },
00164         { 0x0B3F, 0x0B3F }, { 0x0B41, 0x0B43 }, { 0x0B4D, 0x0B4D },
00165         { 0x0B56, 0x0B56 }, { 0x0B82, 0x0B82 }, { 0x0BC0, 0x0BC0 },
00166         { 0x0BCD, 0x0BCD }, { 0x0C3E, 0x0C40 }, { 0x0C46, 0x0C48 },
00167         { 0x0C4A, 0x0C4D }, { 0x0C55, 0x0C56 }, { 0x0CBC, 0x0CBC },
00168         { 0x0CBF, 0x0CBF }, { 0x0CC6, 0x0CC6 }, { 0x0CCC, 0x0CCD },
00169         { 0x0CE2, 0x0CE3 }, { 0x0D41, 0x0D43 }, { 0x0D4D, 0x0D4D },
00170         { 0x0DCA, 0x0DCA }, { 0x0DD2, 0x0DD4 }, { 0x0DD6, 0x0DD6 },
00171         { 0x0E31, 0x0E31 }, { 0x0E34, 0x0E3A }, { 0x0E47, 0x0E4E },
00172         { 0x0EB1, 0x0EB1 }, { 0x0EB4, 0x0EB9 }, { 0x0EBB, 0x0EBC },
00173         { 0x0EC8, 0x0ECD }, { 0x0F18, 0x0F19 }, { 0x0F35, 0x0F35 },
00174         { 0x0F37, 0x0F37 }, { 0x0F39, 0x0F39 }, { 0x0F71, 0x0F7E },
00175         { 0x0F80, 0x0F84 }, { 0x0F86, 0x0F87 }, { 0x0F90, 0x0F97 },
00176         { 0x0F99, 0x0FBC }, { 0x0FC6, 0x0FC6 }, { 0x102D, 0x1030 },
00177         { 0x1032, 0x1032 }, { 0x1036, 0x1037 }, { 0x1039, 0x1039 },
00178         { 0x1058, 0x1059 }, { 0x1160, 0x11FF }, { 0x135F, 0x135F },
00179         { 0x1712, 0x1714 }, { 0x1732, 0x1734 }, { 0x1752, 0x1753 },

```

```

00180     { 0x1772, 0x1773 }, { 0x17B4, 0x17B5 }, { 0x17B7, 0x17BD },
00181     { 0x17C6, 0x17C6 }, { 0x17C9, 0x17D3 }, { 0x17DD, 0x17DD },
00182     { 0x180B, 0x180D }, { 0x18A9, 0x18A9 }, { 0x1920, 0x1922 },
00183     { 0x1927, 0x1928 }, { 0x1932, 0x1932 }, { 0x1939, 0x193B },
00184     { 0x1A17, 0x1A18 }, { 0x1B00, 0x1B03 }, { 0x1B34, 0x1B34 },
00185     { 0x1B36, 0x1B3A }, { 0x1B3C, 0x1B3C }, { 0x1B42, 0x1B42 },
00186     { 0x1B6B, 0x1B73 }, { 0x1DC0, 0x1DCA }, { 0x1DFE, 0x1DFF },
00187     { 0x200B, 0x200F }, { 0x202A, 0x202E }, { 0x2060, 0x2063 },
00188     { 0x206A, 0x206F }, { 0x20D0, 0x20EF }, { 0x302A, 0x302F },
00189     { 0x3099, 0x309A }, { 0xA806, 0xA806 }, { 0xA80B, 0xA80B },
00190     { 0xA825, 0xA826 }, { 0xFB1E, 0xFB1E }, { 0xFE00, 0xFE0F },
00191     { 0xFE20, 0xFE23 }, { 0xFEFF, 0xFEFF }, { 0xFFF9, 0xFFFB },
00192     { 0x10A01, 0x10A03 }, { 0x10A05, 0x10A06 }, { 0x10A0C, 0x10A0F },
00193     { 0x10A38, 0x10A3A }, { 0x10A3F, 0x10A3F }, { 0x1D167, 0x1D169 },
00194     { 0x1D173, 0x1D182 }, { 0x1D185, 0x1D18B }, { 0x1D1AA, 0x1D1AD },
00195     { 0x1D242, 0x1D244 }, { 0xE0001, 0xE0001 }, { 0xE0020, 0xE007F },
00196     { 0xE0100, 0xE01EF }
00197 };
00198
00199 /* test for 8-bit control characters */
00200 if (ucs == 0)
00201     return 0;
00202 if (ucs < 32 || (ucs >= 0x7f && ucs < 0xa0))
00203     return -1;
00204
00205 /* binary search in table of non-spacing characters */
00206 if (bisearch(ucs, combining,
00207             sizeof(combining) / sizeof(struct interval) - 1))
00208     return 0;
00209
00210 /* if we arrive here, ucs is not a combining or C0/C1 control character */
00211
00212 return 1 +
00213     (ucs >= 0x1100 &&
00214      (ucs <= 0x115f ||
00215       ucs == 0x2329 || ucs == 0x232a ||
00216       (ucs >= 0x2e80 && ucs <= 0xa4cf &&
00217        ucs != 0x303f) ||
00218        (ucs >= 0xac00 && ucs <= 0xd7a3) ||
00219        (ucs >= 0xf900 && ucs <= 0xfaff) ||
00220        (ucs >= 0xfel0 && ucs <= 0xfel9) ||
00221        (ucs >= 0xfe30 && ucs <= 0xfe6f) ||
00222        (ucs >= 0xff00 && ucs <= 0xff60) ||
00223        (ucs >= 0xffe0 && ucs <= 0xffe6) ||
00224        (ucs >= 0x20000 && ucs <= 0x2fffd) ||
00225        (ucs >= 0x30000 && ucs <= 0x3fffd)));
00226 }
00227
00228
00229 /*
00230 * FLTK: comment out the remaining functions, as we don't need them.
00231 */
00232 #if 0
00233
00234 /*
00235 * FLTK: was
00236 int mk_wcswidth(const wchar_t *pwcs, size_t n)
00237 */
00238 int mk_wcswidth(const unsigned int *pwcs, size_t n)
00239 {
00240     int w, width = 0;
00241
00242     for (; *pwcs && n-- > 0; pwcs++)
00243         if ((w = mk_wcwidth(*pwcs)) < 0)
00244             return -1;
00245         else
00246             width += w;
00247
00248     return width;
00249 }
00250
00251
00252 /*
00253 * The following functions are the same as mk_wcwidth() and
00254 * mk_wcswidth(), except that spacing characters in the East Asian
00255 * Ambiguous (A) category as defined in Unicode Technical Report #11
00256 * have a column width of 2. This variant might be useful for users of
00257 * CJK legacy encodings who want to migrate to UCS without changing
00258 * the traditional terminal character-width behaviour. It is not
00259 * otherwise recommended for general use.
00260 */
00261 /*
00262 * FLTK: was
00263 int mk_wcwidth_cjk(wchar_t ucs)
00264 */
00265 int mk_wcwidth_cjk(unsigned int ucs)
00266 {

```



```

00267 /* sorted list of non-overlapping intervals of East Asian Ambiguous
00268 * characters, generated by "uniset +WIDTH-A -cat=Me -cat=Mn -cat=Cf c" */
00269 static const struct interval ambiguous[] = {
00270     { 0x00A1, 0x00A1 }, { 0x00A4, 0x00A4 }, { 0x00A7, 0x00A8 },
00271     { 0x00AA, 0x00AA }, { 0x00AE, 0x00AE }, { 0x00B0, 0x00B4 },
00272     { 0x00B6, 0x00BA }, { 0x00BC, 0x00BF }, { 0x00C6, 0x00C6 },
00273     { 0x00D0, 0x00D0 }, { 0x00D7, 0x00D8 }, { 0x00DE, 0x00E1 },
00274     { 0x00E6, 0x00E6 }, { 0x00E8, 0x00EA }, { 0x00EC, 0x00ED },
00275     { 0x00F0, 0x00F0 }, { 0x00F2, 0x00F3 }, { 0x00F7, 0x00FA },
00276     { 0x00FC, 0x00FC }, { 0x00FE, 0x00FE }, { 0x0101, 0x0101 },
00277     { 0x0111, 0x0111 }, { 0x0113, 0x0113 }, { 0x011B, 0x011B },
00278     { 0x0126, 0x0127 }, { 0x012B, 0x012B }, { 0x0131, 0x0133 },
00279     { 0x0138, 0x0138 }, { 0x013F, 0x0142 }, { 0x0144, 0x0144 },
00280     { 0x0148, 0x014B }, { 0x014D, 0x014D }, { 0x0152, 0x0153 },
00281     { 0x0166, 0x0167 }, { 0x016B, 0x016B }, { 0x01CE, 0x01CE },
00282     { 0x01D0, 0x01D0 }, { 0x01D2, 0x01D2 }, { 0x01D4, 0x01D4 },
00283     { 0x01D6, 0x01D6 }, { 0x01D8, 0x01D8 }, { 0x01DA, 0x01DA },
00284     { 0x01DC, 0x01DC }, { 0x0251, 0x0251 }, { 0x0261, 0x0261 },
00285     { 0x02C4, 0x02C4 }, { 0x02C7, 0x02C7 }, { 0x02C9, 0x02CB },
00286     { 0x02CD, 0x02CD }, { 0x02D0, 0x02D0 }, { 0x02D8, 0x02DB },
00287     { 0x02DD, 0x02DD }, { 0x02DF, 0x02DF }, { 0x0391, 0x03A1 },
00288     { 0x03A3, 0x03A9 }, { 0x03B1, 0x03C1 }, { 0x03C3, 0x03C9 },
00289     { 0x0401, 0x0401 }, { 0x0410, 0x044F }, { 0x0451, 0x0451 },
00290     { 0x2010, 0x2010 }, { 0x2013, 0x2016 }, { 0x2018, 0x2019 },
00291     { 0x201C, 0x201D }, { 0x2020, 0x2022 }, { 0x2024, 0x2027 },
00292     { 0x2030, 0x2030 }, { 0x2032, 0x2033 }, { 0x2035, 0x2035 },
00293     { 0x203B, 0x203B }, { 0x203E, 0x203E }, { 0x2074, 0x2074 },
00294     { 0x207F, 0x207F }, { 0x2081, 0x2084 }, { 0x20AC, 0x20AC },
00295     { 0x2103, 0x2103 }, { 0x2105, 0x2105 }, { 0x2109, 0x2109 },
00296     { 0x2113, 0x2113 }, { 0x2116, 0x2116 }, { 0x2121, 0x2122 },
00297     { 0x2126, 0x2126 }, { 0x212B, 0x212B }, { 0x2153, 0x2154 },
00298     { 0x215B, 0x215E }, { 0x2160, 0x216B }, { 0x2170, 0x2179 },
00299     { 0x2190, 0x2199 }, { 0x21B8, 0x21B9 }, { 0x21D2, 0x21D2 },
00300     { 0x21D4, 0x21D4 }, { 0x21E7, 0x21E7 }, { 0x2200, 0x2200 },
00301     { 0x2202, 0x2203 }, { 0x2207, 0x2208 }, { 0x220B, 0x220B },
00302     { 0x220F, 0x220F }, { 0x2211, 0x2211 }, { 0x2215, 0x2215 },
00303     { 0x221A, 0x221A }, { 0x221D, 0x2220 }, { 0x2223, 0x2223 },
00304     { 0x2225, 0x2225 }, { 0x2227, 0x222C }, { 0x222E, 0x222E },
00305     { 0x2234, 0x2237 }, { 0x223C, 0x223D }, { 0x2248, 0x2248 },
00306     { 0x224C, 0x224C }, { 0x2252, 0x2252 }, { 0x2260, 0x2261 },
00307     { 0x2264, 0x2267 }, { 0x226A, 0x226B }, { 0x226E, 0x226F },
00308     { 0x2282, 0x2283 }, { 0x2286, 0x2287 }, { 0x2295, 0x2295 },
00309     { 0x2299, 0x2299 }, { 0x22A5, 0x22A5 }, { 0x22BF, 0x22BF },
00310     { 0x2312, 0x2312 }, { 0x2460, 0x24E9 }, { 0x24EB, 0x254B },
00311     { 0x2550, 0x2573 }, { 0x2580, 0x258F }, { 0x2592, 0x2595 },
00312     { 0x25A0, 0x25A1 }, { 0x25A3, 0x25A9 }, { 0x25B2, 0x25B3 },
00313     { 0x25B6, 0x25B7 }, { 0x25BC, 0x25BD }, { 0x25C0, 0x25C1 },
00314     { 0x25C6, 0x25C8 }, { 0x25CB, 0x25CB }, { 0x25CE, 0x25D1 },
00315     { 0x25E2, 0x25E5 }, { 0x25EF, 0x25EF }, { 0x2605, 0x2606 },
00316     { 0x2609, 0x2609 }, { 0x260E, 0x260F }, { 0x2614, 0x2615 },
00317     { 0x261C, 0x261C }, { 0x261E, 0x261E }, { 0x2640, 0x2640 },
00318     { 0x2642, 0x2642 }, { 0x2660, 0x2661 }, { 0x2663, 0x2665 },
00319     { 0x2667, 0x266A }, { 0x266C, 0x266D }, { 0x266F, 0x266F },
00320     { 0x273D, 0x273D }, { 0x2776, 0x277F }, { 0xE000, 0xF8FF },
00321     { 0xFFFF, 0xFFFF }, { 0xF0000, 0xFFFFD }, { 0x100000, 0x10FFFF }
00322 };
00323
00324 /* binary search in table of non-spacing characters */
00325 if (bisearch(ucs, ambiguous,
00326             sizeof(ambiguous) / sizeof(struct interval) - 1))
00327     return 2;
00328
00329 return mk_wcwidth(ucs);
00330 }
00331
00332
00333 /*
00334 * FLTK: was
00335 int mk_wcswidth_cjk(const wchar_t *pwcs, size_t n)
00336 */
00337 int mk_wcswidth_cjk(const unsigned int *pwcs, size_t n)
00338 {
00339     int w, width = 0;
00340
00341     for (; *pwcs && n-- > 0; pwcs++)
00342         if ((w = mk_wcwidth_cjk(*pwcs)) < 0)
00343             return -1;
00344         else
00345             width += w;
00346
00347     return width;
00348 }
00349
00350 /*
00351 * FLTK: end of commented out functions
00352 */
00353 #endif

```

13.301 ucs2fontmap.c

```

00001 /*
00002  * Author: Jean-Marc Lienher ( http://oksid.ch )
00003  * Copyright 2000-2003 by O'ksi'D.
00004  *
00005  * This library is free software. Distribution and use rights are outlined in
00006  * the file "COPYING" which should have been included with this file.  If this
00007  * file is missing or damaged, see the license at:
00008  *
00009  *   https://www.fltk.org/COPYING.php
00010  *
00011  * Please see the following page on how to report bugs and issues:
00012  *
00013  *   https://www.fltk.org/bugs.php
00014  */
00015
00016 #include <stdlib.h>
00017 #include <string.h>
00018
00019 #define RET_ILSEQ -1
00020 #define RET_TOOFEW(x) (-10 - x)
00021 #define RET_TOOSMALL -2
00022 #define conv_t void*
00023 #define ucs4_t unsigned int
00024 typedef struct {
00025     unsigned short indx;
00026     unsigned short used;
00027 } Summary16;
00028
00029 #define NEED_TOMB /* indicates what part of these include files is needed here (avoid compilation
00030     warnings) */
00031 #include "lcUniConv/cp936ext.h"
00032 #include "lcUniConv/big5.h"
00033 #include "lcUniConv/gb2312.h"
00034 #include "lcUniConv/iso8859_10.h"
00035 #include "lcUniConv/iso8859_11.h"
00036 #include "lcUniConv/iso8859_13.h"
00037 #include "lcUniConv/iso8859_14.h"
00038 #include "lcUniConv/iso8859_15.h"
00039 #include "lcUniConv/iso8859_2.h"
00040 #include "lcUniConv/iso8859_3.h"
00041 #include "lcUniConv/iso8859_4.h"
00042 #include "lcUniConv/iso8859_5.h"
00043 #include "lcUniConv/iso8859_6.h"
00044 #include "lcUniConv/iso8859_7.h"
00045 #include "lcUniConv/iso8859_8.h"
00046 #include "lcUniConv/iso8859_9.h"
00047 #include "lcUniConv/jisx0201.h"
00048 #include "lcUniConv/jisx0208.h"
00049 #include "lcUniConv/jisx0212.h"
00050 #include "lcUniConv/koi8_r.h"
00051 #include "lcUniConv/koi8_u.h"
00052 #include "lcUniConv/ksc5601.h"
00053 #include "lcUniConv/cp1251.h"
00054 #include "headers/symbol_.h"
00055 #include "headers/dingbats_.h"
00056 /***** conv_gen.c *****/
00057
00058 /*const*/
00059 static int ucs2fontmap(char *s, unsigned int ucs, int enc) {
00060     switch(enc) {
00061     case 0: /* iso10646-1 */
00062         s[0] = (char) ((ucs & 0xFF00) >> 8);
00063         s[1] = (char) (ucs & 0xFF);
00064         return 0;
00065     case 1: /* iso8859-1 */
00066         if (ucs <= 0x00FF) {
00067             if (ucs >= 0x0001) {
00068                 s[0] = 0;
00069                 s[1] = (char) (ucs & 0xFF);
00070                 return 1;
00071             }
00072         }
00073         break;
00074     case 2: /* iso8859-2 */
00075         if (ucs <= 0x00a0) {
00076             s[0] = 0;
00077             s[1] = (char) ucs;
00078             return 2;
00079         } else if (ucs < 0x0180) {
00080             if (ucs >= 0x00a0) {
00081                 s[0] = 0;
00082                 s[1] = (char) iso8859_2_page00[ucs-0x00a0];
00083                 if (s[1]) return 2;
00084             }

```

```
00085     } else if (ucs < 0x02e0) {
00086         if (ucs >= 0x02c0) {
00087             s[0] = 0;
00088             s[1] = (char) iso8859_2_page02[ucs-0x02c0];
00089             if (s[1]) return 2;
00090         }
00091     }
00092     break;
00093 case 3:         /* iso8859-3 */
00094     if (iso8859_3_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00095         return 3;
00096     }
00097     break;
00098 case 4:         /* iso8859-4 */
00099     if (iso8859_4_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00100         return 4;
00101     }
00102     break;
00103 case 5:         /* iso8859-5 */
00104     if (iso8859_5_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00105         return 5;
00106     }
00107     break;
00108 case 6:         /* iso8859-6 */
00109     if (iso8859_6_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00110         return 6;
00111     }
00112     break;
00113 case 7:         /* iso8859-7 */
00114     if (iso8859_7_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00115         return 7;
00116     }
00117     break;
00118 case 8:         /* iso8859-8 */
00119     if (iso8859_8_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00120         return 8;
00121     }
00122     break;
00123 case 9:         /* iso8859-9 */
00124     if (iso8859_9_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00125         return 9;
00126     }
00127     break;
00128 case 10:        /* iso8859-10 */
00129     if (iso8859_10_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00130         return 10;
00131     }
00132     break;
00133 case 25:        /* iso8859-11 */
00134     if (iso8859_11_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00135         return 25;
00136     }
00137     break;
00138 case 11:        /* iso8859-13 */
00139     if (iso8859_13_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00140         return 11;
00141     }
00142     break;
00143 case 12:        /* iso8859-14 */
00144     if (iso8859_14_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00145         return 12;
00146     }
00147     break;
00148 case 13:        /* iso8859-15 */
00149     if (iso8859_15_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00150         return 13;
00151     }
00152     break;
00153 case 14:        /* koi8-r */
00154     if (koi8_r_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00155         return 14;
00156     }
00157     break;
00158 case 15:        /* big5 */
00159     if (big5_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00160         return 15;
00161     }
00162     break;
00163 case 16:        /* ksc5601.1987-0 */
00164     if (ksc5601_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00165         return 16;
00166     }
00167     break;
00168 case 17:        /* gb2312.1980-0 */
00169     if (gb2312_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00170         return 17;
00171     }
}
```

```

00172     break;
00173 case 18:     /* jisx0201.1976-0 */
00174     if (jisx0201_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00175         return 18;
00176     }
00177     break;
00178 case 19:     /* jisx0208.1983-0 */
00179     if (jisx0208_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00180         return 19;
00181     }
00182     break;
00183 case 20:     /* jisx0212.1990-0 */
00184     if (jisx0212_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00185         return 20;
00186     }
00187     break;
00188 case 21:     /* symbol */
00189     if (ucs <= 0x00F7) {
00190         if (ucs >= 0x0020) {
00191             s[0] = 0;
00192             s[1] = unicode_to_symbol_1b_0020[ucs - 0x0020];
00193             if (s[1]) return 21;
00194         }
00195     } else if (ucs <= 0x0192) {
00196         if (ucs >= 0x0192) {
00197             s[0] = 0;
00198             s[1] = unicode_to_symbol_1b_0192[ucs - 0x0192];
00199             if (s[1]) return 21;
00200         }
00201     } else if (ucs <= 0x03D6) {
00202         if (ucs >= 0x0391) {
00203             s[0] = 0;
00204             s[1] = unicode_to_symbol_1b_0391[ucs - 0x0391];
00205             if (s[1]) return 21;
00206         }
00207     } else if (ucs <= 0x232A) {
00208         if (ucs >= 0x2022) {
00209             s[0] = 0;
00210             s[1] = unicode_to_symbol_1b_2022[ucs - 0x2022];
00211             if (s[1]) return 21;
00212         }
00213     } else if (ucs <= 0x25CA) {
00214         if (ucs >= 0x25CA) {
00215             s[0] = 0;
00216             s[1] = unicode_to_symbol_1b_25CA[ucs - 0x25CA];
00217             if (s[1]) return 21;
00218         }
00219     } else if (ucs <= 0x2666) {
00220         if (ucs >= 0x2660) {
00221             s[0] = 0;
00222             s[1] = unicode_to_symbol_1b_2660[ucs - 0x2660];
00223             if (s[1]) return 21;
00224         }
00225     } else if (ucs <= 0xF6DB) {
00226         if (ucs >= 0xF6D9) {
00227             s[0] = 0;
00228             s[1] = unicode_to_symbol_1b_F6D9[ucs - 0xF6D9];
00229             if (s[1]) return 21;
00230         }
00231     } else if (ucs <= 0xF8FE) {
00232         if (ucs >= 0xF8E5) {
00233             s[0] = 0;
00234             s[1] = unicode_to_symbol_1b_F8E5[ucs - 0xF8E5];
00235             if (s[1]) return 21;
00236         }
00237     }
00238     break;
00239 case 22:     /* dingbats */
00240     if (ucs <= 0x00A0) {
00241         if (ucs >= 0x0020) {
00242             s[0] = 0;
00243             s[1] = unicode_to_dingbats_1b_0020[ucs - 0x0020];
00244             if (s[1]) return 22;
00245         }
00246     } else if (ucs <= 0x2195) {
00247         if (ucs >= 0x2192) {
00248             s[0] = 0;
00249             s[1] = unicode_to_dingbats_1b_2192[ucs - 0x2192];
00250             if (s[1]) return 22;
00251         }
00252     } else if (ucs <= 0x2469) {
00253         if (ucs >= 0x2460) {
00254             s[0] = 0;
00255             s[1] = unicode_to_dingbats_1b_2460[ucs - 0x2460];
00256             if (s[1]) return 22;
00257         }
00258     } else if (ucs <= 0x2666) {

```

```

00259     if (ucs >= 0x25A0) {
00260         s[0] = 0;
00261         s[1] = unicode_to_dingbats_1b_25A0[ucs - 0x25A0];
00262         if (s[1]) return 22;
00263     }
00264 } else if (ucs <= 0x27BE) {
00265     if (ucs >= 0x2701) {
00266         s[0] = 0;
00267         s[1] = unicode_to_dingbats_1b_2701[ucs - 0x2701];
00268         if (s[1]) return 22;
00269     }
00270 } else if (ucs <= 0xF8E4) {
00271     if (ucs >= 0xF8D7) {
00272         s[0] = 0;
00273         s[1] = unicode_to_dingbats_1b_F8D7[ucs - 0xF8D7];
00274         if (s[1]) return 22;
00275     }
00276 }
00277 break;
00278 case 23: /* koi8-u */
00279     if (koi8_u_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00280         return 23;
00281     }
00282     break;
00283 case 24: /* microsoft-cp1251 */
00284     if (cp1251_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00285         return 24;
00286     }
00287     break;
00288 case 26: /* gbk/cp936ext */
00289     if (cp936ext_wctomb(NULL, (unsigned char*)s, ucs, 2) > 0) {
00290         return 26;
00291     }
00292     break;
00293 default:
00294     break;
00295 };
00296 return -1;
00297 }
00298
00299 /*const*/
00300 static int encoding_number(const char *enc) {
00301     if (!enc || !strcmp(enc, "iso10646-1", 10)) {
00302         return 0;
00303     } else if (!strcmp(enc, "iso8859-1")) {
00304         return 1;
00305     } else if (!strcmp(enc, "iso8859-2")) {
00306         return 2;
00307     } else if (!strcmp(enc, "iso8859-3")) {
00308         return 3;
00309     } else if (!strcmp(enc, "iso8859-4")) {
00310         return 4;
00311     } else if (!strcmp(enc, "iso8859-5")) {
00312         return 5;
00313     } else if (!strcmp(enc, "iso8859-6")) {
00314         return 6;
00315     } else if (!strcmp(enc, "iso8859-7")) {
00316         return 7;
00317     } else if (!strcmp(enc, "iso8859-8")) {
00318         return 8;
00319     } else if (!strcmp(enc, "iso8859-9")) {
00320         return 9;
00321     } else if (!strcmp(enc, "iso8859-10")) {
00322         return 10;
00323     } else if (!strcmp(enc, "iso8859-13")) {
00324         return 11;
00325     } else if (!strcmp(enc, "iso8859-14")) {
00326         return 12;
00327     } else if (!strcmp(enc, "iso8859-15")) {
00328         return 13;
00329     } else if (!strcmp(enc, "koi8-r")) {
00330         return 14;
00331     } else if (!strcmp(enc, "big5-0") || !strcmp(enc, "big5.eten-0") ||
00332         !strcmp(enc, "big5p-0"))
00333     {
00334         return 15;
00335     } else if (!strcmp(enc, "ksc5601.1987-0")) {
00336         return 16;
00337     } else if (!strcmp(enc, "gb2312.1980-0") || !strcmp(enc, "gb2312.80-0") ||
00338         !strcmp(enc, "gb2312.80&gb8565.88") || !strcmp(enc, "gb2312.80-0"))
00339     {
00340         return 17;
00341     } else if (!strcmp(enc, "jisx0201.1976-0")) {
00342         return 18;
00343     } else if (!strcmp(enc, "jisx0208.1983-0") || !strcmp(enc, "jisx0208.1990-0")
00344         || !strcmp(enc, "jisx0208.1978-0"))
00345     {

```

```

00346     return 19;
00347 } else if (!strcmp(enc, "jisx0212.1990-0")) {
00348     return 20;
00349 } else if (!strcmp(enc, "symbol")) {
00350     return 21;
00351 } else if (!strcmp(enc, "dingbats") || !strcmp(enc, "zapfdingbats") ||
00352     !strcmp(enc, "zapf dingbats") || !strcmp(enc, "itc zapf dingbats"))
00353 {
00354     return 22;
00355 } else if (!strcmp(enc, "koi8-u")) {
00356     return 23;
00357 } else if (!strcmp(enc, "microsoft-cp1251")) {
00358     return 24;
00359 } else if (!strcmp(enc, "iso8859-11")) {
00360     return 25;
00361 } else if (!strcmp(enc, "gbk-0") || !strcmp(enc, "cp936") || !strcmp(enc, "gbk")) {
00362     return 26;
00363 };
00364 return -1;
00365 }

```

13.302 utf8Utils.c

```

00001 /*
00002  * Author: Jean-Marc Lienher ( http://oksid.ch )
00003  * Copyright 2000-2003 by O'ksi'D.
00004  *
00005  * This library is free software. Distribution and use rights are outlined in
00006  * the file "COPYING" which should have been included with this file. If this
00007  * file is missing or damaged, see the license at:
00008  *
00009  *     https://www.fltk.org/COPYING.php
00010  *
00011  * Please see the following page on how to report bugs and issues:
00012  *
00013  *     https://www.fltk.org/bugs.php
00014  */
00015
00016 /*
00017  * Unicode to UTF-8 conversion functions.
00018  *
00019  * This file is compiled and linked only for X11 w/o Xft.
00020  */
00021
00022 #include "../Xutf8.h"
00023
00024 /** NOTE : all functions are LIMITED to 24 bits Unicode values !!! */
00025
00026 /*
00027  * Converts the first char of the UTF-8 string to an Unicode value
00028  * Returns the byte length of the converted UTF-8 char
00029  * Returns -1 if the UTF-8 string is not valid
00030  */
00031 int
00032 XConvertUtf8ToUcs(const unsigned char *buf,
00033                  int len,
00034                  unsigned int *ucs) {
00035
00036     if (buf[0] & 0x80) {
00037         if (buf[0] & 0x40) {
00038             if (buf[0] & 0x20) {
00039                 if (buf[0] & 0x10) {
00040                     if (buf[0] & 0x08) {
00041                         if (buf[0] & 0x04) {
00042                             if (buf[0] & 0x02) {
00043                                 /* bad UTF-8 string */
00044                             } else {
00045                                 /* 0x04000000 - 0x7FFFFFFF */
00046                             }
00047                         } else if (len > 4
00048                             && (buf[1] & 0xC0) == 0x80
00049                             && (buf[2] & 0xC0) == 0x80
00050                             && (buf[3] & 0xC0) == 0x80
00051                             && (buf[4] & 0xC0) == 0x80) {
00052                             /* 0x00200000 - 0x03FFFFFF */
00053                             *ucs = ((buf[0] & ~0xF8) << 24) +
00054                                 ((buf[1] & ~0x80) << 18) +
00055                                 ((buf[2] & ~0x80) << 12) +
00056                                 ((buf[3] & ~0x80) << 6) +
00057                                 (buf[4] & ~0x80);
00058                             if (*ucs > 0x001FFFFFF && *ucs < 0x01000000) return 5;
00059                         }
00060                     } else if (len > 3
00061                         && (buf[1] & 0xC0) == 0x80
00062                         && (buf[2] & 0xC0) == 0x80

```

```

00063         && (buf[3] & 0xC0) == 0x80) {
00064         /* 0x00010000 - 0x001FFFFF */
00065         *ucs = ((buf[0] & ~0xF0) << 18) +
00066             ((buf[1] & ~0x80) << 12) +
00067             ((buf[2] & ~0x80) << 6) +
00068             (buf[3] & ~0x80);
00069         if (*ucs > 0x0000FFFF) return 4;
00070     }
00071     } else if (len > 2
00072             && (buf[1] & 0xC0) == 0x80
00073             && (buf[2] & 0xC0) == 0x80) {
00074         /* 0x00000800 - 0x0000FFFF */
00075         *ucs = ((buf[0] & ~0xE0) << 12) +
00076             ((buf[1] & ~0x80) << 6) +
00077             (buf[2] & ~0x80);
00078         if (*ucs > 0x00007FFF) return 3;
00079     }
00080     } else if (len > 1 && (buf[1] & 0xC0) == 0x80) {
00081         /* 0x00000080 - 0x000007FF */
00082         *ucs = ((buf[0] & ~0xC0) << 6) +
00083             (buf[1] & ~0x80);
00084         if (*ucs > 0x000007FF) return 2;
00085     }
00086     }
00087     } else if (len > 0) {
00088         /* 0x00000000 - 0x0000007F */
00089         *ucs = buf[0];
00090         return 1;
00091     }
00092 }
00093 *ucs = (unsigned int) '?'; /* bad UTF-8 string */
00094 return -1;
00095 }
00096
00097 /*
00098  * Converts an Unicode value to an UTF-8 string
00099  * NOTE : the buffer (buf) must be at least 5 bytes long !!!
00100  */
00101 int
00102 XConvertUcsToUtf8(unsigned int ucs,
00103                  char *buf) {
00104
00105     if (ucs < 0x000080) {
00106         buf[0] = ucs;
00107         return 1;
00108     } else if (ucs < 0x000800) {
00109         buf[0] = 0xC0 | (ucs >> 6);
00110         buf[1] = 0x80 | (ucs & 0x3F);
00111         return 2;
00112     } else if (ucs < 0x010000) {
00113         buf[0] = 0xE0 | (ucs >> 12);
00114         buf[1] = 0x80 | ((ucs >> 6) & 0x3F);
00115         buf[2] = 0x80 | (ucs & 0x3F);
00116         return 3;
00117     } else if (ucs < 0x00200000) {
00118         buf[0] = 0xF0 | (ucs >> 18);
00119         buf[1] = 0x80 | ((ucs >> 12) & 0x3F);
00120         buf[2] = 0x80 | ((ucs >> 6) & 0x3F);
00121         buf[3] = 0x80 | (ucs & 0x3F);
00122         return 4;
00123     } else if (ucs < 0x01000000) {
00124         buf[0] = 0xF8 | (ucs >> 24);
00125         buf[1] = 0x80 | ((ucs >> 18) & 0x3F);
00126         buf[2] = 0x80 | ((ucs >> 12) & 0x3F);
00127         buf[3] = 0x80 | ((ucs >> 6) & 0x3F);
00128         buf[4] = 0x80 | (ucs & 0x3F);
00129         return 5;
00130     }
00131     buf[0] = '?';
00132     return -1;
00133 }
00134
00135 /*
00136  * returns the byte length of the first UTF-8 char
00137  * (returns -1 if not valid)
00138  */
00139 int
00140 XUtf8CharByteLen(const unsigned char *buf,
00141                  int len) {
00142     unsigned int ucs;
00143     return XConvertUtf8ToUcs(buf, len, &ucs);
00144 }
00145
00146 /*
00147  * returns the quantity of Unicode chars in the UTF-8 string
00148  */
00149 int

```

```

00150 XCountUtf8Char(const unsigned char *buf,
00151                  int len) {
00152
00153     int i = 0;
00154     int nbc = 0;
00155     while (i < len) {
00156         int cl = XUtf8CharByteLen(buf + i, len - i);
00157         if (cl < 1) cl = 1;
00158         nbc++;
00159         i += cl;
00160     }
00161     return nbc;
00162 }
00163
00164 /*
00165  * Same as XConvertUtf8ToUcs but no sanity check is done.
00166  */
00167 int
00168 XFastConvertUtf8ToUcs(const unsigned char *buf,
00169                      int len,
00170                      unsigned int *ucs) {
00171
00172     if (buf[0] & 0x80) {
00173         if (buf[0] & 0x40) {
00174             if (buf[0] & 0x20) {
00175                 if (buf[0] & 0x10) {
00176                     if (buf[0] & 0x08) {
00177                         if (buf[0] & 0x04) {
00178                             if (buf[0] & 0x02) {
00179                                 /* bad UTF-8 string */
00180                             } else {
00181                                 /* 0x04000000 - 0x7FFFFFFF */
00182                             }
00183                         } else if (len > 4) {
00184                             /* 0x00200000 - 0x03FFFFFF */
00185                             *ucs = ((buf[0] & ~0xF8) << 24) +
00186                                     ((buf[1] & ~0x80) << 18) +
00187                                     ((buf[2] & ~0x80) << 12) +
00188                                     ((buf[3] & ~0x80) << 6) +
00189                                     (buf[4] & ~0x80);
00190                             return 5;
00191                         }
00192                     } else if (len > 3) {
00193                         /* 0x00010000 - 0x001FFFFFF */
00194                         *ucs = ((buf[0] & ~0xF0) << 18) +
00195                                 ((buf[1] & ~0x80) << 12) +
00196                                 ((buf[2] & ~0x80) << 6) +
00197                                 (buf[3] & ~0x80);
00198                         return 4;
00199                     }
00200                 } else if (len > 2) {
00201                     /* 0x00000800 - 0x0000FFFF */
00202                     *ucs = ((buf[0] & ~0xE0) << 12) +
00203                             ((buf[1] & ~0x80) << 6) +
00204                             (buf[2] & ~0x80);
00205                     return 3;
00206                 }
00207             } else if (len > 1) {
00208                 /* 0x00000080 - 0x000007FF */
00209                 *ucs = ((buf[0] & ~0xC0) << 6) +
00210                         (buf[1] & ~0x80);
00211                 return 2;
00212             }
00213         }
00214     } else if (len > 0) {
00215         /* 0x00000000 - 0x0000007F */
00216         *ucs = buf[0];
00217         return 1;
00218     }
00219
00220     *ucs = (unsigned int) '?'; /* bad UTF-8 string */
00221     return -1;
00222 }

```

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