

FLTK 1.3.0 Programming Manual



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Contents

1	FLTK Programming Manual	1
2	Preface	3
2.1	Organization	4
2.2	Conventions	5
2.3	Abbreviations	5
2.4	Copyrights and Trademarks	5
3	1 - Introduction to FLTK	7
3.1	History of FLTK	8
3.2	Features	8
3.3	Licensing	9
3.4	What Does "FLTK" Mean?	9
3.5	Building and Installing FLTK Under UNIX and MacOS X	10
3.6	Building FLTK Under Microsoft Windows	11
3.6.1	Using the Visual C++ DLL Library	12
3.7	Building FLTK Under OS/2	12
3.8	Internet Resources	12
3.9	Reporting Bugs	13
4	2 - FLTK Basics	15
4.1	Writing Your First FLTK Program	16
4.1.1	Creating the Widgets	17
4.1.2	Creating Widget hierarchies	17
4.1.3	Get/Set Methods	17
4.1.4	Redrawing After Changing Attributes	17
4.1.5	Labels	17
4.1.6	Showing the Window	18
4.1.7	The Main Event Loop	18

4.2	Compiling Programs with Standard Compilers	18
4.3	Compiling Programs with Microsoft Visual C++	19
4.4	Naming	20
4.5	Header Files	20
5	3 - Common Widgets and Attributes	21
5.1	Buttons	22
5.2	Text	23
5.3	Valuators	23
5.4	Groups	24
5.5	Setting the Size and Position of Widgets	25
5.6	Colors	25
5.7	Box Types	26
5.7.1	Box Types	27
5.8	Labels and Label Types	28
5.9	Callbacks	31
5.10	Shortcuts	32
6	5 - Drawing Things in FLTK	33
6.1	When Can You Draw Things in FLTK?	34
6.2	Drawing Functions	34
6.2.1	Boxes	35
6.2.2	Clipping	35
6.3	Colors	36
6.3.1	Line Dashes and Thickness	37
6.3.2	Drawing Fast Shapes	38
6.3.3	Drawing Complex Shapes	40
6.3.4	Drawing Text	42
6.3.5	Fonts	43
6.3.6	Character Encoding	44
6.3.7	Drawing Overlays	44
6.4	Drawing Images	45
6.4.1	Direct Image Drawing	45
6.4.2	Direct Image Reading	46
6.4.3	Image Classes	47
6.4.4	Offscreen Drawing	48
7	4 - Designing a Simple Text Editor	49

7.1	Determining the Goals of the Text Editor	50
7.2	Designing the Main Window	50
7.3	Variables	50
7.4	Menubars and Menus	51
7.5	Editing the Text	51
7.6	The Replace Dialog	52
7.7	Callbacks	52
7.7.1	changed_cb()	52
7.7.2	copy_cb()	52
7.7.3	cut_cb()	53
7.7.4	delete_cb()	53
7.7.5	find_cb()	53
7.7.6	find2_cb()	53
7.7.7	new_cb()	54
7.7.8	open_cb()	54
7.7.9	paste_cb()	54
7.7.10	quit_cb()	54
7.7.11	replace_cb()	55
7.7.12	replace2_cb()	55
7.7.13	replall_cb()	55
7.7.14	replcan_cb()	56
7.7.15	save_cb()	56
7.7.16	saveas_cb()	56
7.8	Other Functions	57
7.8.1	check_save()	57
7.8.2	load_file()	57
7.8.3	save_file()	57
7.8.4	set_title()	58
7.9	The main() Function	58
7.10	Compiling the Editor	58
7.11	The Final Product	59
7.12	Advanced Features	59
7.12.1	Syntax Highlighting	59
8	6 - Handling Events	65
8.1	The FLTK Event Model	66
8.2	Mouse Events	66

8.2.1	FL_PUSH	66
8.2.2	FL_DRAG	66
8.2.3	FL_RELEASE	66
8.2.4	FL_MOVE	66
8.2.5	FL_MOUSEWHEEL	66
8.3	Focus Events	67
8.3.1	FL_ENTER	67
8.3.2	FL_LEAVE	67
8.3.3	FL_FOCUS	67
8.3.4	FL_UNFOCUS	67
8.4	Keyboard Events	67
8.4.1	FL_KEYDOWN, FL_KEYUP	67
8.4.2	FL_SHORTCUT	68
8.5	Widget Events	68
8.5.1	FL_DEACTIVATE	68
8.5.2	FL_ACTIVATE	68
8.5.3	FL_HIDE	68
8.5.4	FL_SHOW	68
8.6	Clipboard Events	68
8.6.1	FL_PASTE	68
8.6.2	FL_SELECTIONCLEAR	68
8.7	Drag and Drop Events	69
8.7.1	FL_DND_ENTER	69
8.7.2	FL_DND_DRAG	69
8.7.3	FL_DND_LEAVE	69
8.7.4	FL_DND_RELEASE	69
8.8	Fl::event_*() methods	69
8.9	Event Propagation	70
8.10	FLTK Compose-Character Sequences	71
9	7 - Adding and Extending Widgets	73
9.1	Subclassing	74
9.2	Making a Subclass of Fl_Widget	74
9.3	The Constructor	74
9.4	Protected Methods of Fl_Widget	75
9.5	Handling Events	77
9.6	Drawing the Widget	78

9.7	Resizing the Widget	78
9.8	Making a Composite Widget	79
9.9	Cut and Paste Support	80
9.10	Drag And Drop Support	81
9.11	Making a subclass of Fl_Window	81
10	8 - Using OpenGL	83
10.1	Using OpenGL in FLTK	84
10.2	Making a Subclass of Fl_Gl_Window	84
10.2.1	Defining the Subclass	84
10.2.2	The draw() Method	85
10.2.3	The handle() Method	85
10.3	Using OpenGL in Normal FLTK Windows	86
10.4	OpenGL Drawing Functions	87
10.5	Speeding up OpenGL	88
10.6	Using OpenGL Optimizer with FLTK	88
11	9 - Programming with FLUID	91
11.1	What is FLUID?	92
11.2	Running FLUID Under UNIX	94
11.3	Running FLUID Under Microsoft Windows	94
11.4	Compiling .fl files	94
11.5	A Short Tutorial	95
11.5.1	The CubeView Class	95
11.5.2	The CubeViewUI Class	98
11.5.3	Adding Constructor Initialization Code	102
11.5.4	Generating the Code	102
11.6	FLUID Reference	102
11.6.1	The Widget Browser	102
11.6.2	Menu Items	103
11.6.3	The Widget Panel	108
11.7	GUI Attributes	109
11.7.1	Style Attributes	111
11.7.2	C++ Attributes	113
11.8	Selecting and Moving Widgets	115
11.9	Image Labels	116
11.10	Internationalization with FLUID	117

11.10.1 I18N Methods	117
11.10.2 Using GNU gettext for I18N	117
11.10.3 Using POSIX catgets for I18N	118
11.11 Known limitations	119
12 10 - Advanced FLTK	121
12.1 Multithreading	122
13 11 - Unicode and utf-8 Support	125
13.1 About Unicode and utf-8	126
13.2 Unicode in FLTK	126
14 C - FLTK Enumerations	129
14.1 Version Numbers	130
14.2 Events	130
14.3 Callback "When" Conditions	131
14.4 Fl::event_button() Values	131
14.5 Fl::event_key() Values	132
14.6 Fl::event_state() Values	133
14.7 Alignment Values	133
14.8 Fonts	134
14.9 Colors	134
14.9.1 Color Constants	135
14.10 Cursors	136
14.11 FD "When" Conditions	136
14.12 Damage Masks	136
15 D - GLUT Compatibility	137
15.1 Using the GLUT Compatibility Header File	138
15.2 Known Problems	138
15.3 Mixing GLUT and FLTK Code	139
15.4 class Fl_Glut_Window	139
16 E - Forms Compatibility	141
16.1 Importing Forms Layout Files	142
16.2 Using the Compatibility Header File	142
16.3 Problems You Will Encounter	142
16.4 Additional Notes	144

17 F - Operating System Issues	147
17.1 Accessing the OS Interfaces	148
17.2 The UNIX (X11) Interface	148
17.2.1 Handling Other X Events	148
17.2.2 Drawing using Xlib	149
17.2.3 Changing the Display, Screen, or X Visual	149
17.2.4 Using a Subclass of Fl_Window for Special X Stuff	150
17.2.5 Setting the Icon of a Window	152
17.2.6 X Resources	152
17.3 The Windows (WIN32) Interface	153
17.3.1 Handling Other WIN32 Messages	153
17.3.2 Drawing Things Using the WIN32 GDI	154
17.3.3 Setting the Icon of a Window	154
17.3.4 How to Not Get a MSDOS Console Window	154
17.3.5 Known WIN32 Bugs and Problems	155
17.4 The MacOS Interface	155
17.4.1 Apple "Quit" Event	155
17.4.2 Apple "Open" Event	156
17.4.3 Drawing Things Using QuickDraw	156
17.4.4 Drawing Things Using Quartz	156
17.4.5 Mac File System Specifics	156
17.4.6 Known MacOS Bugs and Problems	157
18 G - Migrating Code from FLTK 1.0 to 1.1	159
18.1 Color Values	160
18.2 Cut and Paste Support	160
18.3 File Chooser	160
18.4 Function Names	160
18.5 Image Support	161
18.6 Keyboard Navigation	161
19 H - Migrating Code from FLTK 1.1 to 1.3	163
20 I - Developer Information	165
20.1 Non-ASCII characters	168
20.2 Document Structure	169
20.3 Creating Links	169
20.4 Changing Old Links	170

20.5 Paragraph Layout	171
20.6 Hack for missing "tiny.gif" file	172
20.7 5 Navigation Proposals	172
21 J - Software License	173
22 K - Example Source Code	181
22.1 Example Applications	182
22.1.1 adjuster	182
22.1.2 arc	182
22.1.3 ask	182
22.1.4 bitmap	182
22.1.5 blocks	183
22.1.6 boxtyle	183
22.1.7 browser	183
22.1.8 button	183
22.1.9 buttons	183
22.1.10 checkers	183
22.1.11 clock	183
22.1.12 colrowser	184
22.1.13 color_chooser	184
22.1.14 cube	184
22.1.15 CubeView	184
22.1.16 cursor	184
22.1.17 curve	184
22.1.18 demo	184
22.1.19 doublebuffer	185
22.1.20 editor	185
22.1.21 fast_slow	185
22.1.22 file_chooser	185
22.1.23 fonts	185
22.1.24 forms	185
22.1.25 fractals	185
22.1.26 fullscreen	186
22.1.27 gl_overlay	186
22.1.28 glpuzzle	186
22.1.29 hello	186

22.1.30 help	186
22.1.31 iconize	186
22.1.32 image	186
22.1.33 inactive	187
22.1.34 input	187
22.1.35 input_choice	187
22.1.36 keyboard	187
22.1.37 label	187
22.1.38 line_style	187
22.1.39 list_visuals	187
22.1.40 mandelbrot	188
22.1.41 menubar	188
22.1.42 message	188
22.1.43 minimum	188
22.1.44 navigation	188
22.1.45 output	188
22.1.46 overlay	188
22.1.47 pack	189
22.1.48 pixmap_browser	189
22.1.49 pixmap	189
22.1.50 preferences	189
22.1.51 radio	189
22.1.52 resizebox	189
22.1.53 resize	189
22.1.54 scroll	189
22.1.55 shape	190
22.1.56 subwindow	190
22.1.57 sudoku	190
22.1.58 symbols	190
22.1.59 tabs	190
22.1.60 threads	190
22.1.61 tile	191
22.1.62 tiled_image	191
22.1.63 valuators	191
22.1.64 fluid	191

24 Deprecated List	197
25 Module Index	199
25.1 Modules	199
26 Class Index	201
26.1 Class Hierarchy	201
27 Class Index	205
27.1 Class List	205
28 File Index	209
28.1 File List	209
29 Module Documentation	215
29.1 Windows handling functions	215
29.1.1 Detailed Description	216
29.1.2 Function Documentation	216
29.1.2.1 default_atclose	216
29.1.2.2 first_window	216
29.1.2.3 grab	216
29.1.2.4 grab	216
29.1.2.5 modal	217
29.1.2.6 next_window	217
29.1.2.7 set_atclose	217
29.1.3 Variable Documentation	217
29.1.3.1 atclose	217
29.2 Events handling functions	218
29.2.1 Detailed Description	220
29.2.2 Function Documentation	220
29.2.2.1 add_handler	220
29.2.2.2 belowmouse	221
29.2.2.3 belowmouse	221
29.2.2.4 compose	221
29.2.2.5 compose_reset	221
29.2.2.6 event	222
29.2.2.7 event_alt	222
29.2.2.8 event_button	222
29.2.2.9 event_button1	222

29.2.2.10 event_button2	222
29.2.2.11 event_button3	222
29.2.2.12 event_buttons	222
29.2.2.13 event_clicks	223
29.2.2.14 event_clicks	223
29.2.2.15 event_ctrl	223
29.2.2.16 event_dx	223
29.2.2.17 event_dy	223
29.2.2.18 event_inside	223
29.2.2.19 event_inside	224
29.2.2.20 event_is_click	224
29.2.2.21 event_key	224
29.2.2.22 event_key	224
29.2.2.23 event_length	225
29.2.2.24 event_original_key	225
29.2.2.25 event_shift	225
29.2.2.26 event_state	225
29.2.2.27 event_text	226
29.2.2.28 event_x_root	226
29.2.2.29 event_y_root	226
29.2.2.30 focus	226
29.2.2.31 focus	226
29.2.2.32 get_key	226
29.2.2.33 get_mouse	227
29.2.2.34 handle	227
29.2.2.35 pushed	227
29.2.2.36 pushed	227
29.2.2.37 test_shortcut	227
29.3 Selection & Clipboard functions	228
29.3.1 Detailed Description	228
29.3.2 Function Documentation	228
29.3.2.1 copy	228
29.3.2.2 dnd	228
29.3.2.3 paste	229
29.3.2.4 paste	229
29.3.2.5 selection	229

29.3.2.6 selection_owner	229
29.3.2.7 selection_owner	229
29.4 Screen functions	231
29.4.1 Detailed Description	231
29.4.2 Function Documentation	231
29.4.2.1 h	231
29.4.2.2 screen_xywh	231
29.4.2.3 screen_xywh	232
29.4.2.4 screen_xywh	232
29.4.2.5 w	232
29.4.2.6 x	232
29.4.2.7 y	232
29.5 Color & Font functions	233
29.5.1 Detailed Description	233
29.5.2 Function Documentation	234
29.5.2.1 free_color	234
29.5.2.2 get_color	234
29.5.2.3 get_font	234
29.5.2.4 get_font_name	234
29.5.2.5 get_font_sizes	234
29.5.2.6 set_color	234
29.5.2.7 set_color	235
29.5.2.8 set_font	235
29.5.2.9 set_font	235
29.5.2.10 set_fonts	235
29.6 Multithreading support functions	236
29.6.1 Detailed Description	236
29.6.2 Function Documentation	236
29.6.2.1 awake	236
29.6.2.2 awake	236
29.6.2.3 lock	237
29.6.2.4 thread_message	237
29.6.2.5 unlock	237
29.7 Safe widget deletion support functions	238
29.7.1 Detailed Description	238
29.7.2 Function Documentation	238

29.7.2.1	delete_widget	238
29.7.2.2	do_widget_deletion	238
29.7.2.3	watch_widget_pointer	238
29.8	Cairo support functions and classes	240
29.8.1	Function Documentation	240
29.8.1.1	cairo_autolink_context	240
29.8.1.2	cairo_autolink_context	241
29.8.1.3	cairo_cc	241
29.8.1.4	cairo_cc	241
29.8.1.5	cairo_make_current	241
29.9	Common Dialogs classes and functions	242
29.9.1	Function Documentation	243
29.9.1.1	fl_alert	243
29.9.1.2	fl_ask	243
29.9.1.3	fl_choice	244
29.9.1.4	fl_color_chooser	244
29.9.1.5	fl_color_chooser	245
29.9.1.6	fl_dir_chooser	245
29.9.1.7	fl_file_chooser	246
29.9.1.8	fl_file_chooser_callback	246
29.9.1.9	fl_file_chooser_callback	246
29.9.1.10	fl_file_chooser_ok_label	247
29.9.1.11	fl_file_chooser_ok_label	247
29.9.1.12	fl_input	247
29.9.1.13	fl_message	247
29.9.1.14	fl_password	247
29.9.2	Variable Documentation	247
29.9.2.1	error	247
29.9.2.2	fatal	248
29.9.2.3	warning	248
30	Class Documentation	249
30.1	Fl Class Reference	249
30.1.1	Detailed Description	259
30.1.2	Member Function Documentation	259
30.1.2.1	add_awake_handler_	259
30.1.2.2	add_check	259

30.1.2.3 add_fd	260
30.1.2.4 add_idle	260
30.1.2.5 add_timeout	260
30.1.2.6 arg	261
30.1.2.7 args	261
30.1.2.8 background	262
30.1.2.9 background2	262
30.1.2.10 box_dh	263
30.1.2.11 box_dw	263
30.1.2.12 box_dx	263
30.1.2.13 box_dy	263
30.1.2.14 check	263
30.1.2.15 damage	264
30.1.2.16 display	264
30.1.2.17 dnd_text_ops	264
30.1.2.18 dnd_text_ops	264
30.1.2.19 draw_box_active	264
30.1.2.20 flush	264
30.1.2.21 foreground	264
30.1.2.22 get_awake_handler_	265
30.1.2.23 get_boxtyle	265
30.1.2.24 get_system_colors	265
30.1.2.25 gl_visual	265
30.1.2.26 own_colormap	265
30.1.2.27 ready	265
30.1.2.28 release	266
30.1.2.29 reload_scheme	266
30.1.2.30 remove_check	266
30.1.2.31 remove_fd	266
30.1.2.32 remove_fd	266
30.1.2.33 remove_timeout	266
30.1.2.34 repeat_timeout	266
30.1.2.35 run	267
30.1.2.36 scheme	267
30.1.2.37 set_boxtyle	267
30.1.2.38 set_boxtyle	267

30.1.2.39	set_idle	267
30.1.2.40	set_labeltype	267
30.1.2.41	set_labeltype	267
30.1.2.42	version	267
30.1.2.43	visible_focus	268
30.1.2.44	visible_focus	268
30.1.2.45	visual	268
30.1.2.46	wait	268
30.1.3	Member Data Documentation	269
30.1.3.1	help	269
30.1.3.2	idle	269
30.2	Fl_Adjuster Class Reference	271
30.2.1	Detailed Description	271
30.2.2	Constructor & Destructor Documentation	272
30.2.2.1	Fl_Adjuster	272
30.2.3	Member Function Documentation	272
30.2.3.1	draw	272
30.2.3.2	handle	272
30.2.3.3	soft	273
30.2.3.4	soft	273
30.3	Fl_Bitmap Class Reference	274
30.3.1	Detailed Description	275
30.3.2	Constructor & Destructor Documentation	275
30.3.2.1	Fl_Bitmap	275
30.3.2.2	Fl_Bitmap	275
30.3.3	Member Function Documentation	275
30.3.3.1	copy	275
30.3.3.2	copy	275
30.3.3.3	draw	276
30.3.3.4	draw	276
30.3.3.5	label	276
30.3.3.6	label	276
30.3.3.7	uncache	276
30.4	Fl_BMP_Image Class Reference	277
30.4.1	Detailed Description	277
30.4.2	Constructor & Destructor Documentation	277

30.4.2.1	FL_BMP_Image	277
30.5	FL_Box Class Reference	278
30.5.1	Detailed Description	278
30.5.2	Constructor & Destructor Documentation	278
30.5.2.1	FL_Box	278
30.5.3	Member Function Documentation	279
30.5.3.1	draw	279
30.5.3.2	handle	279
30.6	FL_Browser Class Reference	280
30.6.1	Detailed Description	284
30.6.2	Constructor & Destructor Documentation	284
30.6.2.1	FL_Browser	284
30.6.2.2	~FL_Browser	284
30.6.3	Member Function Documentation	284
30.6.3.1	_remove	284
30.6.3.2	add	285
30.6.3.3	bottomline	285
30.6.3.4	column_char	285
30.6.3.5	column_char	285
30.6.3.6	column_widths	285
30.6.3.7	column_widths	285
30.6.3.8	data	285
30.6.3.9	format_char	286
30.6.3.10	format_char	286
30.6.3.11	full_height	286
30.6.3.12	hide	287
30.6.3.13	hide	287
30.6.3.14	incr_height	287
30.6.3.15	insert	287
30.6.3.16	insert	287
30.6.3.17	item_first	287
30.6.3.18	item_next	287
30.6.3.19	item_prev	288
30.6.3.20	item_select	288
30.6.3.21	item_selected	288
30.6.3.22	item_width	288

30.6.3.23	lineposition	288
30.6.3.24	load	288
30.6.3.25	make_visible	288
30.6.3.26	middleline	289
30.6.3.27	replace	289
30.6.3.28	select	289
30.6.3.29	selected	289
30.6.3.30	show	289
30.6.3.31	show	289
30.6.3.32	size	290
30.6.3.33	size	290
30.6.3.34	swap	290
30.6.3.35	text	290
30.6.3.36	topline	290
30.6.3.37	topline	290
30.6.3.38	value	290
30.6.3.39	value	290
30.7	Fl_Browser_ Class Reference	292
30.7.1	Detailed Description	296
30.7.2	Constructor & Destructor Documentation	296
30.7.2.1	Fl_Browser_	296
30.7.3	Member Function Documentation	296
30.7.3.1	deleting	296
30.7.3.2	deselect	296
30.7.3.3	display	296
30.7.3.4	draw	296
30.7.3.5	find_item	296
30.7.3.6	full_height	297
30.7.3.7	full_width	297
30.7.3.8	handle	297
30.7.3.9	has_scrollbar	297
30.7.3.10	incr_height	297
30.7.3.11	inserting	297
30.7.3.12	item_first	298
30.7.3.13	item_height	298
30.7.3.14	item_next	298

30.7.3.15 item_prev	298
30.7.3.16 item_quick_height	298
30.7.3.17 item_select	298
30.7.3.18 item_selected	298
30.7.3.19 item_width	298
30.7.3.20 new_list	299
30.7.3.21 redraw_lines	299
30.7.3.22 replacing	299
30.7.3.23 resize	299
30.7.3.24 scrollbar_left	299
30.7.3.25 scrollbar_right	299
30.7.3.26 select	299
30.7.3.27 select_only	299
30.7.3.28 selection	300
30.7.3.29 top	300
30.7.4 Member Data Documentation	300
30.7.4.1 scrollbar	300
30.8 Fl_Button Class Reference	301
30.8.1 Detailed Description	302
30.8.2 Constructor & Destructor Documentation	303
30.8.2.1 Fl_Button	303
30.8.3 Member Function Documentation	303
30.8.3.1 clear	303
30.8.3.2 down_box	303
30.8.3.3 down_box	303
30.8.3.4 draw	303
30.8.3.5 handle	304
30.8.3.6 set	304
30.8.3.7 shortcut	304
30.8.3.8 shortcut	305
30.8.3.9 value	305
30.9 Fl_Cairo_State Class Reference	306
30.9.1 Detailed Description	306
30.10 Fl_Cairo_Window Class Reference	307
30.10.1 Detailed Description	307
30.11 Fl_Chart Class Reference	309

30.11.1 Detailed Description	310
30.11.2 Constructor & Destructor Documentation	311
30.11.2.1 Fl_Chart	311
30.11.3 Member Function Documentation	311
30.11.3.1 add	311
30.11.3.2 autosize	311
30.11.3.3 autosize	312
30.11.3.4 bounds	312
30.11.3.5 bounds	312
30.11.3.6 draw	312
30.11.3.7 insert	312
30.11.3.8 maxsize	313
30.11.3.9 replace	313
30.11.3.10 size	313
30.11.3.11 textcolor	313
30.11.3.12 textfont	313
30.11.3.13 textszie	314
30.12 FL_CHART_ENTRY Struct Reference	315
30.12.1 Detailed Description	315
30.12.2 Member Data Documentation	315
30.12.2.1 col	315
30.12.2.2 str	315
30.12.2.3 val	315
30.13 Fl_Check_Browser Class Reference	316
30.13.1 Detailed Description	317
30.13.2 Constructor & Destructor Documentation	317
30.13.2.1 Fl_Check_Browser	317
30.13.2.2 ~Fl_Check_Browser	317
30.13.3 Member Function Documentation	318
30.13.3.1 add	318
30.13.3.2 check_all	318
30.13.3.3 check_none	318
30.13.3.4 checked	318
30.13.3.5 checked	318
30.13.3.6 clear	318
30.13.3.7 handle	318

30.13.3.8 <code>nchecked</code>	318
30.13.3.9 <code>nitems</code>	318
30.13.3.10 <code>remove</code>	319
30.13.3.11 <code>set_checked</code>	319
30.13.3.12 <code>text</code>	319
30.13.3.13 <code>value</code>	319
30.14 <code>Fl_Check_Button</code> Class Reference	320
30.14.1 Detailed Description	320
30.14.2 Constructor & Destructor Documentation	321
30.14.2.1 <code>Fl_Check_Button</code>	321
30.15 <code>Fl_Choice</code> Class Reference	322
30.15.1 Detailed Description	322
30.15.2 Constructor & Destructor Documentation	323
30.15.2.1 <code>Fl_Choice</code>	323
30.15.3 Member Function Documentation	324
30.15.3.1 <code>draw</code>	324
30.15.3.2 <code>handle</code>	324
30.15.3.3 <code>value</code>	324
30.15.3.4 <code>value</code>	325
30.15.3.5 <code>value</code>	325
30.16 <code>Fl_Clock</code> Class Reference	326
30.16.1 Detailed Description	326
30.16.2 Constructor & Destructor Documentation	327
30.16.2.1 <code>Fl_Clock</code>	327
30.16.2.2 <code>Fl_Clock</code>	327
30.16.3 Member Function Documentation	328
30.16.3.1 <code>handle</code>	328
30.16.3.2 <code>update</code>	328
30.17 <code>Fl_Clock_Output</code> Class Reference	329
30.17.1 Detailed Description	330
30.17.2 Constructor & Destructor Documentation	330
30.17.2.1 <code>Fl_Clock_Output</code>	330
30.17.3 Member Function Documentation	330
30.17.3.1 <code>draw</code>	330
30.17.3.2 <code>hour</code>	331
30.17.3.3 <code>minute</code>	331

30.17.3.4 second	331
30.17.3.5 value	331
30.17.3.6 value	331
30.17.3.7 value	332
30.18 Fl_Color_Chooser Class Reference	333
30.18.1 Detailed Description	334
30.18.2 Constructor & Destructor Documentation	335
30.18.2.1 Fl_Color_Chooser	335
30.18.3 Member Function Documentation	335
30.18.3.1 b	335
30.18.3.2 g	335
30.18.3.3 hsv	335
30.18.3.4 hsv2rgb	335
30.18.3.5 hue	336
30.18.3.6 r	336
30.18.3.7 rgb	336
30.18.3.8 rgb2hsv	336
30.18.3.9 saturation	336
30.18.3.10 value	337
30.19 Fl_Counter Class Reference	338
30.19.1 Detailed Description	339
30.19.2 Constructor & Destructor Documentation	340
30.19.2.1 Fl_Counter	340
30.19.3 Member Function Documentation	340
30.19.3.1 draw	340
30.19.3.2 handle	340
30.19.3.3 lstep	340
30.19.3.4 step	341
30.19.3.5 step	341
30.20 Fl_Dial Class Reference	342
30.20.1 Detailed Description	343
30.20.2 Constructor & Destructor Documentation	343
30.20.2.1 Fl_Dial	343
30.20.3 Member Function Documentation	343
30.20.3.1 angle1	343
30.20.3.2 draw	344

30.20.3.3 handle	344
30.21 Fl_Double_Window Class Reference	345
30.21.1 Detailed Description	346
30.21.2 Constructor & Destructor Documentation	346
30.21.2.1 ~Fl_Double_Window	346
30.21.3 Member Function Documentation	346
30.21.3.1 flush	346
30.21.3.2 hide	347
30.21.3.3 resize	347
30.21.3.4 show	347
30.22 Fl_End Class Reference	348
30.22.1 Detailed Description	348
30.23 Fl_File_Browser Class Reference	349
30.23.1 Detailed Description	350
30.23.2 Constructor & Destructor Documentation	350
30.23.2.1 Fl_File_Browser	350
30.23.3 Member Function Documentation	350
30.23.3.1 filetype	350
30.23.3.2 filetype	350
30.23.3.3 filter	350
30.23.3.4 filter	350
30.23.3.5 iconsize	350
30.23.3.6 iconsize	351
30.23.3.7 load	351
30.24 Fl_File_Chooser Class Reference	352
30.24.1 Detailed Description	356
30.24.2 Constructor & Destructor Documentation	357
30.24.2.1 Fl_File_Chooser	357
30.24.2.2 ~Fl_File_Chooser	357
30.24.3 Member Function Documentation	357
30.24.3.1 add_extra	357
30.24.3.2 color	358
30.24.3.3 color	358
30.24.3.4 count	358
30.24.3.5 directory	358
30.24.3.6 directory	358

30.24.3.7 filter	358
30.24.3.8 filter_value	358
30.24.3.9 filter_value	358
30.24.3.10 hide	358
30.24.3.11 ico_size	358
30.24.3.12 icon_size	359
30.24.3.13 label	359
30.24.3.14 label	359
30.24.3.15 preview	359
30.24.3.16 preview	359
30.24.3.17 rescan	359
30.24.3.18 show	359
30.24.3.19 text_color	359
30.24.3.20 text_color	359
30.24.3.21 text_font	359
30.24.3.22 text_font	359
30.24.3.23 text_size	360
30.24.3.24 text_size	360
30.24.3.25 type	360
30.24.3.26 type	360
30.24.3.27 value	360
30.24.3.28 visible	360
30.25 FL_File_Icon Class Reference	361
30.25.1 Detailed Description	362
30.25.2 Constructor & Destructor Documentation	362
30.25.2.1 FL_File_Icon	362
30.25.3 Member Function Documentation	363
30.25.3.1 add	363
30.25.3.2 add_color	363
30.25.3.3 add_vertex	363
30.25.3.4 add_vertex	363
30.25.3.5 clear	363
30.25.3.6 draw	364
30.25.3.7 find	364
30.25.3.8 first	364
30.25.3.9 label	364

30.25.3.10	labeltype	364
30.25.3.11	load	365
30.25.3.12	load_fti	365
30.25.3.13	load_image	365
30.25.3.14	load_system_icons	365
30.25.3.15	next	365
30.25.3.16	pattern	365
30.25.3.17	size	366
30.25.3.18	type	366
30.25.3.19	value	366
30.26	Fl_File_Input Class Reference	367
30.26.1	Detailed Description	368
30.26.2	Constructor & Destructor Documentation	368
30.26.2.1	Fl_File_Input	368
30.26.3	Member Function Documentation	368
30.26.3.1	down_box	368
30.26.3.2	down_box	368
30.26.3.3	errorcolor	368
30.26.3.4	handle	369
30.26.3.5	value	369
30.26.3.6	value	369
30.27	Fl_Fill_Dial Class Reference	370
30.27.1	Detailed Description	370
30.27.2	Constructor & Destructor Documentation	370
30.27.2.1	Fl_Fill_Dial	370
30.28	Fl_Fill_Slider Class Reference	371
30.28.1	Detailed Description	371
30.28.2	Constructor & Destructor Documentation	371
30.28.2.1	Fl_Fill_Slider	371
30.29	Fl_Float_Input Class Reference	372
30.29.1	Detailed Description	372
30.29.2	Constructor & Destructor Documentation	372
30.29.2.1	Fl_Float_Input	372
30.30	Fl_Font_Descriptor Class Reference	373
30.30.1	Detailed Description	373
30.31	Fl_FormsBitmap Class Reference	374

30.31.1 Detailed Description	374
30.31.2 Member Function Documentation	374
30.31.2.1 bitmap	374
30.31.2.2 bitmap	374
30.31.2.3 draw	375
30.31.2.4 set	375
30.32 Fl_FormsPixmap Class Reference	376
30.32.1 Detailed Description	376
30.32.2 Constructor & Destructor Documentation	376
30.32.2.1 Fl_FormsPixmap	376
30.32.3 Member Function Documentation	377
30.32.3.1 draw	377
30.32.3.2 Pixmap	377
30.32.3.3 Pixmap	377
30.32.3.4 set	377
30.33 Fl_Free Class Reference	378
30.33.1 Detailed Description	378
30.33.2 Constructor & Destructor Documentation	379
30.33.2.1 Fl_Free	379
30.33.3 Member Function Documentation	379
30.33.3.1 draw	379
30.33.3.2 handle	379
30.34 Fl_GIF_Image Class Reference	381
30.34.1 Detailed Description	381
30.34.2 Constructor & Destructor Documentation	381
30.34.2.1 Fl_GIF_Image	381
30.35 Fl_Gl_Window Class Reference	382
30.35.1 Detailed Description	384
30.35.2 Constructor & Destructor Documentation	384
30.35.2.1 Fl_Gl_Window	384
30.35.2.2 Fl_Gl_Window	384
30.35.3 Member Function Documentation	385
30.35.3.1 can_do	385
30.35.3.2 can_do	385
30.35.3.3 can_do	385
30.35.3.4 can_do_overlay	385

30.35.3.5 context	385
30.35.3.6 context_valid	385
30.35.3.7 draw	385
30.35.3.8 flush	386
30.35.3.9 make_current	386
30.35.3.10make_overlay_current	386
30.35.3.11mode	386
30.35.3.12ortho	387
30.35.3.13redraw_overlay	387
30.35.3.14resize	387
30.35.3.15show	387
30.35.3.16swap_buffers	387
30.35.3.17valid	388
30.36Fl_Glut_Bitmap_Font Struct Reference	389
30.36.1 Detailed Description	389
30.37Fl_Glut_Window Class Reference	390
30.37.1 Detailed Description	391
30.37.2 Constructor & Destructor Documentation	391
30.37.2.1 Fl_Glut_Window	391
30.37.2.2 ~Fl_Glut_Window	391
30.37.3 Member Function Documentation	391
30.37.3.1 draw	391
30.37.3.2 draw_overlay	391
30.37.3.3 handle	392
30.37.3.4 make_current	392
30.38Fl_Group Class Reference	393
30.38.1 Detailed Description	396
30.38.2 Constructor & Destructor Documentation	396
30.38.2.1 Fl_Group	396
30.38.2.2 ~Fl_Group	396
30.38.3 Member Function Documentation	396
30.38.3.1 array	396
30.38.3.2 begin	396
30.38.3.3 child	396
30.38.3.4 clear	397
30.38.3.5 clip_children	397

30.38.3.6 current	397
30.38.3.7 draw	397
30.38.3.8 draw_child	397
30.38.3.9 draw_children	397
30.38.3.10 draw_outside_label	398
30.38.3.11 lend	398
30.38.3.12 find	398
30.38.3.13 focus	398
30.38.3.14 handle	398
30.38.3.15 init_sizes	399
30.38.3.16 insert	399
30.38.3.17 insert	399
30.38.3.18 remove	399
30.38.3.19 remove	399
30.38.3.20 resizable	399
30.38.3.21 resize	400
30.38.3.22 sizes	401
30.38.3.23 update_child	401
30.39 Fl_Help_Dialog Class Reference	402
30.39.1 Detailed Description	403
30.39.2 Constructor & Destructor Documentation	403
30.39.2.1 Fl_Help_Dialog	403
30.39.3 Member Function Documentation	403
30.39.3.1 h	403
30.39.3.2 hide	404
30.39.3.3 load	404
30.39.3.4 position	404
30.39.3.5 resize	404
30.39.3.6 show	404
30.39.3.7 textSize	404
30.39.3.8 textSize	404
30.39.3.9 value	404
30.39.3.10 value	404
30.39.3.11 visible	405
30.39.3.12 w	405
30.39.3.13 x	405

30.39.3.14y	405
30.40Fl_Help_Link Struct Reference	406
30.40.1 Detailed Description	406
30.41Fl_Help_Target Struct Reference	407
30.41.1 Detailed Description	407
30.42Fl_Help_View Class Reference	408
30.42.1 Detailed Description	410
30.42.2 Constructor & Destructor Documentation	410
30.42.2.1 ~Fl_Help_View	410
30.42.3 Member Function Documentation	410
30.42.3.1 clear_selection	410
30.42.3.2 directory	410
30.42.3.3 filename	410
30.42.3.4 leftline	410
30.42.3.5 leftline	410
30.42.3.6 link	410
30.42.3.7 load	411
30.42.3.8 resize	411
30.42.3.9 select_all	411
30.42.3.10size	411
30.42.3.11textcolor	411
30.42.3.12textcolor	411
30.42.3.13textfont	411
30.42.3.14textfont	411
30.42.3.15textsize	412
30.42.3.16textsize	412
30.42.3.17title	412
30.42.3.18topline	412
30.42.3.19topline	412
30.42.3.20value	412
30.42.3.21value	412
30.43Fl_Hold_Browser Class Reference	413
30.43.1 Detailed Description	413
30.43.2 Constructor & Destructor Documentation	413
30.43.2.1 Fl_Hold_Browser	413
30.44Fl_Image Class Reference	414

30.44.1 Detailed Description	416
30.44.2 Constructor & Destructor Documentation	416
30.44.2.1 <code>FL_Image</code>	416
30.44.3 Member Function Documentation	416
30.44.3.1 <code>color_average</code>	416
30.44.3.2 <code>copy</code>	416
30.44.3.3 <code>copy</code>	416
30.44.3.4 <code>count</code>	416
30.44.3.5 <code>d</code>	417
30.44.3.6 <code>d</code>	417
30.44.3.7 <code>data</code>	417
30.44.3.8 <code>desaturate</code>	417
30.44.3.9 <code>draw</code>	417
30.44.3.10 <code>draw</code>	417
30.44.3.11 <code>draw_empty</code>	417
30.44.3.12 <code>h</code>	418
30.44.3.13 <code>inactive</code>	418
30.44.3.14 <code>label</code>	418
30.44.3.15 <code>label</code>	418
30.44.3.16 <code>d</code>	418
30.44.3.17 <code>uncache</code>	418
30.44.3.18 <code>w</code>	418
30.45 <code>FL_Input</code> Class Reference	419
30.45.1 Detailed Description	419
30.45.2 Constructor & Destructor Documentation	421
30.45.2.1 <code>FL_Input</code>	421
30.45.3 Member Function Documentation	421
30.45.3.1 <code>draw</code>	421
30.45.3.2 <code>handle</code>	421
30.46 <code>FL_Input_</code> Class Reference	423
30.46.1 Detailed Description	426
30.46.2 Constructor & Destructor Documentation	426
30.46.2.1 <code>FL_Input_</code>	426
30.46.3 Member Function Documentation	426
30.46.3.1 <code>copy</code>	426
30.46.3.2 <code>copy_cuts</code>	427

30.46.3.3 cursor_color	427
30.46.3.4 cursor_color	427
30.46.3.5 cut	427
30.46.3.6 drawtext	427
30.46.3.7 index	427
30.46.3.8 input_type	427
30.46.3.9 input_type	427
30.46.3.10 insert	428
30.46.3.11 mark	428
30.46.3.12 mark	428
30.46.3.13 maximum_size	428
30.46.3.14 maximum_size	428
30.46.3.15 position	428
30.46.3.16 readonly	428
30.46.3.17 readonly	428
30.46.3.18 replace	428
30.46.3.19 resize	429
30.46.3.20 shortcut	429
30.46.3.21 lsize	429
30.46.3.22 size	430
30.46.3.23 static_value	430
30.46.3.24 textcolor	430
30.46.3.25 textcolor	430
30.46.3.26 textfont	430
30.46.3.27 textfont	430
30.46.3.28 textsize	430
30.46.3.29 textsize	430
30.46.3.30 undo	431
30.46.3.31 lup_down_position	431
30.46.3.32 value	431
30.46.3.33 wrap	431
30.46.3.34 wrap	431
30.47 Fl_Input_Choice Class Reference	432
30.47.1 Detailed Description	433
30.47.2 Constructor & Destructor Documentation	434
30.47.2.1 Fl_Input_Choice	434

30.47.3 Member Function Documentation	434
30.47.3.1 add	434
30.47.3.2 changed	434
30.47.3.3 clear	434
30.47.3.4 clear_changed	434
30.47.3.5 input	434
30.47.3.6 menu	435
30.47.3.7 menu	435
30.47.3.8 menubutton	435
30.47.3.9 resize	435
30.47.3.10 set_changed	435
30.47.3.11 value	435
30.48 Fl_Int_Input Class Reference	436
30.48.1 Detailed Description	436
30.48.2 Constructor & Destructor Documentation	436
30.48.2.1 Fl_Int_Input	436
30.49 Fl_JPEG_Image Class Reference	437
30.49.1 Detailed Description	437
30.49.2 Constructor & Destructor Documentation	437
30.49.2.1 Fl_JPEG_Image	437
30.50 Fl_Label Struct Reference	438
30.50.1 Detailed Description	438
30.50.2 Member Function Documentation	439
30.50.2.1 draw	439
30.50.2.2 measure	439
30.50.3 Member Data Documentation	439
30.50.3.1 type	439
30.51 Fl_Light_Button Class Reference	440
30.51.1 Detailed Description	440
30.51.2 Constructor & Destructor Documentation	441
30.51.2.1 Fl_Light_Button	441
30.51.3 Member Function Documentation	441
30.51.3.1 draw	441
30.51.3.2 handle	441
30.52 Fl_Menu_ Class Reference	443
30.52.1 Detailed Description	445

30.52.2 Constructor & Destructor Documentation	446
30.52.2.1 Fl_Menu_	446
30.52.3 Member Function Documentation	446
30.52.3.1 add	446
30.52.3.2 add	446
30.52.3.3 clear	447
30.52.3.4 copy	447
30.52.3.5 down_box	447
30.52.3.6 find_item	447
30.52.3.7 global	447
30.52.3.8 menu	447
30.52.3.9 menu	447
30.52.3.10 mode	448
30.52.3.11 lmode	448
30.52.3.12 mvalue	448
30.52.3.13 picked	448
30.52.3.14 remove	448
30.52.3.15 replace	448
30.52.3.16 shortcut	448
30.52.3.17 size	448
30.52.3.18 &size	449
30.52.3.19 test_shortcut	449
30.52.3.20 text	449
30.52.3.21 ltext	449
30.52.3.22 extcolor	449
30.52.3.23 textcolor	449
30.52.3.24 textfont	449
30.52.3.25 textfont	449
30.52.3.26 textsize	449
30.52.3.27 &textsize	450
30.52.3.28 value	450
30.52.3.29 value	450
30.52.3.30 value	450
30.53 Fl_Menu_Bar Class Reference	451
30.53.1 Detailed Description	451
30.53.2 Constructor & Destructor Documentation	452

30.53.2.1 <code>Fl_Menu_Bar</code>	452
30.53.3 Member Function Documentation	452
30.53.3.1 <code>draw</code>	452
30.53.3.2 <code>handle</code>	452
30.54 <code>Fl_Menu_Button</code> Class Reference	454
30.54.1 Detailed Description	454
30.54.2 Constructor & Destructor Documentation	455
30.54.2.1 <code>Fl_Menu_Button</code>	455
30.54.3 Member Function Documentation	455
30.54.3.1 <code>draw</code>	455
30.54.3.2 <code>handle</code>	456
30.54.3.3 <code>popup</code>	456
30.55 <code>Fl_Menu_Item</code> Struct Reference	457
30.55.1 Detailed Description	461
30.55.2 Member Function Documentation	462
30.55.2.1 <code>activate</code>	462
30.55.2.2 <code>active</code>	463
30.55.2.3 <code>activevisible</code>	463
30.55.2.4 <code>add</code>	463
30.55.2.5 <code>argument</code>	463
30.55.2.6 <code>argument</code>	463
30.55.2.7 <code>callback</code>	463
30.55.2.8 <code>check</code>	463
30.55.2.9 <code>checkbox</code>	463
30.55.2.10 <code>checked</code>	464
30.55.2.11 <code>clear</code>	464
30.55.2.12 <code>deactivate</code>	464
30.55.2.13 <code>do_callback</code>	464
30.55.2.14 <code>do_callback</code>	464
30.55.2.15 <code>do_callback</code>	464
30.55.2.16 <code>draw</code>	464
30.55.2.17 <code>find_shortcut</code>	464
30.55.2.18 <code>first</code>	465
30.55.2.19 <code>first</code>	465
30.55.2.20 <code>hide</code>	465
30.55.2.21 <code>label</code>	465

30.55.2.2 <code>labelcolor</code>	465
30.55.2.23 <code>labelfont</code>	465
30.55.2.24 <code>labelfont</code>	465
30.55.2.25 <code>labelsize</code>	465
30.55.2.26 <code>labelsize</code>	465
30.55.2.27 <code>labeltype</code>	466
30.55.2.28 <code>labeltype</code>	466
30.55.2.29 <code>measure</code>	466
30.55.2.30 <code>next</code>	466
30.55.2.31 <code>next</code>	466
30.55.2.32 <code>popup</code>	466
30.55.2.33 <code>popupdown</code>	467
30.55.2.34 <code>radio</code>	467
30.55.2.35 <code>set</code>	467
30.55.2.36 <code>setonly</code>	467
30.55.2.37 <code>shortcut</code>	467
30.55.2.38 <code>shortcut</code>	467
30.55.2.39 <code>show</code>	467
30.55.2.40 <code>submenu</code>	468
30.55.2.41 <code>test_shortcut</code>	468
30.55.2.42 <code>uncheck</code>	468
30.55.2.43 <code>value</code>	468
30.55.2.44 <code>visible</code>	468
30.56<code>Fl_Menu_Window</code> Class Reference	469
30.56.1 Detailed Description	470
30.56.2 Constructor & Destructor Documentation	470
30.56.2.1 <code>~Fl_Menu_Window</code>	470
30.56.2.2 <code>Fl_Menu_Window</code>	470
30.56.2.3 <code>Fl_Menu_Window</code>	470
30.56.3 Member Function Documentation	470
30.56.3.1 <code>clear_overlay</code>	470
30.56.3.2 <code>flush</code>	470
30.56.3.3 <code>hide</code>	470
30.56.3.4 <code>set_overlay</code>	470
30.56.3.5 <code>show</code>	471
30.57<code>Fl_Multi_Browser</code> Class Reference	472

30.57.1 Detailed Description	472
30.57.2 Constructor & Destructor Documentation	472
30.57.2.1 Fl_Multi_Browser	472
30.58 Fl_Multiline_Input Class Reference	473
30.58.1 Detailed Description	473
30.58.2 Constructor & Destructor Documentation	473
30.58.2.1 Fl_Multiline_Input	473
30.59 Fl_Multiline_Output Class Reference	474
30.59.1 Detailed Description	474
30.59.2 Constructor & Destructor Documentation	474
30.59.2.1 Fl_Multiline_Output	474
30.60 Fl_Output Class Reference	475
30.60.1 Detailed Description	475
30.60.2 Constructor & Destructor Documentation	476
30.60.2.1 Fl_Output	476
30.61 Fl_Overlay_Window Class Reference	477
30.61.1 Detailed Description	478
30.61.2 Constructor & Destructor Documentation	478
30.61.2.1 Fl_Overlay_Window	478
30.61.3 Member Function Documentation	478
30.61.3.1 hide	478
30.61.3.2 redraw_overlay	478
30.61.3.3 resize	478
30.61.3.4 show	479
30.62 Fl_Pack Class Reference	480
30.62.1 Detailed Description	480
30.62.2 Constructor & Destructor Documentation	481
30.62.2.1 Fl_Pack	481
30.62.3 Member Function Documentation	481
30.62.3.1 draw	481
30.63 Fl_Pixmap Class Reference	482
30.63.1 Detailed Description	483
30.63.2 Constructor & Destructor Documentation	483
30.63.2.1 Fl_Pixmap	483
30.63.2.2 Fl_Pixmap	483
30.63.2.3 Fl_Pixmap	483

30.63.2.4 FL_Pixmap	483
30.63.3 Member Function Documentation	484
30.63.3.1 color_average	484
30.63.3.2 copy	484
30.63.3.3 copy	484
30.63.3.4 desaturate	484
30.63.3.5 draw	484
30.63.3.6 draw	484
30.63.3.7 label	485
30.63.3.8 label	485
30.63.3.9 uncache	485
30.64 FL_PNG_Image Class Reference	486
30.64.1 Detailed Description	486
30.64.2 Constructor & Destructor Documentation	486
30.64.2.1 FL_PNG_Image	486
30.65 FL_PNM_Image Class Reference	487
30.65.1 Detailed Description	487
30.65.2 Constructor & Destructor Documentation	487
30.65.2.1 FL_PNM_Image	487
30.66 FL_Positioner Class Reference	488
30.66.1 Detailed Description	489
30.66.2 Constructor & Destructor Documentation	490
30.66.2.1 FL_Positioner	490
30.66.3 Member Function Documentation	490
30.66.3.1 draw	490
30.66.3.2 handle	490
30.66.3.3 value	490
30.66.3.4 xbounds	491
30.66.3.5 xstep	491
30.66.3.6 xvalue	491
30.66.3.7 xvalue	491
30.66.3.8 ybounds	491
30.66.3.9 ystep	491
30.66.3.10 yvalue	491
30.66.3.1 lyvalue	491
30.67 FL_Preferences Class Reference	492

30.67.1 Detailed Description	494
30.67.2 Member Enumeration Documentation	494
30.67.2.1 Root	494
30.67.3 Constructor & Destructor Documentation	495
30.67.3.1 Fl_Preferences	495
30.67.3.2 Fl_Preferences	495
30.67.3.3 Fl_Preferences	496
30.67.3.4 Fl_Preferences	496
30.67.3.5 ~Fl_Preferences	496
30.67.4 Member Function Documentation	496
30.67.4.1 deleteEntry	496
30.67.4.2 deleteGroup	497
30.67.4.3 entries	497
30.67.4.4 entry	497
30.67.4.5 entryExists	498
30.67.4.6 flush	498
30.67.4.7 get	498
30.67.4.8 get	499
30.67.4.9 get	499
30.67.4.10get	499
30.67.4.11get	500
30.67.4.12get	500
30.67.4.13get	500
30.67.4.14getUserdataPath	501
30.67.4.15group	501
30.67.4.16groupExists	502
30.67.4.17groups	502
30.67.4.18&set	502
30.67.4.19set	502
30.67.4.20set	503
30.67.4.21set	503
30.67.4.22set	503
30.67.4.23set	504
30.67.4.24set	504
30.67.4.25size	504
30.68Fl_Preferences::Entry Struct Reference	505

30.68.1 Detailed Description	505
30.69 FL_Preferences::Name Class Reference	506
30.69.1 Detailed Description	506
30.69.2 Constructor & Destructor Documentation	506
30.69.2.1 Name	506
30.69.2.2 Name	506
30.70 FL_Progress Class Reference	508
30.70.1 Detailed Description	508
30.70.2 Constructor & Destructor Documentation	509
30.70.2.1 FL_Progress	509
30.70.3 Member Function Documentation	509
30.70.3.1 draw	509
30.70.3.2 maximum	509
30.70.3.3 maximum	509
30.70.3.4 minimum	509
30.70.3.5 minimum	509
30.70.3.6 value	509
30.70.3.7 value	509
30.71 FL_Repeat_Button Class Reference	510
30.71.1 Detailed Description	510
30.71.2 Constructor & Destructor Documentation	510
30.71.2.1 FL_Repeat_Button	510
30.71.3 Member Function Documentation	510
30.71.3.1 deactivate	510
30.71.3.2 handle	511
30.72 FL_Return_Button Class Reference	512
30.72.1 Detailed Description	512
30.72.2 Constructor & Destructor Documentation	513
30.72.2.1 FL_Return_Button	513
30.72.3 Member Function Documentation	513
30.72.3.1 draw	513
30.72.3.2 handle	513
30.73 FL_RGB_Image Class Reference	515
30.73.1 Detailed Description	516
30.73.2 Constructor & Destructor Documentation	516
30.73.2.1 FL_RGB_Image	516

30.73.2.2 ~Fl_RGB_Image	516
30.73.3 Member Function Documentation	516
30.73.3.1 color_average	516
30.73.3.2 copy	516
30.73.3.3 copy	517
30.73.3.4 desaturate	517
30.73.3.5 draw	517
30.73.3.6 draw	517
30.73.3.7 label	517
30.73.3.8 label	517
30.73.3.9 uncache	517
30.74 Fl_Roller Class Reference	519
30.74.1 Detailed Description	519
30.74.2 Constructor & Destructor Documentation	520
30.74.2.1 Fl_Roller	520
30.74.3 Member Function Documentation	520
30.74.3.1 draw	520
30.74.3.2 handle	520
30.75 Fl_Round_Button Class Reference	521
30.75.1 Detailed Description	521
30.76 Fl_Round_Clock Class Reference	523
30.76.1 Detailed Description	523
30.76.2 Constructor & Destructor Documentation	523
30.76.2.1 Fl_Round_Clock	523
30.77 Fl_Scroll Class Reference	524
30.77.1 Detailed Description	525
30.77.2 Constructor & Destructor Documentation	526
30.77.2.1 Fl_Scroll	526
30.77.3 Member Function Documentation	526
30.77.3.1 clear	526
30.77.3.2 draw	526
30.77.3.3 handle	526
30.77.3.4 resize	527
30.77.3.5 scroll_to	527
30.77.3.6 xposition	527
30.77.3.7 yposition	527

30.78	Fl_Scrollbar Class Reference	528
30.78.1	Detailed Description	529
30.78.2	Constructor & Destructor Documentation	529
30.78.2.1	Fl_Scrollbar	529
30.78.2.2	~Fl_Scrollbar	529
30.78.3	Member Function Documentation	529
30.78.3.1	draw	529
30.78.3.2	handle	530
30.78.3.3	linesize	530
30.78.3.4	linesize	530
30.78.3.5	value	530
30.79	Fl_Secret_Input Class Reference	531
30.79.1	Detailed Description	531
30.79.2	Constructor & Destructor Documentation	531
30.79.2.1	Fl_Secret_Input	531
30.80	Fl_Select_Browser Class Reference	532
30.80.1	Detailed Description	532
30.80.2	Constructor & Destructor Documentation	532
30.80.2.1	Fl_Select_Browser	532
30.81	Fl_Shared_Image Class Reference	533
30.81.1	Detailed Description	535
30.81.2	Constructor & Destructor Documentation	535
30.81.2.1	Fl_Shared_Image	535
30.81.2.2	Fl_Shared_Image	535
30.81.2.3	~Fl_Shared_Image	535
30.81.3	Member Function Documentation	535
30.81.3.1	color_average	535
30.81.3.2	copy	536
30.81.3.3	copy	536
30.81.3.4	desaturate	536
30.81.3.5	draw	536
30.81.3.6	draw	536
30.81.3.7	get	536
30.81.3.8	num_images	537
30.81.3.9	refcount	537
30.81.3.10	release	537

30.81.3.1 <code>luncache</code>	537
30.82 <code>FL_Simple_Counter</code> Class Reference	538
30.82.1 Detailed Description	538
30.83 <code>FL_Single_Window</code> Class Reference	539
30.83.1 Detailed Description	539
30.83.2 Member Function Documentation	540
30.83.2.1 <code>flush</code>	540
30.83.2.2 <code>make_current</code>	540
30.83.2.3 <code>show</code>	540
30.84 <code>FL_Slider</code> Class Reference	541
30.84.1 Detailed Description	542
30.84.2 Constructor & Destructor Documentation	542
30.84.2.1 <code>Fl_Slider</code>	542
30.84.2.2 <code>Fl_Slider</code>	542
30.84.3 Member Function Documentation	543
30.84.3.1 <code>bounds</code>	543
30.84.3.2 <code>draw</code>	543
30.84.3.3 <code>handle</code>	543
30.84.3.4 <code>scrollvalue</code>	543
30.84.3.5 <code>slider</code>	544
30.84.3.6 <code>slider</code>	544
30.84.3.7 <code>slider_size</code>	544
30.84.3.8 <code>slider_size</code>	544
30.85 <code>FL_Spinner</code> Class Reference	545
30.85.1 Detailed Description	546
30.85.2 Constructor & Destructor Documentation	547
30.85.2.1 <code>Fl_Spinner</code>	547
30.85.3 Member Function Documentation	547
30.85.3.1 <code>format</code>	547
30.85.3.2 <code>format</code>	547
30.85.3.3 <code>handle</code>	547
30.85.3.4 <code>maximum</code>	547
30.85.3.5 <code>maximum</code>	547
30.85.3.6 <code>maxnum</code>	548
30.85.3.7 <code>minimum</code>	548
30.85.3.8 <code>minimum</code>	548

30.85.3.9 <code>minum</code>	548
30.85.3.10 <code>range</code>	548
30.85.3.11 <code>resize</code>	548
30.85.3.12 <code>step</code>	548
30.85.3.13 <code>textcolor</code>	549
30.85.3.14 <code>textcolor</code>	549
30.85.3.15 <code>textfont</code>	549
30.85.3.16 <code>textfont</code>	549
30.85.3.17 <code>textsize</code>	549
30.85.3.18 <code>textsize</code>	549
30.85.3.19 <code>type</code>	549
30.85.3.20 <code>value</code>	549
30.85.3.21 <code>value</code>	549
30.86 <code>FL_Tabs</code> Class Reference	550
30.86.1 Detailed Description	550
30.86.2 Constructor & Destructor Documentation	551
30.86.2.1 <code>FL_Tabs</code>	551
30.86.3 Member Function Documentation	552
30.86.3.1 <code>draw</code>	552
30.86.3.2 <code>handle</code>	552
30.86.3.3 <code>value</code>	552
30.86.3.4 <code>value</code>	552
30.87 <code>FL_Text_Buffer</code> Class Reference	554
30.87.1 Detailed Description	561
30.87.2 Constructor & Destructor Documentation	562
30.87.2.1 <code>FL_Text_Buffer</code>	562
30.87.3 Member Function Documentation	562
30.87.3.1 <code>add_modify_callback</code>	562
30.87.3.2 <code>add_predelete_callback</code>	562
30.87.3.3 <code>append</code>	562
30.87.3.4 <code>appendfile</code>	562
30.87.3.5 <code>character</code>	562
30.87.3.6 <code>character_width</code>	562
30.87.3.7 <code>clear_rectangular</code>	563
30.87.3.8 <code>count_displayed_characters</code>	563
30.87.3.9 <code>count_lines</code>	563

30.87.3.10	expand_character	563
30.87.3.11	expand_character	563
30.87.3.12	findchar_backward	563
30.87.3.13	findchar_forward	563
30.87.3.14	findchars_backward	564
30.87.3.15	findchars_forward	564
30.87.3.16	highlight	564
30.87.3.17	highlight	564
30.87.3.18	highlight_position	564
30.87.3.19	highlight_position	564
30.87.3.20	highlight_selection	564
30.87.3.21	highlight_text	564
30.87.3.22	insert	565
30.87.3.23	insert_	565
30.87.3.24	insert_column	565
30.87.3.25	insert_column_	565
30.87.3.26	insertfile	565
30.87.3.27	length	565
30.87.3.28	line_start	565
30.87.3.29	line_text	565
30.87.3.30	null_substitution_character	566
30.87.3.31	loutputfile	566
30.87.3.32	overlay_rectangular	566
30.87.3.33	overlay_rectangular_	566
30.87.3.34	primary_selection	566
30.87.3.35	rectangular_selection_boundaries	566
30.87.3.36	remove	566
30.87.3.37	remove_	567
30.87.3.38	remove_modify_callback	567
30.87.3.39	remove_pdelete_callback	567
30.87.3.40	remove_rectangular_	567
30.87.3.41	remove_secondary_selection	567
30.87.3.42	remove_selection	567
30.87.3.43	remove_selection_	567
30.87.3.44	replace_rectangular	567
30.87.3.45	replace_secondary_selection	567

30.87.3.46replace_selection	568
30.87.3.47replace_selection_	568
30.87.3.48rewind_lines	568
30.87.3.49secondary_select	568
30.87.3.50secondary_selection	568
30.87.3.51secondary_selection_position	568
30.87.3.52secondary_selection_position	568
30.87.3.53secondary_selection_text	568
30.87.3.54secondary_unselect	568
30.87.3.55select	568
30.87.3.56selection_text	569
30.87.3.57substitute_null_characters	569
30.87.3.58tab_distance	569
30.87.3.59text	569
30.87.3.60text_in_rectangle	569
30.87.3.61text_range	569
30.87.3.62unhighlight	569
30.87.3.63unsubstitute_null_characters	569
30.87.3.64word_end	570
30.87.4 Member Data Documentation	570
30.87.4.1 mModifyProcs	570
30.87.4.2 mNullSubsChar	570
30.87.4.3 mPredeleteProcs	570
30.87.4.4 mTabDist	570
30.88 Fl_Text_Display Class Reference	571
30.88.1 Detailed Description	578
30.88.2 Constructor & Destructor Documentation	578
30.88.2.1 Fl_Text_Display	578
30.88.2.2 ~Fl_Text_Display	578
30.88.3 Member Function Documentation	578
30.88.3.1 buffer	578
30.88.3.2 buffer	578
30.88.3.3 calc_line_starts	578
30.88.3.4 count_lines	578
30.88.3.5 cursor_color	579
30.88.3.6 cursor_color	579

30.88.3.7 cursor_style	579
30.88.3.8 display_insert	579
30.88.3.9 draw	579
30.88.3.10 draw_line_numbers	579
30.88.3.11 draw_range	579
30.88.3.12 draw_string	580
30.88.3.13 draw_text	580
30.88.3.14 find_line_end	580
30.88.3.15 find_wrap_range	580
30.88.3.16 get_absolute_top_line_number	580
30.88.3.17 handle	580
30.88.3.18 highlight_data	581
30.88.3.19 insert	581
30.88.3.20 line_end	581
30.88.3.21 maintain_absolute_top_line_number	582
30.88.3.22 measure_deleted_lines	582
30.88.3.23 measure_proportional_character	582
30.88.3.24 move_down	582
30.88.3.25 move_left	582
30.88.3.26 move_right	582
30.88.3.27 move_up	583
30.88.3.28 next_word	583
30.88.3.29 offset_line_starts	583
30.88.3.30 overstrike	583
30.88.3.31 position_style	583
30.88.3.32 position_to_line	583
30.88.3.33 position_to_linecol	583
30.88.3.34 position_to_xy	584
30.88.3.35 previous_word	584
30.88.3.36 redisplay_range	584
30.88.3.37 reset_absolute_top_line_number	584
30.88.3.38 scroll	584
30.88.3.39 scrollbar_width	584
30.88.3.40 scrollbar_width	584
30.88.3.41 shortcut	584
30.88.3.42 shortcut	584

30.88.3.43	show_insert_position	585
30.88.3.44	skip_lines	585
30.88.3.45	textcolor	585
30.88.3.46	textcolor	585
30.88.3.47	textfont	585
30.88.3.48	textfont	585
30.88.3.49	textsize	585
30.88.3.50	textsize	585
30.88.3.51	lword_end	585
30.88.3.52	word_start	585
30.88.3.53	wrap_mode	585
30.88.3.54	wrap_uses_character	586
30.88.3.55	wrapped_column	586
30.88.3.56	wrapped_line_counter	586
30.88.3.57	wrapped_row	586
30.88.3.58	y_to_position	586
30.88.3.59	xy_to_rowcol	587
30.89	Fl_Text_Display::Style_Table_Entry Struct Reference	588
30.89.1	Detailed Description	588
30.90	Fl_Text_Editor Class Reference	589
30.90.1	Detailed Description	592
30.90.2	Constructor & Destructor Documentation	592
30.90.2.1	Fl_Text_Editor	592
30.90.3	Member Function Documentation	592
30.90.3.1	add_default_key_bindings	592
30.90.3.2	bound_key_function	592
30.90.3.3	bound_key_function	592
30.90.3.4	default_key_function	592
30.90.3.5	handle	592
30.90.3.6	insert_mode	593
30.90.3.7	insert_mode	593
30.90.3.8	kf_backspace	593
30.90.3.9	kf_c_s_move	593
30.90.3.10	kf_copy	593
30.90.3.11	kf_cut	593
30.90.3.12	kf_delete	593

30.90.3.13kf_down	594
30.90.3.14kf_end	594
30.90.3.15kf_home	594
30.90.3.16kf_insert	594
30.90.3.17kf_left	594
30.90.3.18kf_move	594
30.90.3.19kf_page_down	594
30.90.3.20kf_page_up	594
30.90.3.21kf_paste	594
30.90.3.22kf_right	594
30.90.3.23kf_select_all	594
30.90.3.24kf_shift_move	595
30.90.3.25kf_undo	595
30.90.3.26kf_up	595
30.90.3.27remove_all_key_bindings	595
30.90.3.28remove_all_key_bindings	595
30.90.3.29remove_key_binding	595
30.91Fl_Text_Editor::Key_Binding Struct Reference	596
30.91.1 Detailed Description	596
30.92Fl_Text_Selection Class Reference	597
30.92.1 Detailed Description	597
30.93Fl_Tile Class Reference	599
30.93.1 Detailed Description	599
30.93.2 Constructor & Destructor Documentation	600
30.93.2.1 Fl_Tile	600
30.93.3 Member Function Documentation	600
30.93.3.1 handle	600
30.93.3.2 position	601
30.93.3.3 resize	601
30.94Fl_Tiled_Image Class Reference	602
30.94.1 Detailed Description	603
30.94.2 Constructor & Destructor Documentation	603
30.94.2.1 Fl_Tiled_Image	603
30.94.3 Member Function Documentation	603
30.94.3.1 color_average	603
30.94.3.2 copy	603

30.94.3.3 <code>copy</code>	603
30.94.3.4 <code>desaturate</code>	603
30.94.3.5 <code>draw</code>	604
30.94.3.6 <code>draw</code>	604
30.95 <code>FL_Timer</code> Class Reference	605
30.95.1 Detailed Description	606
30.95.2 Constructor & Destructor Documentation	606
30.95.2.1 <code>FL_Timer</code>	606
30.95.3 Member Function Documentation	606
30.95.3.1 <code>direction</code>	606
30.95.3.2 <code>direction</code>	606
30.95.3.3 <code>draw</code>	606
30.95.3.4 <code>handle</code>	606
30.95.3.5 <code>suspended</code>	607
30.95.3.6 <code>suspended</code>	607
30.96 <code>FL_Toggle_Button</code> Class Reference	608
30.96.1 Detailed Description	608
30.96.2 Constructor & Destructor Documentation	608
30.96.2.1 <code>FL_Toggle_Button</code>	608
30.97 <code>FL_Tooltip</code> Class Reference	609
30.97.1 Detailed Description	610
30.97.2 Member Function Documentation	610
30.97.2.1 <code>color</code>	610
30.97.2.2 <code>color</code>	610
30.97.2.3 <code>current</code>	610
30.97.2.4 <code>delay</code>	611
30.97.2.5 <code>delay</code>	611
30.97.2.6 <code>disable</code>	611
30.97.2.7 <code>enable</code>	611
30.97.2.8 <code>enabled</code>	611
30.97.2.9 <code>enter_area</code>	611
30.97.2.10 <code>font</code>	611
30.97.2.11 <code>font</code>	611
30.97.2.12 <code>hoverdelay</code>	611
30.97.2.13 <code>hoverdelay</code>	612
30.97.2.14 <code>size</code>	612

30.97.2.15size	612
30.97.2.16textcolor	612
30.97.2.17textcolor	612
30.98Fl_Valuator Class Reference	613
30.98.1 Detailed Description	615
30.98.2 Constructor & Destructor Documentation	615
30.98.2.1 Fl_Valuator	615
30.98.3 Member Function Documentation	615
30.98.3.1 bounds	615
30.98.3.2 clamp	616
30.98.3.3 format	616
30.98.3.4 handle_drag	616
30.98.3.5 handle_release	616
30.98.3.6 increment	616
30.98.3.7 maximum	616
30.98.3.8 maximum	616
30.98.3.9 minimum	616
30.98.3.10minimum	616
30.98.3.11precision	617
30.98.3.12range	617
30.98.3.13round	617
30.98.3.14set_value	617
30.98.3.15step	617
30.98.3.16value	617
30.98.3.17value	617
30.99Fl_Value_Input Class Reference	619
30.99.1 Detailed Description	620
30.99.2 Constructor & Destructor Documentation	621
30.99.2.1 Fl_Value_Input	621
30.99.3 Member Function Documentation	621
30.99.3.1 cursor_color	621
30.99.3.2 cursor_color	621
30.99.3.3 draw	622
30.99.3.4 handle	622
30.99.3.5 resize	622
30.99.3.6 shortcut	623

30.99.3.7 soft	623
30.99.3.8 textcolor	623
30.99.3.9 textcolor	623
30.99.3.10 textfont	623
30.99.3.11 textfont	623
30.99.3.12 textsize	623
30.99.3.13 textsize	623
30.10 IFL_Value_Output Class Reference	625
30.100.1 Detailed Description	626
30.100.2 Constructor & Destructor Documentation	626
30.100.2.1 IFL_Value_Output	626
30.100.3 Member Function Documentation	626
30.100.3.1 ldraw	626
30.100.3.2 handle	627
30.100.3.3 soft	627
30.100.3.4 soft	627
30.100.3.5 textcolor	627
30.100.3.6 textcolor	627
30.100.3.7 textfont	628
30.100.3.8 textfont	628
30.100.3.9 textsize	628
30.10 IFL_Value_Slider Class Reference	629
30.101.1 Detailed Description	630
30.101.2 Constructor & Destructor Documentation	630
30.101.2.1 IFL_Value_Slider	630
30.101.3 Member Function Documentation	630
30.101.3.1 ldraw	630
30.101.3.2 handle	630
30.101.3.3 textcolor	631
30.101.3.4 textcolor	631
30.101.3.5 textfont	631
30.101.3.6 textfont	631
30.101.3.7 textsize	631
30.101.3.8 textsize	631
30.10 IFL_Widget Class Reference	632
30.102.1 Detailed Description	640

30.102.2Member Enumeration Documentation	640
30.102.2.1"@20	640
30.102.3Constructor & Destructor Documentation	640
30.102.3.1Fl_Widget	640
30.102.3.2~Fl_Widget	640
30.102.4Member Function Documentation	641
30.102.4.lactivate	641
30.102.4.2active	641
30.102.4.3active_r	641
30.102.4.4align	641
30.102.4.5align	642
30.102.4.6argument	642
30.102.4.7box	642
30.102.4.8box	643
30.102.4.9callback	643
30.102.4.10callback	643
30.102.4.1dallback	643
30.102.4.1lcallback	643
30.102.4.1lchanged	644
30.102.4.1lclear_changed	644
30.102.4.1lclear_damage	644
30.102.4.1lclear_output	645
30.102.4.1lclear_visible	645
30.102.4.1lclear_visible_focus	645
30.102.4.20blor	645
30.102.4.2dolor	645
30.102.4.20blor	646
30.102.4.23color2	646
30.102.4.24color2	646
30.102.4.25ontains	646
30.102.4.26opy_label	646
30.102.4.27amage	647
30.102.4.28amage	647
30.102.4.29amage	647
30.102.4.30amage_resize	647

30.102.4.3 deactivate	647
30.102.4.3 default_callback	648
30.102.4.3 eimage	648
30.102.4.3 eimage	648
30.102.4.3 eimage	648
30.102.4.3 eo_callback	649
30.102.4.3 eo_callback	649
30.102.4.3 raw	649
30.102.4.4 raw_box	650
30.102.4.4 draw_box	650
30.102.4.4 draw_focus	650
30.102.4.4 ls	650
30.102.4.4 ll	650
30.102.4.4 handle	650
30.102.4.4 nde	651
30.102.4.4 image	651
30.102.4.4 image	651
30.102.4.4 image	651
30.102.4.5 inside	652
30.102.4.5 label	652
30.102.4.5 label	652
30.102.4.5 label	652
30.102.4.5 label_shortcut	653
30.102.4.5 labelcolor	653
30.102.4.5 labelcolor	653
30.102.4.5 labelfont	653
30.102.4.5 labelfont	653
30.102.4.5 labelsize	654
30.102.4.6 labelsize	654
30.102.4.6 labeltype	654
30.102.4.6 labeltype	654
30.102.4.6 measure_label	654
30.102.4.6 output	655
30.102.4.6 parent	655
30.102.4.6 parent	655

30.102.4.6 position	655
30.102.4.6 draw	655
30.102.4.6 draw_label	656
30.102.4.7 size	656
30.102.4.7 selection_color	656
30.102.4.7 selection_color	656
30.102.4.7 set_changed	657
30.102.4.7 set_output	657
30.102.4.7 set_visible	657
30.102.4.7 set_visible_focus	657
30.102.4.7 show	657
30.102.4.7 size	658
30.102.4.7 take_focus	658
30.102.4.8 akesevents	658
30.102.4.8 est_shortcut	658
30.102.4.8 est_shortcut	658
30.102.4.8 oltip	659
30.102.4.8 oltip	659
30.102.4.8 ype	659
30.102.4.8 ype	659
30.102.4.8 ser_data	659
30.102.4.8 ser_data	659
30.102.4.8 visible	660
30.102.4.9 visible_focus	660
30.102.4.9 visible_focus	660
30.102.4.9 visible_r	660
30.102.4.9 8	661
30.102.4.9 4	661
30.102.4.9 5when	661
30.102.4.9 6when	661
30.102.4.9 Window	662
30.102.4.9 8	662
30.102.4.9 9	662
30.102.4.1 00	662
30.102.4.1 01	662
30.10FL_Window Class Reference	663

30.103.1Detailed Description	666
30.103.2Constructor & Destructor Documentation	666
30.103.2.1Fl_Window	666
30.103.2.2Fl_Window	667
30.103.2.3~Fl_Window	667
30.103.3Member Function Documentation	667
30.103.3.1lborder	667
30.103.3.2clear_border	667
30.103.3.3copy_label	667
30.103.3.4current	668
30.103.3.5cursor	668
30.103.3.6default_cursor	668
30.103.3.7draw	668
30.103.3.8flush	668
30.103.3.9fullscreen	669
30.103.3.10handle	669
30.103.3.11hide	669
30.103.3.12spot	669
30.103.3.13iconize	670
30.103.3.14iconlabel	670
30.103.3.15label	670
30.103.3.16label	670
30.103.3.17make_current	670
30.103.3.18modal	670
30.103.3.19on_modal	670
30.103.3.20override	670
30.103.3.21resize	671
30.103.3.22set_modal	671
30.103.3.23set_non_modal	671
30.103.3.24show	671
30.103.3.25shown	671
30.103.3.26size_range	672
30.103.3.27class	672
30.103.4Member Data Documentation	672
30.103.4.1current_	672
30.104Fl_Wizard Class Reference	674

30.104.1Detailed Description	674
30.104.2Constructor & Destructor Documentation	674
30.104.2.1FL_Wizard	674
30.104.3Member Function Documentation	675
30.104.3.1next	675
30.104.3.2prev	675
30.104.3.3value	675
30.104.3.4value	675
30.105FL_XBM_Image Class Reference	676
30.105.1Detailed Description	676
30.105.2Constructor & Destructor Documentation	676
30.105.2.1FL_XBM_Image	676
30.106FL_XPM_Image Class Reference	677
30.106.1Detailed Description	677
30.106.2Constructor & Destructor Documentation	677
30.106.2.1FL_XPM_Image	677
31 File Documentation	679
31.1 Enumerations.H File Reference	679
31.1.1 Detailed Description	684
31.1.2 Define Documentation	684
31.1.2.1 FL_MAJOR_VERSION	684
31.1.2.2 FL_MINOR_VERSION	684
31.1.2.3 FL_PATCH_VERSION	684
31.1.2.4 FL_VERSION	684
31.1.3 Typedef Documentation	685
31.1.3.1 FL_Align	685
31.1.3.2 FL_Font	685
31.1.3.3 FL_Fontsize	685
31.1.4 Enumeration Type Documentation	685
31.1.4.1 FL_Boxtype	685
31.1.4.2 FL_Color	686
31.1.4.3 FL_Event	687
31.1.4.4 FL_Labeltype	689
31.1.4.5 FL_When	690
31.1.5 Variable Documentation	690
31.1.5.1 FL_ALIGN_BOTTOM	690

31.1.5.2 FL_ALIGN_CENTER	690
31.1.5.3 FL_ALIGN_CLIP	690
31.1.5.4 FL_ALIGN_IMAGE_OVER_TEXT	691
31.1.5.5 FL_ALIGN_INSIDE	691
31.1.5.6 FL_ALIGN_LEFT	691
31.1.5.7 FL_ALIGN_RIGHT	691
31.1.5.8 FL_ALIGN_TEXT_OVER_IMAGE	691
31.1.5.9 FL_ALIGN_TOP	691
31.1.5.10 FL_ALIGN_WRAP	691
31.2 fl_arc.cxx File Reference	692
31.2.1 Detailed Description	692
31.2.2 Function Documentation	692
31.2.2.1 fl_arc	692
31.3 fl_arci.cxx File Reference	693
31.3.1 Detailed Description	693
31.3.2 Function Documentation	693
31.3.2.1 fl_arc	693
31.3.2.2 fl_pie	693
31.4 fl_boxtype.cxx File Reference	695
31.4.1 Detailed Description	696
31.4.2 Function Documentation	696
31.4.2.1 fl_draw_box	696
31.4.2.2 fl_frame	697
31.4.2.3 fl_frame2	697
31.4.2.4 fl_internal_boxtype	697
31.5 fl_color.cxx File Reference	698
31.5.1 Detailed Description	698
31.5.2 Function Documentation	699
31.5.2.1 fl_color	699
31.5.2.2 fl_color	699
31.6 Fl_Color_Chooser.H File Reference	700
31.6.1 Detailed Description	700
31.7 fl_curve.cxx File Reference	701
31.7.1 Detailed Description	701
31.7.2 Function Documentation	701
31.7.2.1 fl_curve	701

31.8 fl_draw.H File Reference	702
31.8.1 Detailed Description	707
31.8.2 Function Documentation	707
31.8.2.1 fl_arc	707
31.8.2.2 fl_arc	707
31.8.2.3 fl_begin_complex_polygon	708
31.8.2.4 fl_begin_points	708
31.8.2.5 fl_circle	708
31.8.2.6 fl_clip_box	708
31.8.2.7 fl_color	708
31.8.2.8 fl_color	709
31.8.2.9 fl_color	709
31.8.2.10 fl_curve	709
31.8.2.11 fl_draw_box	709
31.8.2.12 fl_frame	709
31.8.2.13 fl_frame2	710
31.8.2.14 fl_gap	710
31.8.2.15 fl_mult_matrix	710
31.8.2.16 fl_not_clipped	710
31.8.2.17 fl_pie	711
31.8.2.18 fl_polygon	711
31.8.2.19 fl_polygon	711
31.8.2.20 fl_pop_clip	711
31.8.2.21 fl_push_clip	711
31.8.2.22 fl_push_matrix	711
31.8.2.23 fl_rotate	712
31.8.2.24 fl_scale	712
31.8.2.25 fl_scale	712
31.8.2.26 fl_transform_dx	712
31.8.2.27 fl_transform_dy	712
31.8.2.28 fl_transform_x	712
31.8.2.29 fl_transform_y	713
31.8.2.30 fl_transformed_vertex	713
31.8.2.31 fl_translate	713
31.8.2.32 fl_vertex	713
31.9 fl_rect.cxx File Reference	714

31.9.1 Detailed Description	715
31.9.2 Function Documentation	716
31.9.2.1 fl_clip_box	716
31.9.2.2 fl_clip_region	716
31.9.2.3 fl_clip_region	716
31.9.2.4 fl_not_clipped	716
31.9.2.5 fl_polygon	717
31.9.2.6 fl_polygon	717
31.9.2.7 fl_pop_clip	717
31.9.2.8 fl_push_clip	717
31.10 fl_types.h File Reference	718
31.10.1 Detailed Description	718
31.10.2 Typedef Documentation	718
31.10.2.1 Fl_CString	718
31.10.2.2 Fl_String	718
31.11 fl_vertex.cxx File Reference	719
31.11.1 Detailed Description	721
31.11.2 Function Documentation	721
31.11.2.1 fl_begin_complex_polygon	721
31.11.2.2 fl_begin_points	721
31.11.2.3 fl_circle	721
31.11.2.4 fl_gap	721
31.11.2.5 fl_mult_matrix	722
31.11.2.6 fl_push_matrix	722
31.11.2.7 fl_rotate	722
31.11.2.8 fl_scale	722
31.11.2.9 fl_scale	722
31.11.2.10 fl_transform_dx	722
31.11.2.11 fl_transform_dy	723
31.11.2.12 fl_transform_x	723
31.11.2.13 fl_transform_y	723
31.11.2.14 fl_transformed_vertex	723
31.11.2.15 fl_translate	723
31.11.2.16 fl_vertex	723

Chapter 1

FLTK Programming Manual



FLTK 1.3.0 Programming Manual

Revision 8 by Michael Sweet, Craig P. Earls,
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Preface	10 - Advanced FLTK
1 - Introduction to FLTK	11 - Unicode and utf-8 Support
2 - FLTK Basics	A - Class Reference
3 - Common Widgets and Attributes	B - Function Reference
<ul style="list-style-type: none">• Colors• Box Types• Labels and Label Types• Drawing Images	C - FLTK Enumerations
4 - Designing a Simple Text Editor	D - GLUT Compatibility
5 - Drawing Things in FLTK	<ul style="list-style-type: none">• class Fl_Glut_Window
6 - Handling Events	E - Forms Compatibility
<ul style="list-style-type: none">• Fl::event_*() methods• Event Propagation	F - Operating System Issues
7 - Adding and Extending Widgets	G - Migrating Code from FLTK 1.0 to 1.1
8 - Using OpenGL	H - Migrating Code from FLTK 1.1 to 1.3
9 - Programming with FLUID	I - Developer Information
<ul style="list-style-type: none">• GUI Attributes• Selecting and Moving Widgets• Image Labels	J - Software License
	K - Example Source Code

Chapter 2

Preface

This manual describes the Fast Light Tool Kit ("FLTK") version 1.3.0, a C++ Graphical User Interface ("GUI") toolkit for UNIX, Microsoft Windows and MacOS.

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 J - Software License.

2.1 Organization

This manual is organized into the following chapters and appendices:

- [1 - Introduction to FLTK](#)
- [2 - FLTK Basics](#)
- [3 - Common Widgets and Attributes](#)
- [4 - Designing a Simple Text Editor](#)
- [5 - Drawing Things in FLTK](#)
- [6 - Handling Events](#)
- [7 - Adding and Extending Widgets](#)
- [8 - Using OpenGL](#)
- [9 - Programming with FLUID](#)
- [10 - Advanced FLTK](#)
- [11 - Unicode and utf-8 Support](#)
- [A - Class Reference](#)
- [B - Function Reference](#)
- [C - FLTK Enumerations](#)
- [D - GLUT Compatibility](#)
- [E - Forms Compatibility](#)
- [F - Operating System Issues](#)
- [G - Migrating Code from FLTK 1.0 to 1.1](#)
- [H - Migrating Code from FLTK 1.1 to 1.3](#)
- [I - Developer Information](#)
- [J - Software License](#)
- [K - Example Source Code](#)

2.2 Conventions

The following typeface conventions are used in this manual:

- Function and constant names are shown in **bold courier type**
- Code samples and commands are shown in **regular courier type**

2.3 Abbreviations

The following abbreviations are used in this manual:

X11

The X Window System version 11.

Xlib

The X Window System interface library.

WIN32

The Microsoft Windows 32-bit Application Programmer's Interface.

MacOS

The Apple Macintosh OS 8.6 and later, including OS X.

2.4 Copyrights and Trademarks

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Chapter 3

1 - Introduction to FLTK

The Fast Light Tool Kit ("FLTK", pronounced "fulltick") is a cross-platform C++ GUI toolkit for UNIX®/Linux®(X11), Microsoft®Windows®, and MacOS®X.

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.

3.1 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.

3.2 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(Fl_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, WIN32 or Carbon) for maximum speed, and carefully optimized for code size and performance.
- Precise low-level compatibility between the X11, WIN32 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, WIN32, or QuickDraw.
- OpenGL/Mesa drawing area widget.
- Support for OpenGL overlay hardware on both X11 and WIN32, with emulation if none is available.
- Text widgets with Emacs key bindings, X cut & paste, and foreign letter compose!
- Compatibility header file for the GLUT library.
- Compatibility header file for the XForms library.

3.3 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!

3.4 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".

3.5 Building and Installing FLTK Under UNIX and MacOS X

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=xlc; export CXX
setenv CXX "xlc"
```

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 WIN32

-enable-debug

Enable debugging code & symbols

-disable-gl

Disable OpenGL support

-enable-shared

Enable generation of shared libraries

-enable-threads

Enable multithreading support

-enable-xdbe

Enable the X double-buffer extension

-enable-xft

Enable the Xft library for anti-aliased fonts under X11

-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".

3.6 Building FLTK Under Microsoft Windows

There are three ways to build FLTK under Microsoft Windows. The first is to use the Visual C++ 5.0 project files under the "visualc" directory. Just open (or double-click on) the "fltk.dsw" file to get the whole shebang.

The second method is to use the `configure` script included with the FLTK software; this has only been tested with the CygWin tools:

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

The final method is to use a GNU-based development tool with the files in the "makefiles" directory. To build using one of these tools simply copy the appropriate makeinclude and config files to the main directory and do a make:

```
copy makefiles\Makefile.<env> Makefile  
make
```

3.6.1 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.

3.7 Building FLTK Under OS/2

The current OS/2 build requires XFree86 for OS/2 to work. A native Presentation Manager version has not been implemented yet (volunteers are welcome!).

The current set of Makefiles/configuration files assumes that EMX 0.9d and libExt (from [posix2.sourceforge.net](#)) is installed.

To build the XFree86 version of FLTK for OS/2, copy the appropriate makeinclude and config files to the main directory and do a make:

```
copy makefiles\Makefile.os2x Makefile  
make
```

3.8 Internet Resources

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

WWW

```
http://www.fltk.org/  
http://www.fltk.org/str.php [for reporting bugs]  
http://www.fltk.org/software.php [source code]
```

FTP

```
California, USA (ftp://ftp.fltk.org/)  
Maryland, USA (ftp://ftp2.fltk.org/)  
Espoo, Finland (ftp://ftp.funet.fi)  
Germany (linux.mathematik.tu-darmstadt.de)  
Austria (gd.tuwien.ac.at)
```

EMail

```
fltk@fltk.org [see instructions below]  
fltk-bugs@fltk.org [for reporting bugs]
```

NNTP Newsgroups

news.easysw.com

To send a message to the FLTK mailing list ("fltk@fltk.org") you must first join the list. Non-member submissions are blocked to avoid problems with unsolicited email.

To join the FLTK mailing list, send a message to "majordomo@fltk.org" with "subscribe fltk" in the message body. A digest of this list is available by subscribing to the "fltk-digest" mailing list.

3.9 Reporting Bugs

To report a bug in FLTK, send an email to "fltk-bugs@fltk.org". Please include the FLTK version, operating system & version, and compiler that you are using when describing the bug or problem. We will be unable to provide any kind of help without that basic information.

Bugs can also be reported to the "fltk.bugs" newsgroup or on the SourceForge bug tracker pages.

For general support and questions, please use the FLTK mailing list at "fltk@fltk.org" or one of the newsgroups.

Chapter 4

2 - FLTK Basics

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

4.1 Writing Your First FLTK Program

All programs must include the file `<FL/Fl.H>`. 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(300,180);
    Fl_Box *box = new Fl_Box(20,40,260,100,"Hello, World!");
    box->box(Fl_UP_BOX);
    box->labelsize(36);
    box->labelfont(Fl_BOLD+Fl_ITALIC);
    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(300,180);
```

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(20,40,260,100,"Hello, World!");
```

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

```
box->box(Fl_UP_BOX);
box->labelsize(36);
box->labelfont(Fl_BOLD+Fl_ITALIC);
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 window in Figure 2-1. You can quit the program by closing the window or pressing the ESCape key.

Figure 4.1: The Hello, World! Window

4.1.1 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`) and the units are in pixels.

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

`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.

4.1.2 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.

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(...)`.

4.1.3 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. You can learn more about boxtypes in [Chapter 3](#).

You could examine the boxtyle in 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".

4.1.4 Redrawing After Changing Attributes

Almost all of the set/get 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.

4.1.5 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.

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`. You can also specify typefaces directly.

The `labelsize` method sets the height of the font in pixels.

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 [Chapter 3](#).

4.1.6 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.

4.1.7 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.

4.2 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:

```
CC -I/usr/local/include ...
gcc -I/usr/local/include ...
```

The `fltk-config` script included with FLTK can be used to get the options that are required by your compiler:

```
CC `fltk-config --cxxflags` ...
```

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

```
CC ... -L/usr/local/lib -lfltk -lXext -lX11 -lm  
gcc ... -L/usr/local/lib -lfltk -lXext -lX11 -lm
```

Aside from the "fltk" library, there is also a "fltk_forms" library for the XForms compatibility classes, "fltk_gl" for the OpenGL and GLUT classes, and "fltk_images" for the image file classes, [Fl_Help_Dialog](#) widget, and system icon support.

Note:

The libraries are named "fltk.lib", "fltkgl.lib", "fltkforms.lib", and "fltkimages.lib", respectively under Windows.

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

```
CC ... `fltk-config --ldflags`
```

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

```
CC ... `fltk-config --use-forms --ldflags`  
CC ... `fltk-config --use-gl --ldflags`  
CC ... `fltk-config --use-images --ldflags`  
CC ... `fltk-config --use-forms --use-gl --use-images --ldflags`
```

Finally, you can use the `fltk-config` script to compile a single source file as a FLTK program:

```
fltk-config --compile filename.cpp  
fltk-config --use-forms --compile filename.cpp  
fltk-config --use-gl --compile filename.cpp  
fltk-config --use-images --compile filename.cpp  
fltk-config --use-forms --use-gl --use-images --compile filename.cpp
```

Any of these will create an executable named `filename`.

4.3 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 FLTK and WinSock2 (WS2_32.LIB) libraries to the "Link" settings.

You can build your Microsoft Windows applications as Console or WIN32 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.

Note: The Visual C++ 5.0 optimizer is known to cause problems with many programs. We only recommend using the "Favor Small Code" optimization setting. The Visual C++ 6.0 optimizer seems to be much better and can be used with the "optimized for speed" setting.

4.4 Naming

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

- Functions are either `F1::foo()` or `f1_foo()`.
- Class and type names are capitalized: `F1_Foo`.
- `Constants and enumerations` are uppercase: `FL_FOO`.
- All header files start with `<FL/...>`.

4.5 Header Files

The proper way to include FLTK header files is:

```
#include <FL/F1_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\F1_xyz.H>
#include <f1/f1_xyz.h>
#include <F1/f1_xyz.h>
```

Chapter 5

3 - 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.

5.1 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.

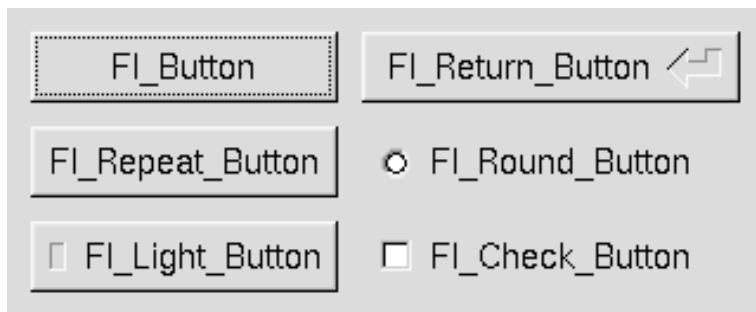


Figure 5.1: FLTK Button Widgets

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.

5.2 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.

5.3 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.

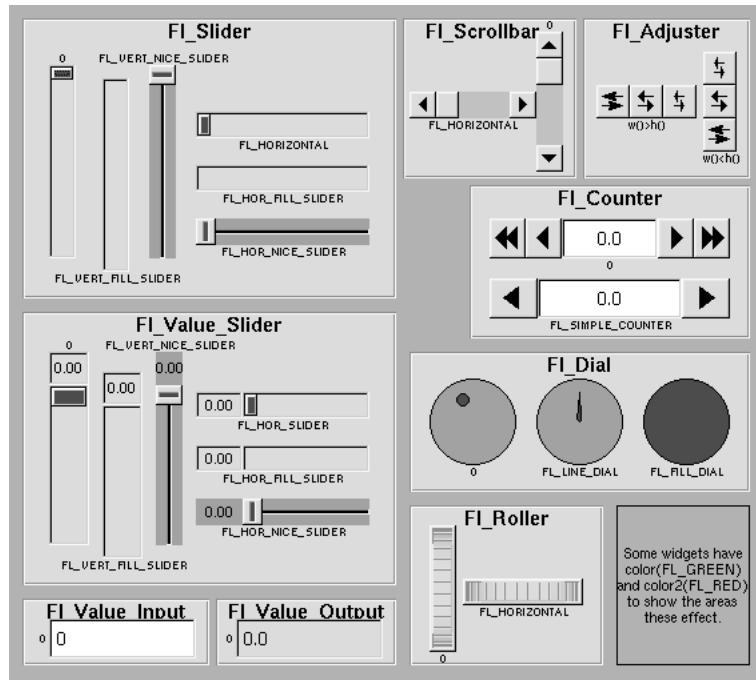


Figure 5.2: FLTK valuator widgets

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.

5.4 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.

5.5 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.

5.6 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 WIN32 colormap, but instead is an internal table with fixed contents.

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`
- `FL_WHITE`

These symbols are the default colors for all FLTK widgets. They are explained in more detail in the chapter [Enumerations](#)

- `FL_FOREGROUND_COLOR`
- `FL_BACKGROUND_COLOR`
- `FL_INACTIVE_COLOR`
- `FL_SELECTION_COLOR`

RGB colors can be set using the `fl_rgb_color()` function:

```
Fl_Color c = fl_rgb_color(85, 170, 255);
```

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

```
button->color(FL_RED);
```

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

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

5.7 Box Types

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

Figure 3-3 shows the standard box types included with FLTK.

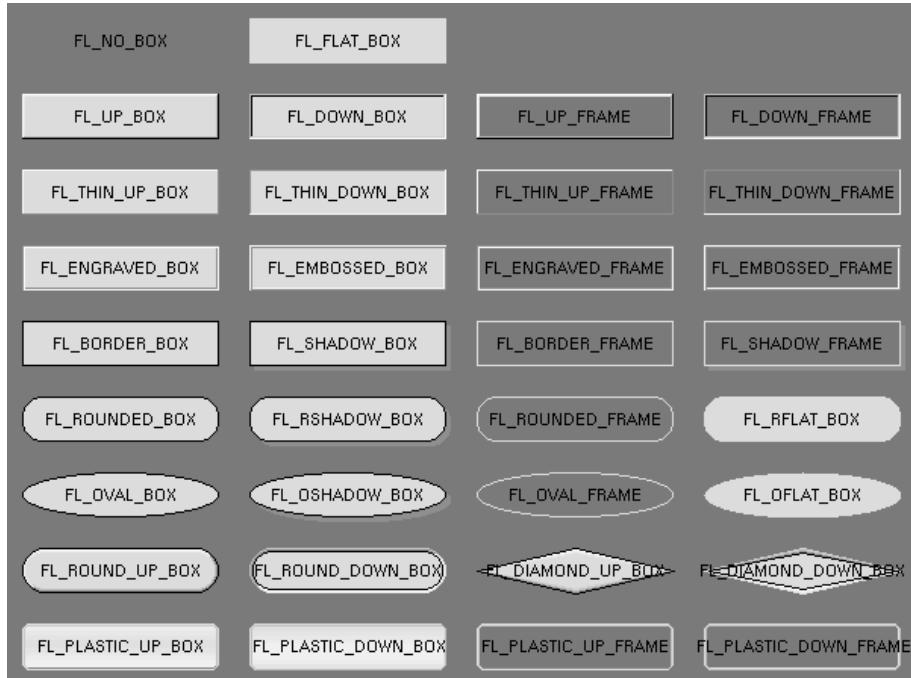


Figure 5.3: FLTK box types

`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 Figure 3-3 is the area that is not drawn by the frame types.

5.7.1 Box Types

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

Note:

This interface has changed in FLTK 2.0!

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)

`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 also: [fl_frame drawing](#).

Fl_Boxtype fl_frame(Fl_Boxtype)

`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 also: [fl_frame drawing](#).

Fl_Boxtype fl_box(Fl_Boxtype)

`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 also: [fl_frame](#).

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(Fl_Boxtype)` expects the neutral design on a boxtyle with a numerical value evenly divideable by two. `fl_frame(Fl_Boxtype)` expects the UP_BOX design at a value divideable by four.

5.8 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. Figure 3-4 shows the available 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 → ".

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_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_TEXT_OVER_IMAGE` - show the label text over the image.
- `FL_IMAGE_OVER_TEXT` - show the label image over the text (default).

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_EMBOSS_LABEL` - draws edges as thought the text is raised.
- `FL_ICON_LABEL` - draws the icon associated with the text.

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 `F1_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 `f1_font` mechanism (e.g. `FL_ENGRAVED_LABEL`) or with program-generated letters or symbology.

Note:

This interface has changed in FLTK 2.0!

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 `F1_Label` structure containing the label information, the bounding box for the label, and the label alignment:

```
void xyz_draw(const F1_Label *label, int x, int y, int w, int h, F1_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 `F1_Label` structure and references to the width and height:

```
void xyz_measure(const F1_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 `F1::set_labeltype` method creates a label type using your draw and measure functions:

```
#define XYZ_LABEL FL_FREELABELTYPE
F1::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 `F1::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(F1_Color c)` which typically uses the `complex drawing functions` 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)(F1_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.

5.9 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);
```

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);
```

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.

Hint:

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);
```

5.10 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 like `FL_Enter` - combined with any modifiers like Shift, Alt, and Control.

Chapter 6

5 - Drawing Things in FLTK

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

6.1 When Can You Draw Things in FLTK?

There are only certain places you can execute drawing code in FLTK. 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()`.
- The most common place is inside the virtual method `Fl_Widget::draw()`. To write code here, you must subclass one of the existing `Fl_Widget` classes and implement your own version of `draw()`.
- You can also write `boxtypes` and `labeltypes`. These are 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.

6.2 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](#)
- [Image Classes](#)
- [Drawing Overlays](#)
- [Offscreen Drawing](#)

6.2.1 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 first box drawing function is `fl_draw_box()` which draws a standard boxtyle *b* in the specified color *c*.

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

The `fl_frame()` function 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 results of calling `fl_frame()` with a string that is not a multiple of 4 characters in length are undefined.

The only difference between this function and `fl_frame2()` is the order of the line segments.

See also: `fl_frame boxtype`.

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

The `fl_frame2()` function 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 results of calling `fl_frame2()` with a string that is not a multiple of 4 characters in length are undefined.

The only difference between this function and `fl_frame()` is the order of the line segments.

6.2.2 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 pixels 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_clip(int x, int y, int w, int h)
```

```
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. The `fl_clip()` name 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.

6.3 Colors

FLTK manages colors as 32-bit unsigned integers. Values from 0 to 255 represent colors from the FLTK 1.0.x 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>`.

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 1.0.x colormap or a direct RGB value on TrueColor screens. You can generate 24-bit RGB color values using the `fl_rgb_color()` function.

```
void fl_color(Fl_Color)
```

Sets the color for all subsequent drawing operations.

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 `fl_color()` that was set. 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.

6.3.1 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=0, char* dashes=0)`

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 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!

`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 pixels 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 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:

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

6.3.2 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)`

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_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 WIN32. 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 counterclockwise from 3'oclock 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 `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` pixels. The callback is then called for every newly exposed rectangular area,

6.3.3 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 WIN32 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_push_matrix()
void fl_pop_matrix()
```

Save and restore the current transformation. The maximum depth of the stack is 4.

```
void fl_scale(float x, float y)
void fl_scale(float x)
void fl_translate(float x, float y)
void fl_rotate(float d)
void fl_mult_matrix(float a, float b, float c, float d, float x, float 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 through 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.

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.

`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 `fl_end_loop();fl_begin_loop()`.

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

Add a single vertex to the current path.

```
void fl_curve(float x, float y, float x1, float y1, float x2, float y2, float x3, float y3)
```

Add a series of points on a Bezier curve to the path. The curve ends (and two of the points) are at `x`, `y` and `x3`, `y3`.

```
void fl_arc(float x, float y, float r, float start, float 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()`. `x`, `y` are the center of the circle, 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.

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

`fl_circle()` is equivalent to `fl_arc(...,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.

6.3.4 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 characters starting at the given 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.

```
void fl_draw(const char *, 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. 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.

The text length is limited to 1024 caracters per line.

```
void fl_measure(const char *, int &w, int &h, int draw_symbols = 1)
```

Measure how wide and tall the string will be when printed by the `fl_draw(...,align)` function. If the incoming `w` is non-zero it will wrap to that width.

```
int fl_height()
```

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

```
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.

```
float fl_width(const char*)
float fl_width(const char*, int n)
float fl_width(uchar)
```

Return the pixel width of a nul-terminated string, a sequence of n characters, or a single character in the current font.

```
const char *fl_shortcut_label(ulong)
```

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.

6.3.5 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.

```
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 pixels and not "points". Lines should be spaced `size` pixels 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.

6.3.6 Character Encoding

FLTK 1 supports western character sets using the eight bit encoding of the user-selected global code page. For MS Windows and X11, the code page is assumed to be Windows-1252/Latin1, a superset to ISO 8859-1. On Mac OS X, we assume MacRoman.

FLTK provides the functions `fl_latin1_to_local()`, `fl_local_to_latin1()`, `fl_mac_roman_to_local()`, and `fl_local_to_mac_roman()` to convert strings between both encodings. These functions are only required if your source code contains "C"-strings with international characters and if this source will be compiled on multiple platforms.

Assuming that the following source code was written on MS Windows, this example will output the correct label on OS X and X11 as well. Without the conversion call, the label on OS X would read `Fahrvergngen` with a deformed umlaut u ("cedille", html "¸").

```
btn = new Fl_Button(10, 10, 300, 25);
btn->copy_label(fl_latin1_to_local("Fahrvergnügen"));
```

Note:

If your application uses characters that are not part of both encodings, or it will be used in areas that commonly use different code pages, you might consider upgrading to FLTK 2 which supports UTF-8 encoding.

Todo

drawing.dox: I fixed the above encoding problem of these ¸ and umlaut characters, but this text is obsoleted by FLTK 1.3 with utf-8 encoding, or must be rewritten accordingly: How to use native (e.g. Windows "ANSI", or ISO-8859-x) encoding in embedded strings for labels, error messages and more. Please check this (utf-8) encoding on different OS'es and with different language and font environments.

For more information about character encoding, unicode and utf-8 see chapter [11 - Unicode and utf-8 Support](#).

6.3.7 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.

6.4 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.

6.4.1 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 *, int X, int Y, int W, int H, int D = 3, int LD = 0)
void fl_draw_image_mono(const uchar *, int X, int Y, int W, int H, int D = 1, int LD = 0)
```

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. *X, Y* are where to put the top-left corner. *W* and *H* define the size of the image. *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. *LD* 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 *, int x, int y, int w, uchar *)
void fl_draw_image(fl_draw_image_cb, void *, int X, int Y, int W, int H, int D = 3)
void fl_draw_image_mono(fl_draw_image_cb, void *, int X, int Y, int W, int H, int D = 1)
```

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 **data, int X, int Y, Fl_Color = FL_GRAY)
```

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 **data, 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.

6.4.2 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 = 0);
```

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.

6.4.3 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.

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:

- [Fl_GIF_Image](#)
- [Fl_JPEG_Image](#)
- [Fl_PNG_Image](#)
- [Fl_PNM_Image](#)
- [Fl_XBM_Image](#)
- [Fl_XPM_Image](#)

Each of these image classes load a named file of the corresponding format. The [Fl_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 [Fl_Tiled_Image](#) to tile another image object in the specified area. This class can be used to tile a background image in a [Fl_Group](#) widget, for example.

```
virtual void copy();  
virtual void copy(int w, int h);
```

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.

```
void draw(int x, int y, int w, int h, int ox = 0, int oy = 0);
```

The draw() method draws the image object. x, y, w, h indicates a destination rectangle. ox, oy, w, h is a 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.

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

Draws the image with the upper-left corner at x, y . This is the same as doing `draw(x,y,img->w(),img->h(),0,0)`.

6.4.4 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. [Fl_Double_Window](#) uses offscreen rendering to avoid flickering on systems that don't support double-buffering natively.

```
Fl_Offscreen fl_create_offscreen(int w, int h)
```

Create an RGB offscreen buffer with $w*h$ pixels.

```
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. FLTK can draw into a buffer at any time. There is no need to wait for an [Fl_Widget::draw\(\)](#) to occur.

```
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 buffer at x, y .

Chapter 7

4 - Designing a Simple Text Editor

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

7.1 Determining the Goals of the Text Editor

Since this will be the first big project you'll be doing with FLTK, let's define what we want our text editor to do:

1. Provide a menubar/menus for all functions.
2. Edit a single text file, possibly with multiple views.
3. Load from a file.
4. Save to a file.
5. Cut/copy/delete/paste functions.
6. Search and replace functions.
7. Keep track of when the file has been changed.

7.2 Designing the Main Window

Now that we've outlined the goals for our editor, we can begin with the design of our GUI. Obviously the first thing that we need is a window, which we'll place inside a class called `EditorWindow`:

```
class EditorWindow : public Fl_Double_Window {
public:
    EditorWindow(int w, int h, const char* t);
    ~EditorWindow();

    Fl_Window      *replace_dlg;
    Fl_Input       *replace_find;
    Fl_Input       *replace_with;
    Fl_Button      *replace_all;
    Fl_Return_Button *replace_next;
    Fl_Button      *replace_cancel;

    Fl_Text_Editor *editor;
    char           search[256];
};
```

7.3 Variables

Our text editor will need some global variables to keep track of things:

```
int          changed = 0;
char         filename[256] = "";
Fl_Text_Buffer *textbuf;
```

The `textbuf` variable is the text editor buffer for our window class described previously. We'll cover the other variables as we build the application.

7.4 Menubars and Menus

The first goal requires us to use a menubar and menus that define each function the editor needs to perform. The `Fl_Menu_Item` structure is used to define the menus and items in a menubar:

```
Fl_Menu_Item menuitems[] = {
    { "&File", 0, 0, 0, FL_SUBMENU },
    { "&New File", 0, (Fl_Callback *)new_cb },
    { "&Open File...", FL_CTRL + 'o', (Fl_Callback *)open_cb },
    { "&Insert File...", FL_CTRL + 'i', (Fl_Callback *)insert_cb, 0, FL_MENU_DIVIDER },
    { "&Save File", FL_CTRL + 's', (Fl_Callback *)save_cb },
    { "&Save File &As...", FL_CTRL + FL_SHIFT + 's', (Fl_Callback *)saveas_cb, 0, FL_MENU_DIVIDER },
    { "New &View", FL_ALT + 'v', (Fl_Callback *)view_cb, 0 },
    { "&Close View", FL_CTRL + 'w', (Fl_Callback *)close_cb, 0, FL_MENU_DIVIDER },
    { "&Exit", FL_CTRL + 'q', (Fl_Callback *)quit_cb, 0 },
    { 0 },

    { "&Edit", 0, 0, 0, FL_SUBMENU },
    { "&Undo", FL_CTRL + 'z', (Fl_Callback *)undo_cb, 0, FL_MENU_DIVIDER },
    { "&Cu&t", FL_CTRL + 'x', (Fl_Callback *)cut_cb },
    { "&Copy", FL_CTRL + 'c', (Fl_Callback *)copy_cb },
    { "&Paste", FL_CTRL + 'v', (Fl_Callback *)paste_cb },
    { "&Delete", 0, (Fl_Callback *)delete_cb },
    { 0 },

    { "&Search", 0, 0, 0, FL_SUBMENU },
    { "&Find...", FL_CTRL + 'f', (Fl_Callback *)find_cb },
    { "Find Again", FL_CTRL + 'g', find2_cb },
    { "&Replace...", FL_CTRL + 'r', replace_cb },
    { "Re&place Again", FL_CTRL + 't', replace2_cb },
    { 0 },

    { 0 }
};
```

Once we have the menus defined we can create the `Fl_Menu_Bar` widget and assign the menus to it with:

```
Fl_Menu_Bar *m = new Fl_Menu_Bar(0, 0, 640, 30);
m->copy(menuitems);
```

We'll define the callback functions later.

7.5 Editing the Text

To keep things simple our text editor will use the `Fl_Text_Editor` widget to edit the text:

```
w->editor = new Fl_Text_Editor(0, 30, 640, 370);
w->editor->buffer(textbuf);
```

So that we can keep track of changes to the file, we also want to add a "modify" callback:

```
textbuf->add_modify_callback(changed_cb, w);
textbuf->call_modify_callbacks();
```

Finally, we want to use a mono-spaced font like `FL_COURIER`:

```
w->editor->textfont(FL_COURIER);
```

7.6 The Replace Dialog

We can use the FLTK convenience functions for many of the editor's dialogs, however the replace dialog needs its own custom window. To keep things simple we will have a "find" string, a "replace" string, and "replace all", "replace next", and "cancel" buttons. The strings are just `Fl_Input` widgets, the "replace all" and "cancel" buttons are `Fl_Button` widgets, and the "replace next" button is a `Fl_Return_Button` widget:

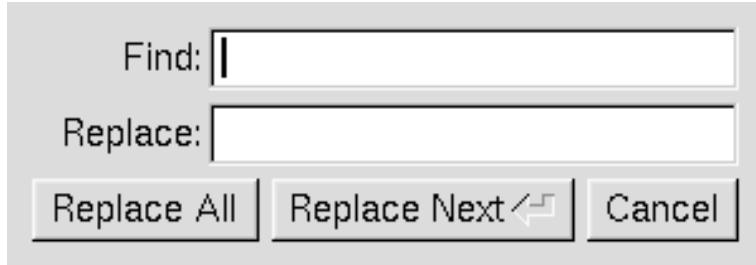


Figure 7.1: The search and replace dialog

```
Fl_Window *replace_dlg = new Fl_Window(300, 105, "Replace");
Fl_Input *replace_find = new Fl_Input(70, 10, 200, 25, "Find:");
Fl_Input *replace_with = new Fl_Input(70, 40, 200, 25, "Replace:");
Fl_Button *replace_all = new Fl_Button(10, 70, 90, 25, "Replace All");
Fl_Button *replace_next = new Fl_Button(105, 70, 120, 25, "Replace Next");
Fl_Button *replace_cancel = new Fl_Button(230, 70, 60, 25, "Cancel");
```

7.7 Callbacks

Now that we've defined the GUI components of our editor, we need to define our callback functions.

7.7.1 changed_cb()

This function will be called whenever the user changes any text in the `editor` widget:

```
void changed_cb(int, int nInserted, int nDeleted, int, const char*, void* v) {
    if ((nInserted || nDeleted) && !loading) changed = 1;
    EditorWindow *w = (EditorWindow *)v;
    set_title(w);
    if (loading) w->editor->show_insert_position();
}
```

The `set_title()` function is one that we will write to set the changed status on the current file. We're doing it this way because we want to show the changed status in the window's title bar.

7.7.2 copy_cb()

This callback function will call `kf_copy()` to copy the currently selected text to the clipboard:

```
void copy_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    Fl_Text_Editor::kf_copy(0, e->editor);
}
```

7.7.3 cut_cb()

This callback function will call `kf_cut()` to cut the currently selected text to the clipboard:

```
void cut_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    Fl_Text_Editor::kf_cut(0, e->editor);
}
```

7.7.4 delete_cb()

This callback function will call `remove_selection()` to delete the currently selected text to the clipboard:

```
void delete_cb(Fl_Widget*, void* v) {
    textbuf->remove_selection();
}
```

7.7.5 find_cb()

This callback function asks for a search string using the `fl_input()` convenience function and then calls the `find2_cb()` function to find the string:

```
void find_cb(Fl_Widget* w, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    const char *val;

    val = fl_input("Search String:", e->search);
    if (val != NULL) {
        // User entered a string - go find it!
        strcpy(e->search, val);
        find2_cb(w, v);
    }
}
```

7.7.6 find2_cb()

This function will find the next occurrence of the search string. If the search string is blank then we want to pop up the search dialog:

```
void find2_cb(Fl_Widget* w, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    if (e->search[0] == '\0') {
        // Search string is blank; get a new one...
        find_cb(w, v);
        return;
    }

    int pos = e->editor->insert_position();
    int found = textbuf->search_forward(pos, e->search, &pos);
    if (found) {
        // Found a match; select and update the position...
        textbuf->select(pos, pos+strlen(e->search));
        e->editor->insert_position(pos+strlen(e->search));
        e->editor->show_insert_position();
    }
    else fl_alert("No occurrences of '%s' found!", e->search);
}
```

If the search string cannot be found we use the `f1_alert()` convenience function to display a message to that effect.

7.7.7 new_cb()

This callback function will clear the editor widget and current filename. It also calls the `check_save()` function to give the user the opportunity to save the current file first as needed:

```
void new_cb(Fl_Widget*, void*) {
    if (!check_save()) return;

    filename[0] = '\0';
    textbuf->select(0, textbuf->length());
    textbuf->remove_selection();
    changed = 0;
    textbuf->call_modify_callbacks();
}
```

7.7.8 open_cb()

This callback function will ask the user for a filename and then load the specified file into the input widget and current filename. It also calls the `check_save()` function to give the user the opportunity to save the current file first as needed:

```
void open_cb(Fl_Widget*, void*) {
    if (!check_save()) return;

    char *newfile = fl_file_chooser("Open File?", "*", filename);
    if (newfile != NULL) load_file(newfile, -1);
}
```

We call the `load_file()` function to actually load the file.

7.7.9 paste_cb()

This callback function will call `kf_paste()` to paste the clipboard at the current position:

```
void paste_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    Fl_Text_Editor::kf_paste(0, e->editor);
}
```

7.7.10 quit_cb()

The quit callback will first see if the current file has been modified, and if so give the user a chance to save it. It then exits from the program:

```
void quit_cb(Fl_Widget*, void*) {
    if (changed && !check_save())
        return;

    exit(0);
}
```

7.7.11 replace_cb()

The replace callback just shows the replace dialog:

```
void replace_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    e->replace_dlg->show();
}
```

7.7.12 replace2_cb()

This callback will replace the next occurrence of the replacement string. If nothing has been entered for the replacement string, then the replace dialog is displayed instead:

```
void replace2_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    const char *find = e->replace_find->value();
    const char *replace = e->replace_with->value();

    if (find[0] == '\0') {
        // Search string is blank; get a new one...
        e->replace_dlg->show();
        return;
    }

    e->replace_dlg->hide();

    int pos = e->editor->insert_position();
    int found = textbuf->search_forward(pos, find, &pos);

    if (found) {
        // Found a match; update the position and replace text...
        textbuf->select(pos, pos+strlen(find));
        textbuf->remove_selection();
        textbuf->insert(pos, replace);
        textbuf->select(pos, pos+strlen(replace));
        e->editor->insert_position(pos+strlen(replace));
        e->editor->show_insert_position();
    }
    else fl_alert("No occurrences of '%s' found!", find);
}
```

7.7.13 replall_cb()

This callback will replace all occurrences of the search string in the file:

```
void replall_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    const char *find = e->replace_find->value();
    const char *replace = e->replace_with->value();

    find = e->replace_find->value();
    if (find[0] == '\0') {
        // Search string is blank; get a new one...
        e->replace_dlg->show();
        return;
    }

    e->replace_dlg->hide();

    e->editor->insert_position(0);
```

```

int times = 0;

// Loop through the whole string
for (int found = 1; found;) {
    int pos = e->editor->insert_position();
    found = textbuf->search_forward(pos, find, &pos);

    if (found) {
        // Found a match; update the position and replace text...
        textbuf->select(pos, pos+strlen(find));
        textbuf->remove_selection();
        textbuf->insert(pos, replace);
        e->editor->insert_position(pos+strlen(replace));
        e->editor->show_insert_position();
        times++;
    }
}

if (times) fl_message("Replaced %d occurrences.", times);
else fl_alert("No occurrences of '\"%s\" found!", find);
}

```

7.7.14 replcan_cb()

This callback just hides the replace dialog:

```

void replcan_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    e->replace_dlg->hide();
}

```

7.7.15 save_cb()

This callback saves the current file. If the current filename is blank it calls the "save as" callback:

```

void save_cb(void) {
    if (filename[0] == '\0') {
        // No filename - get one!
        saveas_cb();
        return;
    }
    else save_file(filename);
}

```

The `save_file()` function saves the current file to the specified filename.

7.7.16 saveas_cb()

This callback asks the user for a filename and saves the current file:

```

void saveas_cb(void) {
    char *newfile;

    newfile = fl_file_chooser("Save File As?", "*", filename);
    if (newfile != NULL) save_file(newfile);
}

```

The `save_file()` function saves the current file to the specified filename.

7.8 Other Functions

Now that we've defined the callback functions, we need our support functions to make it all work:

7.8.1 check_save()

This function checks to see if the current file needs to be saved. If so, it asks the user if they want to save it:

```
int check_save(void) {
    if (!changed) return 1;

    int r = fl_choice("The current file has not been saved.\n"
                      "Would you like to save it now?",
                      "Cancel", "Save", "Discard");

    if (r == 1) {
        save_cb(); // Save the file...
        return !changed;
    }

    return (r == 2) ? 1 : 0;
}
```

7.8.2 load_file()

This function loads the specified file into the `textbuf` class:

```
int loading = 0;
void load_file(char *newfile, int ipos) {
    loading = 1;
    int insert = (ipos != -1);
    changed = insert;
    if (!insert) strcpy(filename, "");
    int r;
    if (!insert) r = textbuf->loadfile(newfile);
    else r = textbuf->insertfile(newfile, ipos);
    if (r)
        fl_alert("Error reading from file \'%s\':\n%s.", newfile, strerror(errno));
    else
        if (!insert) strcpy(filename, newfile);
    loading = 0;
    textbuf->call_modify_callbacks();
}
```

When loading the file we use the `loadfile()` method to "replace" the text in the buffer, or the `insertfile()` method to insert text in the buffer from the named file.

7.8.3 save_file()

This function saves the current buffer to the specified file:

```
void save_file(char *newfile) {
    if (textbuf->savefile(newfile))
        fl_alert("Error writing to file \'%s\':\n%s.", newfile, strerror(errno));
    else
        strcpy(filename, newfile);
```

```

changed = 0;
textbuf->call_modify_callbacks();
}

```

7.8.4 set_title()

This function checks the `changed` variable and updates the window label accordingly:

```

void set_title(Fl_Window* w) {
    if (filename[0] == '\0') strcpy(title, "Untitled");
    else {
        char *slash;
        slash = strrchr(filename, '/');
#ifndef WIN32
        if (slash == NULL) slash = strrchr(filename, '\\');
#endif
        if (slash != NULL) strcpy(title, slash + 1);
        else strcpy(title, filename);
    }

    if (changed) strcat(title, " (modified)");

    w->label(title);
}

```

7.9 The main() Function

Once we've created all of the support functions, the only thing left is to tie them all together with the `main()` function. The `main()` function creates a new text buffer, creates a new view (window) for the text, shows the window, loads the file on the command-line (if any), and then enters the FLTK event loop:

```

int main(int argc, char **argv) {
    textbuf = new Fl_Text_Buffer;

    Fl_Window* window = new_view();

    window->show(1, argv);

    if (argc > 1) load_file(argv[1], -1);

    return Fl::run();
}

```

7.10 Compiling the Editor

The complete source for our text editor can be found in the `test/editor.cxx` source file. Both the Makefile and Visual C++ workspace include the necessary rules to build the editor. You can also compile it using a standard compiler with:

```
CC -o editor editor.cxx -lfltk -lxext -lx11 -lm
```

or by using the `fltk-config` script with:

```
fltk-config --compile editor.cxx
```

As noted in [Chapter 1](#), you may need to include compiler and linker options to tell them where to find the FLTK library. Also, the CC command may also be called `gcc` or `c++` on your system.

Congratulations, you've just built your own text editor!

7.11 The Final Product

The final editor window should look like the image in Figure 4-2.

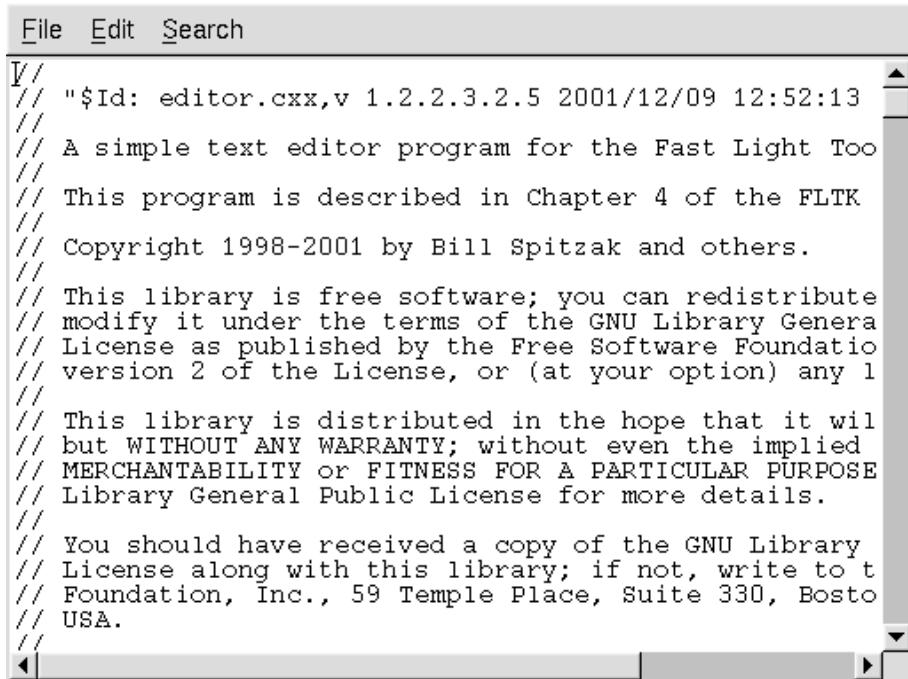


Figure 7.2: The completed editor window

7.12 Advanced Features

Now that we've implemented the basic functionality, it is time to show off some of the advanced features of the `F1_Text_Editor` widget.

7.12.1 Syntax Highlighting

The `F1_Text_Editor` widget supports highlighting of text with different fonts, colors, and sizes. The implementation is based on the excellent `NEdit` text editor core, which uses a parallel "style" buffer which tracks the font, color, and size of the text that is drawn.

Styles are defined using the `F1_Text_Display::Style_Table_Entry` structure defined in `<FL/F1_Text_Display.H>`:

```
struct Style_Table_Entry {
    F1_Color color;
    F1_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:

```
F1_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:

```
F1_Text_Buffer *stylebuf;

w->editor->highlight_data(stylebuf, 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:

```
textbuf->add_modify_callback(style_update, w->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) {
        stylebuf->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';

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

    // Select the area that was just updated to avoid unnecessary
    // callbacks...
    stylebuf->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 = textbuf->line_start(pos);
    end   = textbuf->line_end(pos + nInserted - nDeleted);
    text  = textbuf->text_range(start, end);
    style = stylebuf->text_range(start, end);
    last  = style[end - start - 1];

    style_parse(text, style, end - start);

    stylebuf->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   = textbuf->length();
        text  = textbuf->text_range(start, end);
        style = stylebuf->text_range(start, end);

        style_parse(text, style, end - start);

        stylebuf->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';
}
}
```


Chapter 8

6 - Handling Events

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

8.1 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 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.

8.2 Mouse Events

8.2.1 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. 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.

8.2.2 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`.

8.2.3 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`.

8.2.4 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`.

8.2.5 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.

8.3 Focus Events

8.3.1 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.

8.3.2 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`.

8.3.3 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 interaction with the window manager it will be zero.

8.3.4 FL_UNFOCUS

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

8.4 Keyboard Events

8.4.1 FL_KEYDOWN, FL_KEYUP

A key was pressed or released. 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 `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.

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 foreign 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.

8.4.2 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.

8.5 Widget Events

8.5.1 FL_DEACTIVATE

This widget is no longer active, due to `deactivate()` being called on it or one of its parents. `active()` may still be true after this, the widget is only active if `active()` is true on it and all its parents (use `active_r()` to check this).

8.5.2 FL_ACTIVATE

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

8.5.3 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. `visible()` may still be true after this, but the widget is visible only if `visible()` is true for it and all its parents (use `visible_r()` to check this).

8.5.4 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. *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 handle() method!*

8.6 Clipboard Events

8.6.1 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()`.

8.6.2 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.

8.7 Drag and Drop Events

FLTK supports drag and drop of text and files from any application on the desktop. Text is transferred using the current code page. Files are received as a list of full path and file names, separated by newline. On some platforms, path names are prepended with `file://`.

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`.

8.7.1 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.

8.7.2 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.

8.7.3 FL_DND_LEAVE

The mouse has moved out of the widget.

8.7.4 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.

8.8 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`

8.9 Event Propagation

FLTK follows very simple and unchangeable rules for sending events. The major innovation is that widgets can indicate (by returning 0 from the `handle()` method) that they are not interested in an event, and FLTK can then send that event elsewhere. This eliminates the need for "interests" (event masks or tables), and this is probably the main reason FLTK is much smaller than other toolkits.

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`
- `Fl_Widget::take_focus`

8.10 FLTK Compose-Character Sequences

The foreign-letter compose processing done by the `F1_Input` widget is provided in a function that you can call if you are writing your own text editor widget.

FLTK uses its own compose processing to allow "preview" of the partially composed sequence, which is impossible with the usual "dead key" processing.

Although currently only characters in the ISO-8859-1 character set are handled, you should call this in case any enhancements to the 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:

- `F1::compose()`
- `F1::compose_reset()`

Chapter 9

7 - Adding and Extending Widgets

This chapter describes how to add your own widgets or extend existing widgets in FLTK.

9.1 Subclassing

New widgets are created by *subclassing* an existing FLTK widget, typically `F1_Widget` for controls and `F1_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. `F1_Group` is the main composite widget class in FLTK, and all of the other composite widgets (`F1_Pack`, `F1_Scroll`, `F1_Tabs`, `F1_Tile`, and `F1_Window`) 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 `F1_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.

9.2 Making a Subclass of `F1_Widget`

Your subclasses can directly descend from `F1_Widget` or any subclass of `F1_Widget`. `F1_Widget` has only four virtual methods, and overriding some or all of these may be necessary.

9.3 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)
: F1_Widget(x, y, w, h, label) {
// do initialization stuff...
}
```

`F1_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);
```

9.4 Protected Methods of Fl_Widget

The following methods are provided for subclasses to use:

- `Fl_Widget::clear_visible`
- `Fl_Widget::damage`
- `Fl_Widget::draw_box`
- `Fl_Widget::draw_focus`
- `Fl_Widget::draw_label`
- `Fl_Widget::set_flag`
- `Fl_Widget::set_visible`
- `Fl_Widget::test_shortcut`
- `Fl_Widget::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 private `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() &amp; 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();
}

```

```

void Fl_Widget::draw_box() const
void Fl_Widget::draw_box(Fl_Boxtype b, ulong c) const

```

The first form draws this widget's `box()`, using the dimensions of the widget. The second form uses `b` as the box type and `c` as the color for the box.

```

void Fl_Widget::draw_focus() const
void Fl_Widget::draw_focus(Fl_Boxtype b, 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

```

This 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(SHORTCUT_LABEL)
```

Modifies `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() const
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 key press, 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 Fl_Widget::type() const
void Fl_Widget::type(uchar t)
```

The property `Fl_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 Infomation), 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). Look through the header files for `FL_RESERVED_TYPE` to find an unused number. If you make a subclass of `Fl_Window` you must use `FL_WINDOW + n` (`n` must be in the range 1 to 7).

9.5 Handling Events

The virtual method `int Fl_Widget::handle(int event)` is called to handle each event passed to the widget. It can:

- Change the state of the widget.
- Call `Fl_Widget::redraw()` if the widget needs to be redisplayed.
- Call `Fl_Widget::damage(n)` if the widget needs a partial-update (assuming you provide support for this in your `Fl_Widget::draw()` method).
- Call `Fl_Widget::do_callback()` if a callback should be generated.
- Call `Fl_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 aquired by calling the `Fl::event_*`() functions. 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.

9.6 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 above `damage(b, x, y, w, h)`) 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 [below](#).

9.7 Resizing the Widget

The `resize(int x, int y, int w, int 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.

9.8 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_outside_label](#)
- [update_child](#)

```
void Fl_Group::draw_child(Fl_Widget&)
```

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_outside_label(Fl_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&)
```

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.

9.9 Cut and Paste Support

FLTK provides routines to cut and paste 8-bit text (in the future this may be UTF-8) between applications:

- [Fl::paste](#)
- [Fl::selection](#)
- [Fl::selection_owner](#)

It may be possible to cut/paste non-text data by using [Fl::add_handler\(\)](#).

9.10 Drag And Drop Support

FLTK provides routines to drag and drop 8-bit 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 `events`:

- `FL_DND_ENTER`
- `FL_DND_DRAG`
- `FL_DND_LEAVE`
- `FL_DND_RELEASE`
- `FL_PASTE`

9.11 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.
1. 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 "[Appendix F – Operating System Issues](#)" for more information.

Chapter 10

8 - Using OpenGL

This chapter discusses using FLTK for your OpenGL applications.

10.1 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. 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>`, define some extra drawing functions provided by FLTK, and include the `<windows.h>` header file needed by WIN32 applications.

10.2 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.

10.2.1 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.)

10.2.2 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 ...
}
```

10.2.3 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 **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.

10.3 Using OpenGL in Normal FLTK Windows

You can put OpenGL code into an **Fl_Widget::draw()** method or into the code for a **boxtyle** 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();
... put your OpenGL code here ...
gl_finish();

```

gl_start() and **gl_finish()** set up 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, WIN32, or FLTK functions.

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` !

10.4 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 *)`

`float gl_width(const char *, int n)`

`float gl_width(uchar)`

Returns information about the current OpenGL font.

`void gl_draw(const char *)`

`void gl_draw(const char *, 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 *, int x, int y)
void gl_draw(const char *, int n, int x, int y)
void gl_draw(const char *, float x, float y)
void gl_draw(const char *, 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 *, 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\(\)](#).

10.5 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 it's 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.

10.6 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_Window {
    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_Window(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...

#ifndef 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 {
#endif 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.

Chapter 11

9 - 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](#)
- [Internationalization with FLUID](#)
- [Known Limitations](#)

11.1 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.

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 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 11.1: FLUID organization

Normally the FLUID file defines one or more functions or classes which output C++ code. Each function defines a 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.

11.2 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.

11.3 Running FLUID Under Microsoft Windows

To run FLUID under WIN32, double-click on the *FLUID.exe* file. You can also run FLUID from the Command Prompt window. FLUID always runs in the background under WIN32.

11.4 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 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 $<
```

11.5 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.

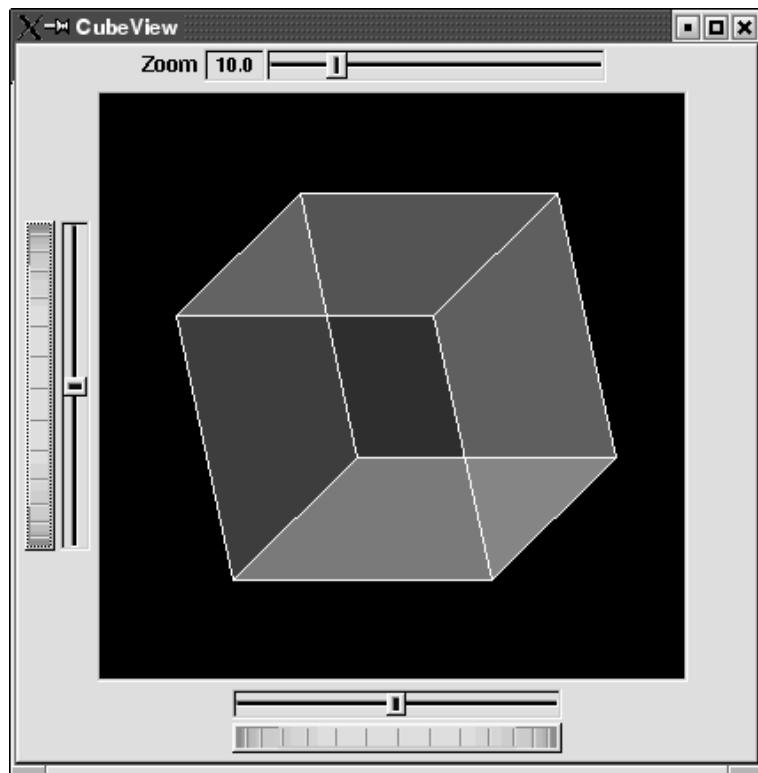


Figure 11.2: CubeView demo

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 callbacks member functions of a custom widget classes.
3. Subclass an `Fl_Gl_Window` to suit your purposes.

11.5.1 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 the 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":

```
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(float angle){vAng=angle;};
    // Return the rotation about the vertical (y ) axis.
    float v_angle(){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(float angle){hAng=angle;};
    // the rotation about the horizontal (x ) axis.
    float h_angle(){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(float 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(float y){yshift=y;};
    /* The widget class draw() override.
The draw() function initialize 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. The color is #defined by
CUBECOLOR.
 */
    void drawCube();

    float vAng,hAng; float 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 "cube" 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)
{
    vAng = 0.0; hAng=0.0; size=10.0;
    /* 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;
};

// The color used for the edges of the bounding cube.
#define CUBECOLOR 255,255,255,255

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,w(),h());
        glOrtho(-10,10,-10,10,-20000,10000); glEnable(GL_BLEND);
        glBlendFunc(GL_SRC_ALPHA, GL_ONE_MINUS_SRC_ALPHA);
    }

    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
    glPushMatrix(); glTranslatef(xshift, yshift, 0);
    glRotatef(hAng, 0,1,0); glRotatef(vAng, 1,0,0);
    glScalef(float(size),float(size),float(size)); drawCube();
    glPopMatrix();
};

```

11.5.2 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.

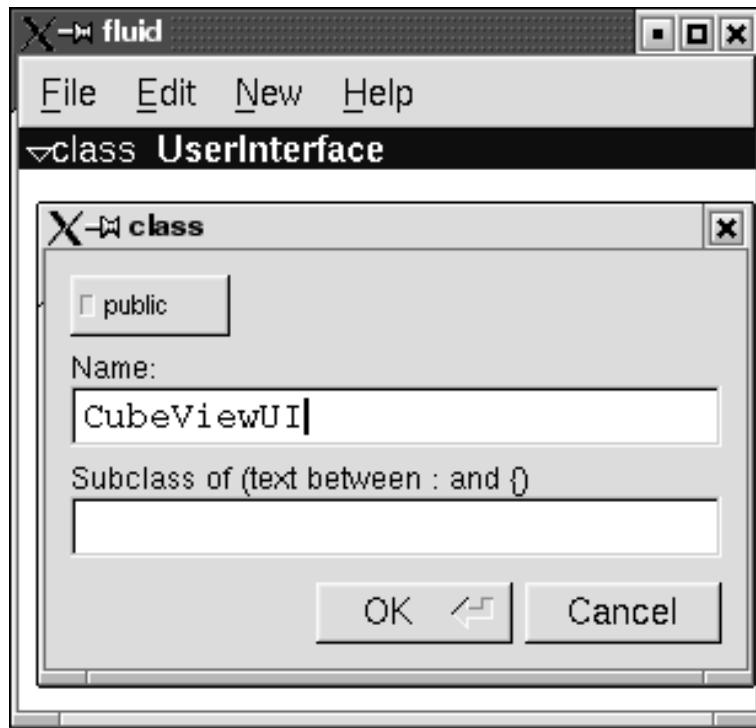


Figure 11.3: FLUID file for CubeView

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:

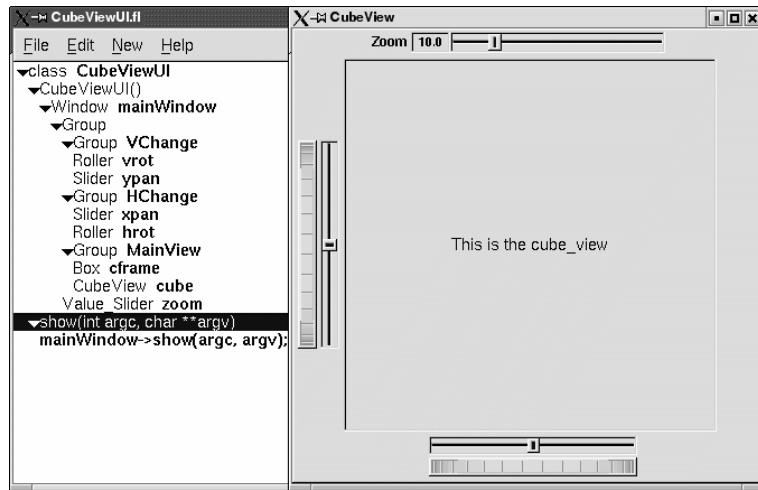


Figure 11.4: FLUID window containing CubeView demo

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 CubeView class inherits the `Fl_GL_Window` class, which is created in the same way as a `Fl_Box` widget. 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.

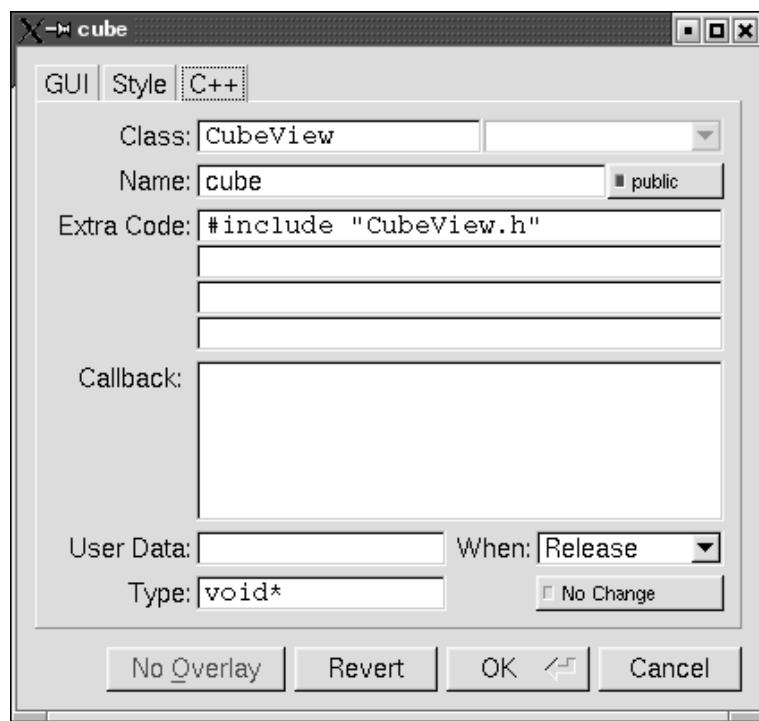


Figure 11.5: CubeView methods

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 in 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 no 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. 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`.

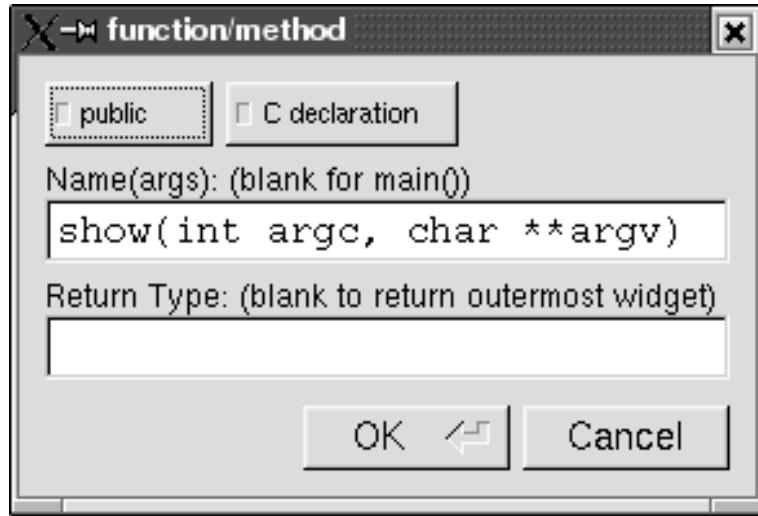


Figure 11.6: CubeView constructor

Once the new method has been added, highlight its name and select **New->Code->Code**. Enter the method's code in the code window.

11.5.3 Adding Constructor Initialization Code

If you need to add code to initialize 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.

11.5.4 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.

11.6 FLUID Reference

The following sections describe each of the windows in FLUID.

11.6.1 The Widget Browser

The main window shows a menu bar and a scrolling browser of all the defined widgets. The name of the .f1 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 [F1_Window](#).

Below that are either *widgets* (subclasses of [F1_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).

11.6.2 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/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)

This isn't implemented yet. You should do save often so you can recover from any mistakes you make.

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+c)

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/Open... (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 [F1_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/Overlays on/off (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/Project Settings... (Ctrl+p)

Displays the project settings panel. The output filenames control the extensions or names of the files the are generated by FLUID. If you check the "Include .h from .cxx" button the code file will include the header file automatically.

The internationalization options are described [later in this chapter](#).

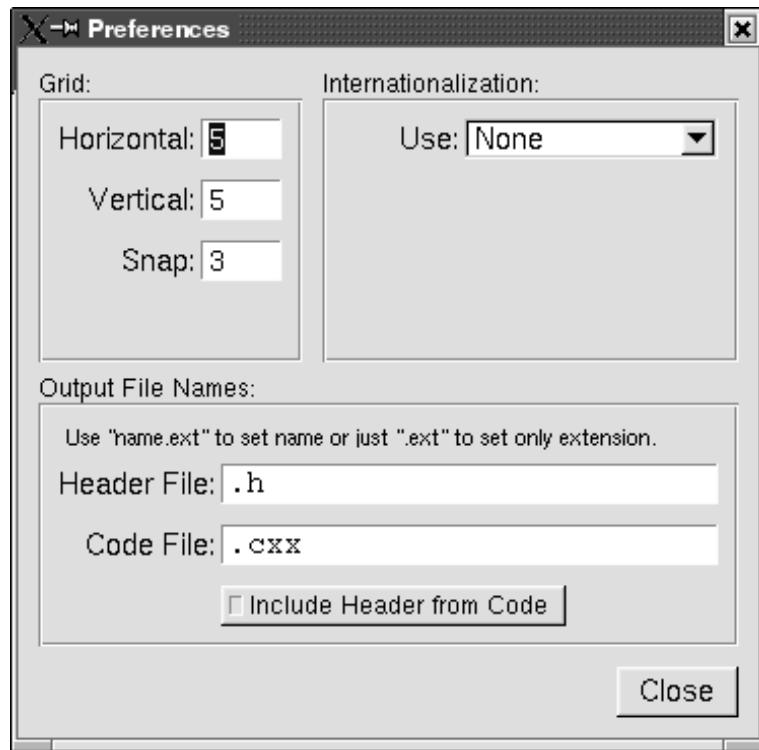


Figure 11.7: FLUID Preferences Window

Edit/GUI Settings... (Shift+Ctrl+p)

Displays the GUI settings panel. This panel is used to control the user interface settings.

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 a `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... (Ctrl+g)

Displays the grid settings panel. This panel controls the grid 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.

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/About FLUID

Pops up a panel showing the version of FLUID.

Help/On FLUID

Shows this chapter of the manual.

Help/Manual

Shows the contents page of the manual

11.6.3 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 "no overlay" 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.

"Revert" or "Cancel" put everything back to when you last brought up the panel or hit OK. However in the current version of FLUID, changes to "visible" attributes (such as the color, label, box) are not undone by revert or cancel. Changes to code like the callbacks are undone, however.

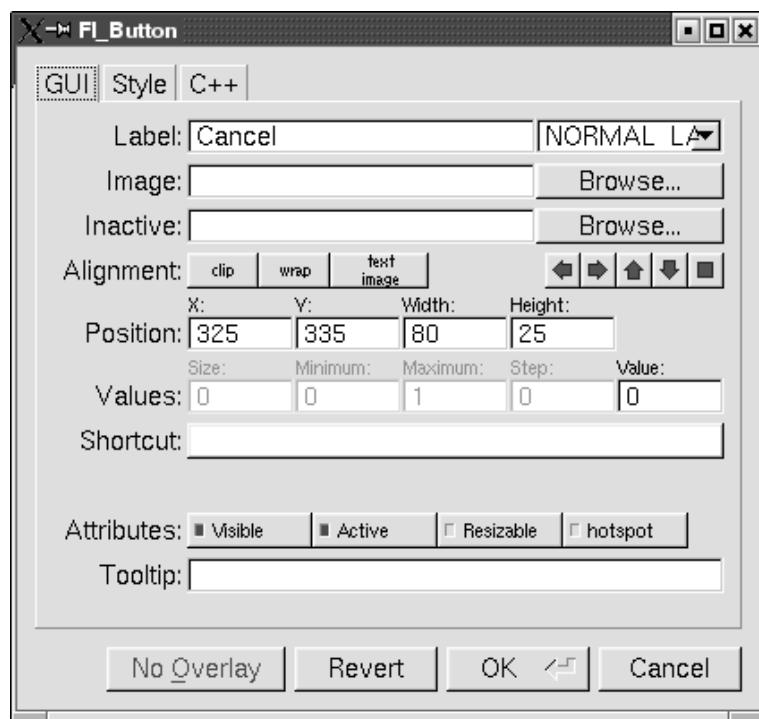


Figure 11.8: The FLUID widget GUI attributes

11.7 GUI Attributes

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.

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 resizable. 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.

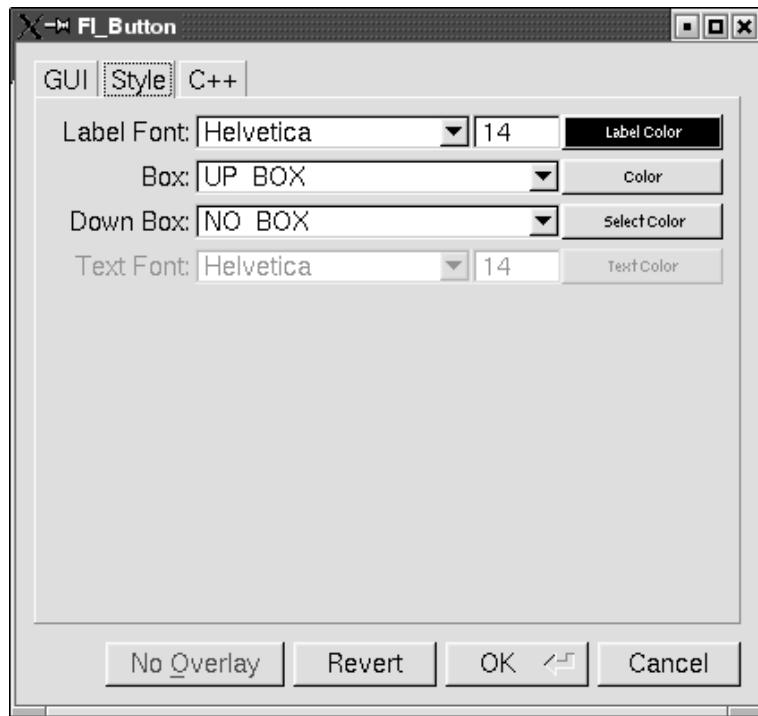


Figure 11.9: The FLUID widget Style attributes

11.7.1 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 boxtyle 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 boxtyle to draw when a button is pressed or for some parts of other widgets like scrollbars and valiators.

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.

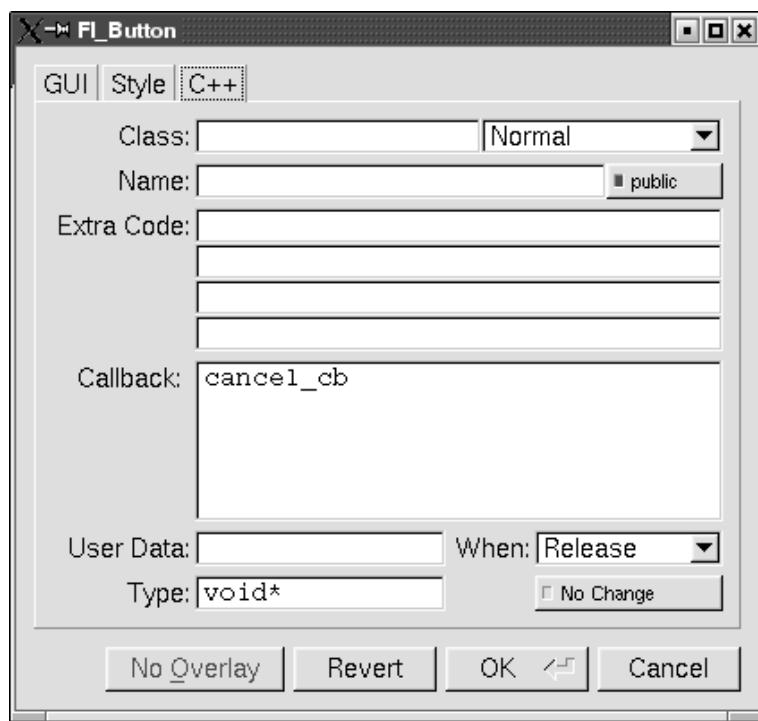


Figure 11.10: The FLUID widget C++ attributes

11.7.2 C++ Attributes

Class

This is how you use your own subclasses of `Fl_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. Currently the only way to get a double-buffered window is to change this field for the window to "Fl_Double_Window" and to add

```
"#include <FL/Fl_Double_Window.h>
```

to the extra code.

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 that 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 but letters, numbers, and the underscore then FLUID treats it as code.

A name names 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.

11.8 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:

11.9 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 ".xbm" 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 WIN32 applications for icons. FLUID converts BMP files into (modified) XPM format and uses a [Fl_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 a [Fl_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 a [Fl_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 [Fl_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.

11.10 Internationalization with FLUID

FLUID supports internationalization (I18N for short) of label strings used by widgets. The preferences window (**Ctrl+p**) provides access to the I18N options.

11.10.1 I18N Methods

FLUID supports three methods of I18N: use none, use GNU gettext, and use POSIX catgets. The "use 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.

11.10.2 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. Two new input fields will then appear to control the include file and function/macro name to use when retrieving the localized label strings.

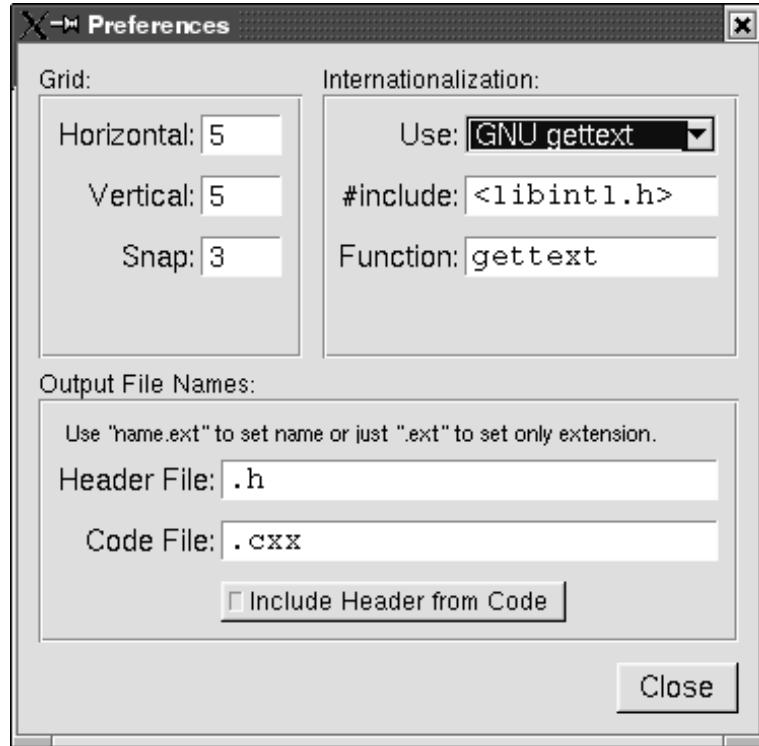


Figure 11.11: Internationalization using GNU gettext

The "\#include" field controls the header file to include for I18N; by default this is `<libintl.h>`, the standard I18N file for GNU gettext.

The "Function" field controls the function (or macro) that will retrieve the localized message; by default the `gettext` function will be called.

11.10.3 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.

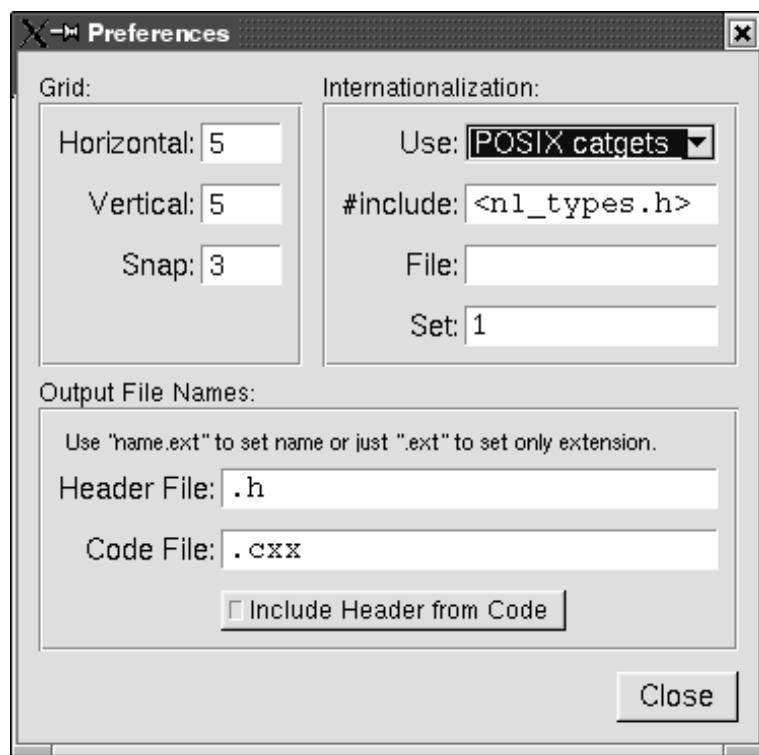


Figure 11.12: Internationalization using POSIX catgets

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 `.fl1` file.

The "Set" field controls the set number in the catalog file. The default set is 1 and rarely needs to be changed.

11.11 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.

Chapter 12

10 - Advanced FLTK

This chapter explains advanced programming and design topics that will help you to get the most out of FLTK.

12.1 Multithreading

FLTK supports multithreaded application using a locking mechanism based on "pthreads". We do not provide a threading interface as part of the library. However a simple example how threads can be implemented for all supported platforms can be found in `test/threads.h` and `test/threads.cxx`.

To use the locking mechanism, FLTK must be compiled with `-enable-threads` set during the configure process. IDE-based versions of FLTK are automatically compiled with locking enabled if possible.

In `main()`, call `Fl::lock()` before `Fl::run()` or `Fl::wait()` to start the runtime multithreading support for your program. All callbacks and derived functions like `handle()` and `draw()` will now be properly locked:

```
}
```

```
int main() {
    Fl::lock();
    /* run thread */
    while (Fl::wait() > 0) {
        if (Fl::thread_message()) {
            /* process your data */
        }
    }
}
```

You can now 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()`:

```
Fl::lock();      // avoid conflicting calls
...
Fl::unlock();   // allow other threads to access FLTK again
```

You can send messages from child threads to the main thread using `Fl::awake(msg)`:

```
void *msg;       // "msg" is a pointer to your message
Fl::awake(msg); // send "msg" to main thread
```

You can also tell the main thread to call a function for you as soon as possible by using `Fl::awake(callback, userdata)`:

```
void do_something(void *userdata) {
    // running with the main thread
}

// running in another thread
void *data;      // "data" is a pointer to your user data
Fl::awake(do_something, data); // call something in main thread
```

FLTK supports multiple platforms, some of them which do not allow any other but 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 widgets derived from `F1_Window`, including dialogs, file choosers, subwindows or `F1_GL_Windows`
- Don't call `F1::wait()`, `F1::flush()` or any related methods that will handle system messages
- Don't start or cancel timers
- Don't change window decorations or titles
- The `make_current()` method may or may not work well for regular windows, but should always work for `F1_GL_Windows` to allow for high speed rendering on graphics cards with multiple pipelines

See also: `void awake(void *message)`, `void lock()`, `void *thread_message()`, `void unlock()`.

Chapter 13

11 - Unicode and utf-8 Support

This chapter explains how FLTK handles international text via Unicode and utf-8.

Unicode support was only recently added to FLTK and is still incomplete. This chapter is Work in Progress, reflecting the current state of Unicode support.

13.1 About Unicode and utf-8

The Unicode Standard is a worldwide accepted character encoding standard. Unicode provides access to over 100,000 characters used in all the major languages written today.

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 in utf-8, making the transformation to Unicode quick and easy.

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 iteration of the library.

13.2 Unicode in FLTK

FLTK will be entirely converted to Unicode in utf-8 encoding. If a different encoding is required by the underlying operating system, FLTK will convert string as needed.

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](#)
- why FLTK has no `Fl_String` class

DONE:

- initial transfer of the Ian/O'ksi'D patch
- adapted Makefiles and IDEs for available platforms
- hacked some Unicode keyboard entry for OS X

ISSUES:

- IDEs:
 - Makefile support: tested on Fedora Core 5 and OS X, but heaven knows on which platforms this may fail
 - Xcode: tested, seems to be working (but see comments below on OS X)

- VisualC (VC6): tested, test/utf8 works, but may have had some issues during merge. Some additional work needed (imm32.lib)
 - VisualStudio2005: tested, test/utf8 works, some addtl. work needed (imm32.lib)
 - VisualCNet: sorry, I have no longer access to that IDE
 - Borland and other compiler: sorry, I can't update those
- Platforms:
 - you will encounter problems on all platforms!
 - X11: many characters are missing, but that may be related to bad fonts on my machine. I also could not do any keyboard tests yet. Rendering seems to generally work ok.
 - Win32: US and German keyboard worked ok, but no compositing was tested. Rendering looks pretty good.
 - OS X: redering looks good. Keyboard is completely messed up, even in US setting (with Alt key)
 - all: while merging I have seen plenty of places that are not entirley utf8-safe, particularly [Fl_Input](#), [Fl_Text_Editor](#), and [Fl_Help_View](#). Keycodes from the keyboard conflict with Unicode characters. Right-to-left rendered text can not be marked or edited, and probably much more.

Chapter 14

C - FLTK 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 is zero are marked with "(0)", this is often useful to know when programming.

14.1 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 3.
- `FL_PATCH_VERSION` - The patch release number, currently 0.
- `FL_VERSION` - A combined floating-point version number for the major, minor, and patch release numbers, currently 1.0300.

14.2 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.

14.3 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.

14.4 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

14.5 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; use `FL_KP` + n for number n.
- `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.

14.6 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 WIN32 and X11, or `FL_META` 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 ($N > 0$) is pushed.

14.7 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`
- `FL_ALIGN_TOP_RIGHT`
- `FL_ALIGN_BOTTOM_LEFT`
- `FL_ALIGN_BOTTOM_RIGHT`
- `FL_ALIGN_LEFT_TOP`

- `FL_ALIGN_RIGHT_TOP`
- `FL_ALIGN_LEFT_BOTTOM`
- `FL_ALIGN_RIGHT_BOTTOM`
- `FL_ALIGN_INSIDE` - 'or' this with other values to put label inside the widget.

14.8 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.

14.9 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.

14.9.1 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 inline methods for getting a grayscale, color cube, or RGB color value are described in [Appendix B – Function Reference](#).

14.10 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 MSWindows)
- `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

14.11 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.

14.12 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 `F1_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.

Chapter 15

D - 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.

15.1 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.

15.2 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)`
- `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 `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 `F1::args()`, and will accept any abbreviation of these switches (such as "-di" for "-display").

15.3 Mixing GLUT and FLTK Code

You can make your GLUT window a child of a `F1_Window` with the following scheme. The biggest trick is that GLUT insists on `show()`'ing the window at the point it is created, which means the `F1_Window` parent window must already be shown.

- Don't call `glutInit()`.
- Create your `F1_Window`, and any FLTK widgets. Leave a blank area in the window for your GLUT window.
- `show()` the `F1_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()`, `F1::run()`, or loop calling `F1::wait()` to run the program.

15.4 class `F1_Glut_Window`

Chapter 16

E - Forms Compatibility

This appendix describes the Forms compatibility included with FLTK.

16.1 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>.

16.2 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. Take a look at `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.

16.3 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.

`F1_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.

`F1_Timer` widgets are provided to emulate the XForms timer. These work, but are quite inefficient and inaccurate compared to using `F1::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 "boxtyle" 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 `F1_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_DBLCHECK` (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

16.4 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	<code>Fl::event_x_root()</code>
MOUSE_Y	<code>Fl::event_y_root()</code>
LEFTSHIFTKEY,RIGHTSHIFTKEY	<code>Fl::event_shift()</code>
CAPSLOCKKEY	<code>Fl::event_capslock()</code>
LEFTCTRLKEY,RIGHTCTRLKEY	<code>Fl::event_ctrl()</code>
LEFTALTKEY,RIGHTALTKEY	<code>Fl::event_alt()</code>
MOUSE1,RIGHTMOUSE	<code>Fl::event_state()</code>
MOUSE2,MIDDLEMOUSE	<code>Fl::event_state()</code>
MOUSE3,LEFTMOUSE	<code>Fl::event_state()</code>

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*");
```

Chapter 17

F - Operating System Issues

This appendix describes the operating system specific interfaces in FLTK.

17.1 Accessing the OS Interfaces

All programs that need to access the operating system specific interfaces must include the following header file:

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

Despite the name, 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.

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.

17.2 The UNIX (X11) Interface

The UNIX interface provides access to the X Window System state information and data structures.

17.2.1 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().

```
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.

```
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.

17.2.2 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;
extern Window fl_window;
extern GC fl_gc;
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*`.

17.2.3 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 WIN32 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_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);
```

17.2.4 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

`F1_Window::show()`. If not `shown()` your implementation must call either `F1_X::set_xid()` or `F1_X::make_xid()`.

An example:

```
void MyWindow::show() {
    if (shown()) {F1_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(f1_display, RootWindow(f1_display,f1_screen),
                                   vis->visual, AllocNone);
    }
    F1_X::make_xid(this, visual, colormap);
}
```

`F1_X *F1_Xset_xid(F1_Window *, Window xid)`

Allocate a hidden structure called an `F1_X`, put the XID into it, and set a pointer to it from the `F1_Window`. This causes `F1_Window::shown()` to return true.

`void F1_X::make_xid(F1_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 `F1_X::set_xid()` with this new window and maps the window.

`virtual void F1_Window::flush()`

This virtual function is called by `F1::flush()` to update the window. For FLTK's own windows it does this by setting the global variables `f1_window` and `f1_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 `F1_X::i(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(F1_X::i(this)->region);
    F1_X::i(this)->region = 0;
    if (damage() != 2) {... draw things into backing store ...}
    ... copy backing store to window ...
}
```

`virtual void F1_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 `F1_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(f1_display,mypixmap);
        my pixmap = 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();
}
```

17.2.5 Setting the Icon of a Window

FLTK currently supports setting a window's icon **before** it is shown using the `Fl_Window::icon()` method.

`void Fl_Window::icon(char *)`

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(f1_display, DefaultRootWindow(f1_display),
                                 icon_bits, icon_width, icon_height);

window->icon((char *)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(f1_display, DefaultRootWindow(f1_display),
                       icon_xpm, &p, &mask, NULL);

window->icon((char *)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(argc, argv)` for the icon to be used. The `Fl_Window::show()` method does not bind the icon to the window.

17.2.6 X Resources

When the `Fl_Window::show(argc, 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 `F1_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`).

17.3 The Windows (WIN32) Interface

The Windows interface provides access to the WIN32 GDI state information and data structures.

17.3.1 Handling Other WIN32 Messages

By default a single WNDCLASSEX called "FLTK" is created. All `F1_Window`'s are of this class unless you use `F1_Window::xclass()`. The window class is created the first time `F1_Window::show()` is called.

You can probably combine FLTK with other libraries that make their own WIN32 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 WIN32 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.

17.3.2 Drawing Things Using the WIN32 GDI

When the virtual function `Fl_Widget::draw()` is called, FLTK stores all the silly extra arguments you need to make a proper GDI call in some global variables:

```
extern HINSTANCE fl_display;
extern HWND fl_window;
extern HDC fl_gc;
COLORREF fl_RGB();
HPEN fl_pen();
HBRUSH fl_brush();
```

These global variables are set before `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.

17.3.3 Setting the Icon of a Window

FLTK currently supports setting a window's icon *before* it is shown using the `Fl_Window::icon()` method.

```
void Fl_Window::icon(char *)
```

Sets 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((char *)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(argc, argv)` for the icon to be used. The `Fl_Window::show()` method does not bind the icon to the window.

17.3.4 How to Not Get a MSDOS Console Window

WIN32 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 WIN32 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.*

WIN32 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, WIN32 applications are run in the background by the console, although you can use "start /wait program" to run them in the foreground.

17.3.5 Known WIN32 Bugs and Problems

The following is a list of known bugs and problems in the WIN32 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 WIN32 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

17.4 The MacOS Interface

FLTK supports MacOS X using the Apple Carbon library. Older versions of MacOS are *not* 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`. 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 keyboard will set `FL_ALT` in `Fl::event_state()`, set `Fl::event_key()` to 'y' and return the Yen symbol in `Fl::event_text()`.

`WindowRef fl_xid(const Fl_Window *)`

Returns the window reference for an `Fl_Window`, or `NULL` if the window has not been shown.

`Fl_Window *fl_find(WindowRef xid)`

Returns the `Fl_Window` that corresponds to the give window handle, or `NULL` if not found. FLTK windows that are children of top-level windows share the `WindowRef` of the top-level window.

17.4.1 Apple "Quit" Event

When the user press Cmd-Q or requests a termination of the application, OS X will send a "Quit" Apple Event. FLTK handles this event by sending an `FL_CLOSE` event to all open windows. If all windows close, the application will terminate.

17.4.2 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 setting the `f1_open_callback`.

```
void f1_open_callback(void (*cb)(const char *))
```

`cb` will be called with a single iUnix-style file name and path. If multiple files were dropped, `f1_open_callback` will be called multiple times.

17.4.3 Drawing Things Using QuickDraw

When the virtual function `F1_Widget::draw()` is called, FLTK has prepared the Window and CGraf-Port for drawing. Clipping and offsets are prepared to allow correct subwindow drawing.

17.4.4 Drawing Things Using Quartz

If the FLTK library was compiled using the configuration flag `-enable-quartz`, all code inside `F1_Widget::draw()` is expected to call Quartz drawing functions instead of QuickDraw. 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 `F1_Window`.

[F1_Double_Window](#)

OS X double-buffers all windows automatically. On OS X, `F1_Window` and `F1_Double_Window` are handled internally in the same way.

17.4.5 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

Caution:

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 UNIX-style filenames and paths.

17.4.6 Known MacOS Bugs and Problems

The following is a list of known bugs and problems in the MacOS version of FLTK:

- Line styles are not well supported. This is due to limitations in the QuickDraw interface.
- Nested subwindows are not supported, i.e. you can have a `Fl_Window` widget inside a `Fl_Window`, but not a `Fl_Window` inside a `Fl_Window` inside a `Fl_Window`.

Chapter 18

G - Migrating Code from FLTK 1.0 to 1.1

This appendix describes the differences between the FLTK 1.0.x and FLTK 1.1.x functions and classes.

18.1 Color Values

Color values are now stored in a 32-bit unsigned integer instead of the unsigned character in 1.0.x. This allows for the specification of 24-bit RGB values or 8-bit FLTK color indices.

`FL_BLACK` and `FL_WHITE` now remain black and white, even if the base color of the gray ramp is changed using `Fl::background()`. `FL_DARK3` and `FL_LIGHT3` can be used instead to draw a very dark or a very bright background hue.

Widgets use the new color symbols `FL_FOREGROUND_COLOR`, `FL_BACKGROUND_COLOR`, `FL_BACKGROUND2_COLOR`, `FL_INACTIVE_COLOR`, and `FL_SELECTION_COLOR`. More details can be found in the chapter [Enumerations](#).

18.2 Cut and Paste Support

The FLTK clipboard is now broken into two parts - a local selection value and a cut-and-paste value. This allows FLTK to support things like highlighting and replacing text that was previously cut or copied, which makes FLTK applications behave like traditional GUI applications.

18.3 File Chooser

The file chooser in FLTK 1.1.x is significantly different than the one supplied with FLTK 1.0.x. Any code that directly references the old `FCB` class or members will need to be ported to the new `Fl_File_Chooser` class.

18.4 Function Names

Some function names have changed from FLTK 1.0.x to 1.1.x in order to avoid name space collisions. You can still use the old function names by defining the `FLTK_1_0_COMPAT` symbol on the command-line when you compile (`-DFLTK_1_0_COMPAT`) or in your source, e.g.:

```
#define FLTK_1_0_COMPAT
#include <FL/Fl.h>
#include <FL/Enumerations.h>
#include <FL/filename.h>
```

The following table shows the old and new function names:

Old 1.0.x Name	New 1.1.x Name
contrast()	fl_contrast()
down()	fl_down()
filename_absolute()	fl_filename_absolute()
filename_expand()	fl_filename_expand()
filename_ext()	fl_filename_ext()
filename_isdir()	fl_filename_isdir()
filename_list()	fl_filename_list()
filename_match()	fl_filename_match()
filename_name()	fl_filename_name()
filename_relative()	fl_filename_relative()
filename_setext()	fl_filename_setext()
frame()	fl_frame()
inactive()	fl_inactive()
numericsort()	fl_numericsort()

18.5 Image Support

Image support in FLTK has been significantly revamped in 1.1.x. The [Fl_Image](#) class is now a proper base class, with the core image drawing functionality in the [Fl_Bitmap](#), [Fl_Pixmap](#), and [Fl_RGB_Image](#) classes.

BMP, GIF, JPEG, PNG, XBM, and XPM image files can now be loaded using the appropriate image classes, and the [Fl_Shared_Image](#) class can be used to cache images in memory.

Image labels are no longer provided as an add-on label type. If you use the old `label()` methods on an image, the widget's `image()` method is called to set the image as the label.

Image labels in menu items must still use the old labeltype mechanism to preserve source compatibility.

18.6 Keyboard Navigation

FLTK 1.1.x now supports keyboard navigation and control with all widgets. To restore the old FLTK 1.0.x behavior so that only text widgets get keyboard focus, call the `Fl::visible_focus()` method to disable it:

```
Fl::visible_focus(0);
```


Chapter 19

H - Migrating Code from FLTK 1.1 to 1.3

This appendix describes the differences between the FLTK 1.1.x and FLTK 1.3.x functions and classes.

If you want to migrate your code from FLTK 1.0 to FLTK 1.3, then you should also consult Appendix [G - Migrating Code from FLTK 1.0 to 1.1](#).

Chapter 20

I - Developer Information

This chapter describes FLTK development and documentation.

Note:

documentation with doxygen will be described here.

Example

Note:

In the following code example(s) "*" will be replaced by "#" as a temporary solution.

```
/** \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.gif
\image latex clock.eps "" width=10cm
\image html round_clock.gif
\image latex clock.eps "" width=10cm
\image html round_clock.eps "" 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 boxtyle 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 boxtyle, position, size, and
label string.
\param[in] t boxtyle
\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)

5. 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.hxx:
/** \relatesalso Gizmo
 * Pops up a gizmo dialog with a Gizmo in it
 */
int popup_gizmo(...);
```

Example comment:

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 will be visible again.

```
The following text is a developer comment.
<!-- *** This *** is *** invisible *** -->
This will be visible again.
```

Different Headlines:

```
<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)

20.1 Non-ASCII characters

if you came here from below: back to [Creating Links](#)

```
Doxxygen understands many HTML quoting characters like
&quot;, &uuml;, &ccedil;, &Ccedil;, but not all HTML quoting characters.
```

This will appear in the document:

Doxxygen understands many HTML quoting characters like ", ü, ç, Ç, but not all HTML quoting characters.

For further informations about quoting see <http://www.stack.nl/~dimitri/doxygen/htmlcmds.html>

Example with UTF-8 encoded text

```
<P>Assuming that the following source code was written on MS Windows,
this example will output the correct label on OS X and X11 as well.
Without the conversion call, the label on OS X would read
<tt>Fahrvergn_gen</tt> with a deformed umlaut u ("cedille",
html "&cedil;").
\#code
btn = new Fl_Button(10, 10, 300, 25);
btn->copy_label(fl_latin1_to_local("Fahrvergnügen"));
\endcode

\note If your application uses characters that are not part of both
encodings, or it will be used in areas that commonly use different
code pages, you might consider upgrading to FLTK 2 which supports
UTF-8 encoding.

\todo This is an example todo entry, please ignore !
```

This will appear in the document:

Assuming that the following source code was written on MS Windows, this example will output the correct label on OS X and X11 as well. Without the conversion call, the label on OS X would read Fahrvergn_gen with a deformed umlaut u ("cedille", html "¸"). #code btn = new Fl_Button(10, 10, 300, 25); btn->copy_label(fl_latin1_to_local("Fahrvergnügen")); #endcode

Note:

If your application uses characters that are not part of both encodings, or it will be used in areas that commonly use different code pages, you might consider upgrading to FLTK 2 which supports UTF-8 encoding.

[Todo](#)

This is an example todo entry, please ignore !

20.2 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
```

20.3 Creating Links

Links to other documents and external links can be embedded with

- normal HTML links
- HTML links without markup - doxygen creates "http://" links automatically
- links to other doxygen chapters with the `\ref` statements
- links to named sections within the same or other doxygen chapters, if they are defined there with a `\section` statement

see chapter \ref unicode creates a link to the named chapter unicode that has been created with a \subpage statement.

see chapter 5 creates a link to a named html anchor "character_encoding" within the same file.

For further informations about quoting see
<http://www.stack.nl/~dimitri/doxygen/htmlcmds.html>

Bold link text: you can see the \e old online documentation of FLTK 1.3 at \b <http://www.fltk.org/doc-1.3/toc.html>

see section \ref development_non-ascii

appears as:

see chapter 11 - Unicode and utf-8 Support creates a link to the named chapter unicode that has been created with a \subpage statement.

see chapter 5 creates a link to a named html anchor "character_encoding" within the same file.

For further informations about quoting see <http://www.stack.nl/~dimitri/doxygen/htmlcmds.html>

Bold link text: you can see the **old online documentation** of FLTK 1.3 at <http://www.fltk.org/doc-1.3/toc.html>

see section Non-ASCII characters

20.4 Changing Old Links

Old HTML links and anchors in text documentation pages should be changed as follows:

```
<H2><A name="event_xxx">Fl::event_*() methods</A></H2>
```

becomes :

```
<A NAME="event_xxx"></A> <!-- For old HTML links only ! -->
\section events_event_xxx Fl::event_*() methods
```

The additional HTML "" statement is temporary needed, until all links (references) are modified, then:

```
<H2><A name="event_xxx">Fl::event_*() methods</A></H2>
```

becomes :

```
\section events_event_xxx Fl::event_*() methods
```

The "\section" statement can also be a "\subsection" or "\subsubsection" statement.

The references (in this example from index.dox) are changed as follows:

```
\subpage events

<B>
  <UL>
    <LI><A HREF="events.html#event_xxx">Fl::event_*() methods</A></LI>
    <LI><A HREF="events.html#propagation">Event Propagation</A></LI>
  </UL>
</B>
```

becomes :

```
\subpage events

<b>
    \li \ref events_event_xxx
    \li \ref events_propagation
</b>
```

20.5 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 "html" 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.

20.6 Hack for missing "tiny.gif" file

[Todo](#)

HACK* : include image file for footer. Doxygen does not include the file "tiny.gif" from "html_footer" in its output html dir. Find out, how this can be done, or avoid using an image in the HTML footer.



20.7 5 Navigation Proposals

Chapter 21

J - Software License

December 11, 2001

The FLTK library and included programs are provided under the terms of the GNU Library General Public License (LGPL) with the following exceptions:

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 to "fltk-bugs@fltk.org".
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 (<http://www.fltk.org>).

GNU LIBRARY GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright (C) 1991 Free Software Foundation, Inc.

59 Temple Place - Suite 330, Boston, MA 02111-1307, USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users.

This license, the Library General Public License, applies to some specially designated Free Software Foundation software, and to any other libraries whose authors decide to use it. You can use it for your libraries, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this

service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(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.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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Chapter 22

K - Example Source Code

March 19, 2005

The FLTK distribution contains over 60 sample applications written in, or ported to, FLTK. If the FLTK archive you received does not contain a 'test' directory, you can download the complete FLTK distribution from <http://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.

22.1 Example Applications

adjuster	arc	ask	bitmap	blocks	boxtyle
browser	button	buttons	checkers	clock	colbrowser
color_chooser	cube	CubeView	cursor	curve	demo
doublebuffer	editor	fast_slow	file_chooser	fluid	fonts
forms	fractals	fullscreen	gl_overlay	glpuzzle	hello
help	iconize	image	inactive	input	input_choice
keyboard	label	line_style	list_visuals	mandelbrot	menubar
message	minimum	navigation	output	overlay	pack
pixmap_- browser	pixmap	preferences	radio	resizebox	resize
scroll	shape	subwindow	sudoku	symbols	tabs
threads	tile	tiled_image	valuators		

22.1.1 adjuster

`adjuster` shows a nifty little widget for quickly setting values in a great range.

22.1.2 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.

22.1.3 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... .

22.1.4 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.

22.1.5 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.

22.1.6 boxtypes

`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.

22.1.7 browser

`browser` shows the capabilities of the [Fl_Browser](#) widget. Important features tested are loading of files, line formatting, and correct positioning of the browser data window.

22.1.8 button

The `button` test is a simple demo of push-buttons and callbacks.

22.1.9 buttons

`buttons` shows a sample of FLTK button types.

22.1.10 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.

22.1.11 clock

The `clock` demo shows two analog clocks. The innards of the [Fl_Clock](#) widget are pretty interesting, explaining the use of timeouts and matrix based drawing.

22.1.12 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*.

22.1.13 color_chooser

The `color_chooser` gives a short demo of FLTK's palette based color chooser and of the RGB based color wheel.

22.1.14 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.

22.1.15 CubeView

`CubeView` shows how to create a UI containing OpenGL with Fluid.

22.1.16 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).

22.1.17 curve

`curve` draws a nice Bezier curve into a custom widget. The *points* option for splines is not supported on all platforms.

22.1.18 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`.

22.1.19 doublebuffer

The `doublebuffer` demo show 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 tripble buffer a window in that case.

22.1.20 editor

FLTK has two very different text input widgets. [Fl_Input](#) and derived classes are rather light weight, however [Fl_Text_Editor](#) is a complete port of *nedit* (with permission). The `editor` test is almost a full application, showing custom syntax highlighting and dialog creation.

22.1.21 fast_slow

`fast_slow` shows how an application can use the [Fl_Widget::when\(\)](#) setting to receive different kinds of callbacks.

22.1.22 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.

22.1.23 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.

22.1.24 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.

22.1.25 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.

22.1.26 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.

22.1.27 gl_overlay

`gl_overlay` shows OpenGL overlay plane rendering. If no hardware overlay plane is available, FLTK will simulate it for you.

22.1.28 glpuzzle

The `glpuzzle` test shows how most Glut source code compiles easily under FLTK.

22.1.29 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.

22.1.30 help

`help` 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.

22.1.31 iconize

`iconize` demonstrates the effect of the window functions `hide()`, `iconize()`, and `show()`.

22.1.32 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).

22.1.33 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.

22.1.34 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\(\)](#).

22.1.35 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.

22.1.36 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.

22.1.37 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`.

22.1.38 line_style

Advanced line drawing can be tested with `line_style`. Not all platforms support all line styles.

22.1.39 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.

22.1.40 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.

22.1.41 menubar

`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.

22.1.42 message

`message` pops up a few of FLTK's standard message boxes.

22.1.43 minimum

`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.

22.1.44 navigation

`navigation` demonstrates how the text cursor moves from text field to text field when using the arrow keys, tab, and shift-tab.

22.1.45 output

`output` shows the difference between the single line and multi line mode of the [Fl_Output](#) widget. Fonts can be selected from the FLTK standard list of fonts.

22.1.46 overlay

The `overlay` test app show how easy an FLTK window can be layered to display cursor and manipulator style elements. This example derives a new class from [Fl_Overlay_Window](#) and provides a new function to draw custom overlays.

22.1.47 pack

The `pack` test program demonstrates the resizing and repositioning of children of the [Fl_Pack](#) group. Putting an [Fl_Pack](#) into an [Fl_Scroll](#) is a useful way to create a browser for large sets of data.

22.1.48 pixmap_browser

`pixmap_browser` tests the shared-image interface. When using the same image multiple times, [Fl_Shared_Image](#) will keep it only once in memory.

22.1.49 pixmap

This simple test shows the use of a LUT based pixmap as a label for a box widget. Pixmaps are stored in the X11 '.xpm' file format and can be part of the source code. Pixmaps support one transparent color.

22.1.50 preferences

I do have my `preferences` in the morning, but sometimes I just can't remember a thing. This is where the [Fl_Preferences](#) come in handy. They remember any kind of data between program launches.

22.1.51 radio

The `radio` tool was created entirely with *fluid*. It shows some of the available button types and tests radio button behavior.

22.1.52 resizebox

`resizebox` shows some possible ways of FLTK's automatic resize behavior..

22.1.53 resize

The `resize` demo tests size and position functions with the given window manager.

22.1.54 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.

22.1.55 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.

22.1.56 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.

22.1.57 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.

22.1.58 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.).

22.1.59 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 [Fl_Tabs](#) widget on the left and the [Fl_Wizard](#) widget on the right side for direct comparison of these two panel management widgets.

22.1.60 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.

22.1.61 tile

The `tile` tool shows a nice way of using [Fl_Tile](#). To test correct resizing of subwindows, the widget for region 1 is created from an [Fl_Window](#) class.

22.1.62 tiled_image

The `tiled_image` demo uses an 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.

22.1.63 valuators

`valuators` shows all of FLTK's nifty widgets to change numeric values.

22.1.64 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.

Chapter 23

Todo List

Member `Fl_Browser_::draw(int, int, int, int)` Find the implementation, if any, and document it there!

Class `Fl_Button` Refactor the doxygen comments for `Fl_Button` type() documentation.

Class `Fl_Button` Refactor the doxygen comments for `Fl_Button` when() documentation.

Class `Fl_Chart` Refactor `Fl_Chart::type()` information.

Class `Fl_Check_Button` Refactor `Fl_Check_Button` doxygen comments (add color() info etc?)

Class `Fl_Check_Button` Generate Fl_Check_Button.gif with visible checkmark.

Class `Fl_Choice` Refactor the doxygen comments for `Fl_Choice` changed() documentation.

Member `Fl_Clock::update()` Find `Fl_Clock::update()` implementation, if any, and document it.

Class `Fl_Counter` Refactor the doxygen comments for `Fl_Counter` type() documentation.

Member `Fl_File_Input::errorcolor() const` Better docs for `Fl_File_Input::errorcolor()` - is it even used?

Member `Fl_Group::sizes()` should the internal representation of the sizes() array be documented?

Class `Fl_Label` For FLTK1.3, the `Fl_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.

Member `Fl_Preferences::get(const char *entry, void *value, const void *defaultValue, int defaultSize, int maxSize)` maxSize should receive the number of bytes that were read.

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!

Class `Fl_Text_Selection` members must be documented

Member `Fl_Widget::align()` const This function should not take uchar as an argument. Apart from the fact that uchar is too short with only 8 bits, it does not provide type safety (in which case we don't need to declare `Fl_Type` an enum to begin with).

Member `Fl_Widget::argument(long v)` The user data value must be implemented using a *union* to avoid 64 bit machine incompatibilities.

Member `Fl_Color` enum `Fl_Color` needs some more comments for values, see `Fl/Enumerations.H`

Member `Fl_When` doxygen comments for values are incomplete and maybe wrong or unclear

Member `Fl_Labeltype` The doxygen comments are incomplete, and some labeltypes are starting with an underscore. Also, there are three external functions undocumented (yet):

- `fl_define_FL_SHADOW_LABEL()`
- `fl_define_FL_ENGRAVED_LABEL()`
- `fl_define_FL_EMBOSSSED_LABEL()`

Member `Fl_String` FIXME: temporary (?) typedef to mark UTF8 and Unicode conversions

Member `Fl::watch_widget_pointer(Fl_Widget *&w)` explain the role of the watch list, it may be related to invalid widget deletion crash fixes...

Page 5 - Drawing Things in FLTK drawing.dox: I fixed the above encoding problem of these ć and umlaut characters, but this text is obsoleted by FLTK 1.3 with utf-8 encoding, or must be rewritten accordingly: How to use native (e.g. Windows "ANSI", or ISO-8859-x) encoding in embedded strings for labels, error messages and more. Please check this (utf-8) encoding on different OS'es and with different language and font environments.

Page I - Developer Information This is an example todo entry, please ignore !

Page I - Developer Information HACK* : include image file for footer. Doxygen does not include the file "tiny.gif" from "html_footer" in its output html dir. Find out, how this can be done, or avoid using an image in the HTML footer.

Chapter 24

Deprecated List

Member `Fl_Group::focus(Fl_Widget *W)` This is for backwards compatibility only. You should use `W->take_focus()` instead.

Member `Fl_Menu_Item::check()` .

Member `Fl_Menu_Item::checked() const` .

Member `Fl_Menu_Item::uncheck()` .

Member `Fl_Spinner::maximum() const`

Member `Fl_Spinner::mininum() const`

Chapter 25

Module Index

25.1 Modules

Here is a list of all modules:

Windows handling functions	215
Events handling functions	218
Selection & Clipboard functions	228
Screen functions	231
Color & Font functions	233
Multithreading support functions	236
Safe widget deletion support functions	238
Cairo support functions and classes	240
Common Dialogs classes and functions	242

Chapter 26

Class Index

26.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Fl	249
Fl_Cairo_State	306
FL_CHART_ENTRY	315
Fl_End	348
Fl_File_Chooser	352
Fl_File_Icon	361
Fl_Font_Descriptor	373
Fl_Glut_Bitmap_Font	389
Fl_Help_Dialog	402
Fl_Help_Link	406
Fl_Help_Target	407
Fl_Image	414
Fl_Bitmap	274
Fl_XBM_Image	676
Fl_Pixmap	482
Fl_GIF_Image	381
Fl_XPM_Image	677
Fl_RGB_Image	515
Fl_BMP_Image	277
Fl_JPEG_Image	437
Fl_PNG_Image	486
Fl_PNM_Image	487
Fl_Shared_Image	533
Fl_Tiled_Image	602
Fl_Label	438
Fl_Menu_Item	457
Fl_Preferences	492
Fl_Preferences::Entry	505
Fl_Preferences::Name	506
Fl_Text_Buffer	554
Fl_Text_Display::Style_Table_Entry	588
Fl_Text_Editor::Key_Binding	596
Fl_Text_Selection	597

Fl_Tooltip	609
Fl_Widget	632
Fl_Box	278
Fl_Button	301
Fl_Light_Button	440
Fl_Check_Button	320
Fl_Round_Button	521
Fl_Repeat_Button	510
Fl_Return_Button	512
Fl_Toggle_Button	608
Fl_Chart	309
Fl_Clock_Output	329
Fl_Clock	326
Fl_Round_Clock	523
Fl_FormsBitmap	374
Fl_FormsPixmap	376
Fl_Free	378
Fl_Group	393
Fl_Browser	292
Fl_Browser	280
Fl_File_Browser	349
Fl_Hold_Browser	413
Fl_Multi_Browser	472
Fl_Select_Browser	532
Fl_Check_Browser	316
Fl_Color_Chooser	333
Fl_Help_View	408
Fl_Input_Choice	432
Fl_Pack	480
Fl_Scroll	524
Fl_Spinner	545
Fl_Tabs	550
Fl_Text_Display	571
Fl_Text_Editor	589
Fl_Tile	599
Fl_Window	663
Fl_Double_Window	345
Fl_Cairo_Window	307
Fl_Overlay_Window	477
Fl_Gl_Window	382
Fl_Glut_Window	390
Fl_Single_Window	539
Fl_Menu_Window	469
Fl_Wizard	674
Fl_Input_	423
Fl_Input	419
Fl_File_Input	367
Fl_Float_Input	372
Fl_Int_Input	436
Fl_Multiline_Input	473
Fl_Output	475
Fl_Multiline_Output	474

Fl_Secret_Input	531
Fl_Menu_	443
Fl_Choice	322
Fl_Menu_Bar	451
Fl_Menu_Button	454
Fl_Positioner	488
Fl_Progress	508
Fl_Timer	605
Fl_Valuator	613
Fl_Adjuster	271
Fl_Counter	338
Fl_Simple_Counter	538
Fl_Dial	342
Fl_Fill_Dial	370
Fl_Roller	519
Fl_Slider	541
Fl_Fill_Slider	371
Fl_Scrollbar	528
Fl_Value_Slider	629
Fl_Value_Input	619
Fl_Value_Output	625

Chapter 27

Class Index

27.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Fl (The Fl is the FLTK global (static) containing state information and global methods for the current application)	249
Fl_Adjuster (Was stolen from Prisms, and has proven to be very useful for values that need a large dynamic range)	271
Fl_Bitmap (Supports caching and drawing of mono-color (bitmap) images)	274
Fl_BMP_Image (Supports loading, caching, and drawing of Windows Bitmap (BMP) image files)	277
Fl_Box (This widget simply draws its box, and possibly it's label)	278
Fl_Browser (Displays a scrolling list of text lines, and manages all the storage for the text)	280
Fl_Browser_ (This is the base for browsers)	292
Fl_Button (Buttons generate callbacks when they are clicked by the user)	301
Fl_Cairo_State (Contains all the necessary info on the current cairo context)	306
Fl_Cairo_Window (This defines a pre-configured cairo fltk window)	307
Fl_Chart (Fl_Chart displays simple charts)	309
FL_CHART_ENTRY (For internal use only)	315
Fl_Check_Browser (Displays a scrolling list of text lines that may be selected and/or checked by the user)	316
Fl_Check_Button (A button with an "checkmark" to show its status)	320
Fl_Choice (A button that is used to pop up a menu)	322
Fl_Clock (This widget provides a round analog clock display)	326
Fl_Clock_Output (This widget can be used to display a program-supplied time)	329
Fl_Color_Chooser (Standard RGB color chooser)	333
Fl_Counter (Controls a single floating point value with button (or keyboard) arrows)	338
Fl_Dial (Circular dial to control a single floating point value)	342
Fl_Double_Window (The Fl_Double_Window provides a double-buffered window)	345
Fl_End (This is a dummy class that allows you to end a Fl_Group in a constructor list of a class:)	348
Fl_File_Browser (Displays a list of filenames, optionally with file-specific icons)	349
Fl_File_Chooser (Displays a standard file selection dialog that supports various selection modes)	352
Fl_File_Icon (Manages icon images that can be used as labels in other widgets and as icons in the FileBrowser widget)	361
Fl_File_Input (This widget displays a pathname in a text input field)	367
Fl_Fill_Dial (Draws a dial with a filled arc)	370
Fl_Fill_Slider (Widget that draws a filled horizontal slider, useful as a progress or value meter) .	371

Fl_Float_Input (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))	372
Fl_Font_Descriptor (This a structure for an actual system font, with junk to help choose it and info on character sizes)	373
Fl_FormsBitmap (Forms compatibility Bitmap Image Widget)	374
Fl_FormsPixmap (Forms pixmap drawing routines)	376
Fl_Free (Emulation of the Forms "free" widget)	378
Fl_GIF_Image (Supports loading, caching, and drawing of Compuserve GIF SM images)	381
Fl_GL_Window (Sets things up so OpenGL works, and also keeps an OpenGL "context" for that window, so that changes to the lighting and projection may be reused between redraws)	382
Fl_Glut_Bitmap_Font (Fltk glut font/size attributes used in the glutXXX functions)	389
Fl_Glut_Window (GLUT is emulated using this window class and these static variables (plus several more static variables hidden in glut_compatibility.cxx):)	390
Fl_Group (FLTK container widget)	393
Fl_Help_Dialog (Displays a standard help dialog window using the Fl_Help_View widget)	402
Fl_Help_Link (Definition of a link for the html viewer)	406
Fl_Help_Target (Fl_Help_Target structure)	407
Fl_Help_View (Displays HTML text)	408
Fl_Hold_Browser (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)	413
Fl_Image (Fl_Image is the base class used for caching and drawing all kinds of images in FLTK)	414
Fl_Input (This is the FLTK text input widget)	419
Fl_Input_ (This is a virtual base class below Fl_Input)	423
Fl_Input_Choice (A combination of the input widget and a menu button)	432
Fl_Int_Input (Subclass of Fl_Input that only allows the user to type decimal digits (or hex num- bers of the form 0xaef))	436
Fl_JPEG_Image (Supports loading, caching, and drawing of Joint Photographic Experts Group (JPEG) File Interchange Format (JFIF) images)	437
Fl_Label (This struct stores all information for a text or mixed graphics label)	438
Fl_Light_Button	440
Fl_Menu_ (Base class of all widgets that have a menu in FLTK)	443
Fl_Menu_Bar (This widget provides a standard menubar interface)	451
Fl_Menu_Button (This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of Fl_Menu_Item objects)	454
Fl_Menu_Item (The Fl_Menu_Item structure defines a single menu item that is used by the Fl_- Menu_class)	457
Fl_Menu_Window (Window type used for menus)	469
Fl_Multi_Browser (Subclass of Fl_Browser which lets the user select any set of the lines)	472
' characters as new lines rather than ^J, and accepts the Return, Tab, and up and down arrow keys)	473
Fl_Multiline_Output (This widget is a subclass of Fl_Output that displays multiple lines of text)	474
Fl_Output (This widget displays a piece of text)	475
Fl_Overlay_Window (This window provides double buffering and also the ability to draw the "overlay" which is another picture placed on top of the main image)	477
Fl_Pack (This widget was designed to add the functionality of compressing and aligning widgets)	480
Fl_Pixmap (Supports caching and drawing of colormap (pixmap) images, including transparency)	482
Fl_PNG_Image (Supports loading, caching, and drawing of Portable Network Graphics (PNG) image files)	486
Fl_PNM_Image (Supports loading, caching, and drawing of Portable Anymap (PNM, PBM, PGM, PPM) image files)	487
Fl_Positioner (This class is provided for Forms compatibility)	488
Fl_Preferences (Fl_Preferences provides methods to store user settings between application starts)	492
Fl_Preferences::Entry (An entry associates a preference name to its corresponding value)	505

Fl_Preferences::Name ('Name' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly)	506
Fl_Progress (Displays a progress bar for the user)	508
Fl_Repeat_Button (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)	510
Fl_Return_Button (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)	512
Fl_RGB_Image (Supports caching and drawing of full-color images with 1 to 4 channels of color information)	515
Fl_Roller ("dolly" control commonly used to move 3D objects)	519
Fl_Round_Button (Buttons generate callbacks when they are clicked by the user)	521
Fl_Round_Clock (A clock widget of type FL_ROUND_CLOCK)	523
Fl_Scroll (This container widget lets you maneuver around a set of widgets much larger than your window)	524
Fl_Scrollbar (Displays a slider with arrow buttons at the ends of the scrollbar)	528
Fl_Secret_Input (Subclass of Fl_Input that displays its input as a string of asterisks)	531
Fl_Select_Browser (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)	532
Fl_Shared_Image (This class supports caching, loading, and drawing of image files)	533
Fl_Simple_Counter (This widget creates a counter with only 2 arrow buttons)	538
Fl_Single_Window (This is the same as Fl_Window)	539
Fl_Slider (Sliding knob inside a box)	541
Fl_Spinner (This widget is a combination of the input widget and repeat buttons)	545
Fl_Tabs ("file card tabs" interface that allows you to put lots and lots of buttons and switches in a panel, as popularized by many toolkits)	550
Fl_Text_Buffer (Used by the Fl_Text_Display and Fl_Text_Editor to manage complex text data and is based upon the excellent NEdit text editor engine - see http://www.nedit.org/)	554
Fl_Text_Display (This is the FLTK text display widget)	571
Fl_Text_Display::Style_Table_Entry (This structure associates the color,font,size of a string to draw with an attribute mask matching attr)	588
Fl_Text_Editor (This is the FLTK text editor widget)	589
Fl_Text_Editor::Key_Binding (Simple linked list associating a key/state to a function)	596
Fl_Text_Selection (This is an internal class for Fl_Text_Buffer to manage text selections)	597
Fl_Tile (Lets you resize the children by dragging the border between them:)	599
Fl_Tiled_Image (This class supports tiling of images over a specified area)	602
Fl_Timer (This is provided only to emulate the Forms Timer widget)	605
Fl_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)	608
Fl_Tooltip (Tooltip support for all FLTK widgets)	609
Fl_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)	613
Fl_Value_Input (Displays a numeric value)	619
Fl_Value_Output (Displays a floating point value)	625
Fl_Value_Slider (Fl_Slider widget with a box displaying the current value)	629
Fl_Widget (Fl_Widget is the base class for all widgets in FLTK)	632
Fl_Window (This widget produces an actual window)	663
Fl_Wizard (This widget is based off the Fl_Tabs widget, but instead of displaying tabs it only changes "tabs" under program control)	674
Fl_XBM_Image (Supports loading, caching, and drawing of X Bitmap (XBM) bitmap files)	676
Fl_XPM_Image (Supports loading, caching, and drawing of X Pixmap (XPM) images, including transparency)	677

Chapter 28

File Index

28.1 File List

Here is a list of all documented files with brief descriptions:

aimm.h	??
armscii_8.h	??
ascii.h	??
big5.h	??
big5_emacs.h	??
case.h	??
cgdebug.h	??
cp1133.h	??
cp1251.h	??
cp1255.h	??
cp1256.h	??
dingbats_.h	??
dirent.h	??
Enumerations.H (This file contains type definitions and general enumerations)	679
fastarrow.h	??
filename.H	??
Fl.H	??
Fl_Adjuster.H	??
fl_arc.cxx (Utility functions for drawing arcs and circles)	692
fl_arci.cxx (Utility functions for drawing circles using integers)	693
fl_ask.H	??
Fl_Bitmap.H	??
Fl_BMP_Image.H	??
Fl_Box.H	??
fl_boxtype.cxx (Drawing code for common box types)	695
Fl_Browser.H	??
Fl_Browser_.H	??
Fl_Button.H	??
Fl_Cairo.H	??
Fl_Cairo_Window.H	??
Fl_Chart.H	??
Fl_Check_Browser.H	??
Fl_Check_Button.H	??

Fl_Choice.H	??
Fl_Clock.H	??
fl_cmap.h	??
fl_color.cxx (Color handling)	698
Fl_Color_Chooser.H (Fl_Color_Chooser widget)	700
Fl_Counter.H	??
fl_curve.cxx (Utility for drawing Bezier curves, adding the points to the current fl_begin/fl_vertex/fl_end path)	701
Fl_Dial.H	??
Fl_Double_Window.H	??
fl_draw.H (Utility header to pull drawing functions together)	702
Fl_Export.H	??
Fl_File_Browser.H	??
Fl_File_Chooser.H	??
Fl_File_Icon.H	??
Fl_File_Input.H	??
Fl_Fill_Dial.H	??
Fl_Fill_Slider.H	??
Fl_Float_Input.H	??
Fl_Font.H	??
Fl_FormsBitmap.H	??
Fl_FormsPixmap.H	??
Fl_Free.H	??
Fl_GIF_Image.H	??
Fl_Gl_Choice.H	??
Fl_Gl_Window.H	??
Fl_Group.H	??
Fl_Help_Dialog.H	??
Fl_Help_View.H	??
Fl_Hold_Browser.H	??
Fl_Hor_Fill_Slider.H	??
Fl_Hor_Nice_Slider.H	??
Fl_Hor_Slider.H	??
Fl_Hor_Value_Slider.H	??
Fl_Image.H	??
Fl_Input.H	??
Fl_Input_.H	??
Fl_Input_Choice.H	??
Fl_Int_Input.H	??
Fl_JPEG_Image.H	??
Fl_Light_Button.H	??
Fl_Line_Dial.H	??
Fl_Menu.H	??
Fl_Menu_.H	??
Fl_Menu_Bar.H	??
Fl_Menu_Button.H	??
Fl_Menu_Item.H	??
Fl_Menu_Window.H	??
fl_message.H	??
Fl_Multi_Browser.H	??
Fl_Multi_Label.H	??
Fl_Multiline_Input.H	??
Fl_Multiline_Output.H	??
Fl_Nice_Slider.H	??

Fl_Object.H	??
Fl_Output.H	??
Fl_Overlay_Window.H	??
Fl_Pack.H	??
Fl_Pixmap.H	??
Fl_PNG_Image.H	??
Fl_PNM_Image.H	??
Fl_Positioner.H	??
Fl_Preferences.H	??
Fl_Progress.H	??
Fl_Radio_Button.H	??
Fl_Radio_Light_Button.H	??
Fl_Radio_Round_Button.H	??
fl_rect.cxx (Drawing and clipping routines for rectangles)	714
Fl_Repeat_Button.H	??
Fl_Return_Button.H	??
Fl_RGB_Image.H	??
Fl_Roller.H	??
Fl_Round_Button.H	??
Fl_Round_Clock.H	??
Fl_Scroll.H	??
Fl_Scrollbar.H	??
Fl_Secret_Input.H	??
Fl_Select_Browser.H	??
Fl_Shared_Image.H	??
fl_show_colormap.H	??
fl_show_input.H	??
Fl_Simple_Counter.H	??
Fl_Single_Window.H	??
Fl_Slider.H	??
Fl_Spinner.H	??
Fl_Sys_Menu_Bar.H	??
Fl_Tabs.H	??
Fl_Text_Buffer.H	??
Fl_Text_Display.H	??
Fl_Text_Editor.H	??
Fl_Tile.H	??
Fl_Tiled_Image.H	??
Fl_Timer.H	??
Fl_Toggle_Button.H	??
Fl_Toggle_Light_Button.H	??
Fl_Toggle_Round_Button.H	??
Fl_Tooltip.H	??
fl_types.h (This file contains simple "C"-style type definitions)	718
fl_utf8.h	??
Fl_Valuator.H	??
Fl_Value_Input.H	??
Fl_Value_Output.H	??
Fl_Value_Slider.H	??
fl_vertex.cxx (Portable drawing code for drawing arbitrary shapes with simple 2D transformations)	719
Fl_Widget.H	??
Fl_Window.H	??
Fl_Wizard.H	??

Fl_XBM_Image.H	??
Fl_XColor.H	??
Fl_XPM_Image.H	??
flstring.h	??
forms.H	??
freeglut_teapot_data.h	??
gb2312.h	??
georgian_academy.h	??
georgian_ps.h	??
gl.h	??
gl2opengl.h	??
gl_draw.H	??
glu.h	??
glut.H	??
iso8859_1.h	??
iso8859_10.h	??
iso8859_11.h	??
iso8859_13.h	??
iso8859_14.h	??
iso8859_15.h	??
iso8859_16.h	??
iso8859_2.h	??
iso8859_3.h	??
iso8859_4.h	??
iso8859_5.h	??
iso8859_6.h	??
iso8859_7.h	??
iso8859_8.h	??
iso8859_9.h	??
iso8859_9e.h	??
jisx0201.h	??
jisx0208.h	??
jisx0212.h	??
koi8_c.h	??
koi8_r.h	??
koi8_u.h	??
ksc5601.h	??
mac.H	??
math.h	??
mediumarrow.h	??
mulelao.h	??
names.h	??
slowarrow.h	??
spacing.h	??
symbol_h	??
tatar_cyr.h	??
tcvn.h	??
tis620.h	??
ucs2be.h	??
utf8.h	??
viscii.h	??
win32.H	??
x.H	??
Ximint.h	??

Xlibint.h	??
Xutf8.h	??

Chapter 29

Module Documentation

29.1 Windows handling functions

Windows and standard dialogs handling.

Functions

- 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 *)`
See `Fl_Window first_window()`.*
- static `Fl_Window * Fl::next_window (const Fl_Window *)`
Returns the next top-level window in the list of shown() windows.
- static `Fl_Window * Fl::modal ()`
Returns the top-most `modal()` window currently shown.
- static `Fl_Window * Fl::grab ()`
This is used when pop-up menu systems are active.
- static void `Fl::grab (Fl_Window *)`
Selects the window to grab.
- static void `Fl::set_abort (void(*f)(const char *,...))`
For back compatibility, sets the void `Fl::fatal` handler callback.
- static void `Fl::default_atclose (Fl_Window *, void *)`
Default callback for window widgets.
- static void `Fl::set_atclose (void(*f)(Fl_Window *, void *))`
For back compatibility, sets the `Fl::atclose` handler callback.

Variables

- static void(* Fl::atclose)(Fl_Window *, void *) = default_atclose

Back compatibility: default window callback handler.

29.1.1 Detailed Description

Windows and standard dialogs handling.

29.1.2 Function Documentation

29.1.2.1 void Fl::default_atclose (Fl_Window * *window*, void * *v*) [static, inherited]

Default callback for window widgets.

It hides the window and then calls the default widget callback.

29.1.2.2 Fl_Window * Fl::first_window () [static, inherited]

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.

The second form 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.

29.1.2.3 void Fl::grab (Fl_Window * *win*) [static, inherited]

Selects the window to grab.

See [Fl_Window*](#) [Fl::grab\(\)](#)

29.1.2.4 static Fl_Window* Fl::grab () [inline, static, inherited]

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 WIN32 *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.

29.1.2.5 static Fl_Window* Fl::modal () [inline, static, inherited]

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).

29.1.2.6 Fl_Window * Fl::next_window (const Fl_Window * window) [static, inherited]

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().

29.1.2.7 static void Fl::set_atclose (void(*)(Fl_Window *, void *)f) [inline, static, inherited]

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\(Fl_Callback*\)](#)

29.1.3 Variable Documentation**29.1.3.1 void(* Fl::atclose)(Fl_Window *, void *) (Fl_Window *, void *) = default_atclose [static, inherited]**

Back compatibility: default window callback handler.

See also:

[Fl::set_atclose\(\)](#)

29.2 Events handling functions

[Fl](#) class events handling API.

Functions

- static int [Fl::event\(\)](#)
Returns the last event that was processed.
- 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_y\(\)](#)
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_root\(\)](#)
Returns the mouse position on the screen of the event.
- 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 assoiated with the [FL_MOUSEWHEEL](#) event.
- 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::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 int [Fl::event_is_click\(\)](#)
The first form 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\(int i\)](#)
Only i=0 works! See int [event_is_click\(\)](#).
- static int [Fl::event_button\(\)](#)
Gets which particular mouse button caused the current event.
- static int [Fl::event_state\(\)](#)
This is a bitfield of what shift states were on and what mouse buttons were held down during the most recent event.

- static int [Fl::event_state](#) (int i)
See int [event_state\(\)](#).
- static int [Fl::event_key](#) ()
Gets which key on the keyboard was last pushed.
- static int [Fl::event_original_key](#) ()
If NumLock is deactivated, FLTK translates events from the numeric keypad into the corresponding arrow key events.
- 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::get_key](#) (int key)
Returns true if the given key is held down now.
- static const char * [Fl::event_text](#) ()
Returns the text associated with the current FL_PASTE or FL_DND_RELEASE event.
- static int [Fl::event_length](#) ()
Returns the length of the text in [Fl::event_text\(\)](#).
- 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 int [Fl::event_inside](#) (int, int, int, int)
Returns whether or not the mouse event is inside the given rectangle.
- static int [Fl::event_inside](#) (const [Fl_Widget](#) *)
Returns whether or not the mouse event is inside the given widget.
- static int [Fl::test_shortcut](#) (int)
Test the current event, which must be an FL_KEYBOARD or FL_SHORTCUT, against a shortcut value (described in [Fl_Button](#)).
- static int [Fl::handle](#) (int, [Fl_Window](#) *)
Sends the event to a window for processing.
- 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_Widget](#) * [Fl::pushed](#) ()
Sets the widget that is being pushed.

- static void `Fl::pushed (Fl_Widget *)`
Sets the widget that is being pushed.
- 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 void `Fl::add_handler (int(*h)(int))`
Install a function to parse unrecognized events.
- static void `Fl::remove_handler (int(*h)(int))`
Removes a previously added event handler.
- static int `Fl::event_shift ()`
Returns non-zero if the Shift key is pressed.
- static int `Fl::event_ctrl ()`
Returns non-zero if the Control key is pressed.
- static int `Fl::event_alt ()`
Returns non-zero if the Alt key is pressed.
- 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_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.

29.2.1 Detailed Description

`Fl` class events handling API.

29.2.2 Function Documentation

29.2.2.1 void `Fl::add_handler (int(*)(int) ha)` [static, inherited]

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.
- 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.

29.2.2.2 void Fl::belowmouse (Fl_Widget * o) [static, inherited]

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\(\)](#)).

29.2.2.3 static Fl_Widget* Fl::belowmouse () [inline, static, inherited]

Gets the widget that is below the mouse.

See also:

[belowmouse\(Fl_Widget*\)](#)

29.2.2.4 int Fl::compose (int & del) [static, inherited]

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!). In 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.

Though the current implementation returns immediately, future versions may take quite awhile, as they may pop up a window or do other user-interface things to allow characters to be selected.

29.2.2.5 static void Fl::compose_reset () [inline, static, inherited]

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.

29.2.2.6 static int Fl::event () [inline, static, inherited]

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.

29.2.2.7 static int Fl::event_alt () [inline, static, inherited]

Returns non-zero if the Alt key is pressed.

29.2.2.8 static int Fl::event_button () [inline, static, inherited]

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:

FL_LEFT_MOUSE

FL_MIDDLE_MOUSE

FL_RIGHT_MOUSE.

See also:

[Fl::event_buttons\(\)](#)

29.2.2.9 static int Fl::event_button1 () [inline, static, inherited]

Returns non-zero if mouse button 1 is currently held down.

For more details, see [Fl::event_buttons\(\)](#).

29.2.2.10 static int Fl::event_button2 () [inline, static, inherited]

Returns non-zero if button 2 is currently held down.

For more details, see [Fl::event_buttons\(\)](#).

29.2.2.11 static int Fl::event_button3 () [inline, static, inherited]

Returns non-zero if button 3 is currently held down.

For more details, see [Fl::event_buttons\(\)](#).

29.2.2.12 static int Fl::event_buttons () [inline, static, inherited]

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] }

29.2.2.13 static void Fl::event_clicks (int *i*) [inline, static, inherited]

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:

← *i* correspond to no double-click if 0, *i*+1 mouse clicks otherwise

See also:

int [event_clicks\(\)](#)

29.2.2.14 static int Fl::event_clicks () [inline, static, inherited]

Returns non zero if we had a double click event.

Return values:

Non-zero if the most recent FL_PUSH or FL_KEYBOARD was a "double click".

N-1 for N clicks. A double click is counted if the same button is pressed again while [event_is_click\(\)](#) is true.

29.2.2.15 static int Fl::event_ctrl () [inline, static, inherited]

Returns non-zero if the Control key is pressed.

29.2.2.16 static int Fl::event_dx () [inline, static, inherited]

Returns the current horizontal mouse scrolling associated with the FL_MOUSEWHEEL event.

Right is positive.

29.2.2.17 static int Fl::event_dy () [inline, static, inherited]

Returns the current vertical mouse scrolling assoiated with the FL_MOUSEWHEEL event.

Down is positive.

29.2.2.18 int Fl::event_inside (const Fl_Widget * *o*) [static, inherited]

Returns whether or not the mouse event is inside the given widget.

Returns non-zero if the current event_x and event_y put it inside the widget or inside an arbitrary bounding box. You should always call this rather than doing your own comparison so you are consistent about edge effects.

29.2.2.19 int Fl::event_inside (int xx, int yy, int ww, int hh) [static, inherited]

Returns whether or not the mouse event is inside the given rectangle.

Returns non-zero if the current event_x and event_y put it inside the widget or inside an arbitrary bounding box. You should always call this rather than doing your own comparison so you are consistent about edge effects.

29.2.2.20 static int Fl::event_is_click () [inline, static, inherited]

The first form 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. The second form 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.

29.2.2.21 int Fl::event_key (int key) [static, inherited]

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. 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_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 WIN32 [Fl::get_key\(FL_KP_Enter\)](#) and [Fl::event_key\(FL_KP_Enter\)](#) do not work.

29.2.2.22 static int Fl::event_key () [inline, static, inherited]

Gets which key on the keyboard was last pushed.

Return values:

0 if the last event was not a key press or release.

See also:

int [event_key\(int\)](#)

29.2.2.23 static int Fl::event_length () [inline, static, inherited]

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.

29.2.2.24 static int Fl::event_original_key () [inline, static, inherited]

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.

29.2.2.25 static int Fl::event_shift () [inline, static, inherited]

Returns non-zero if the Shift key is pressed.

29.2.2.26 static int Fl::event_state () [inline, static, inherited]

This is a bitfield of what shift states were on and what mouse buttons were held down during the most recent event.

The second version returns non-zero if any of the passed bits are turned on. The legal 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.

29.2.2.27 static const char* Fl::event_text () [inline, static, inherited]

Returns the text associated with the current FL_PASTE or FL_DND_RELEASE event.

29.2.2.28 static int Fl::event_x_root () [inline, static, inherited]

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\(\)](#).

29.2.2.29 static int Fl::event_y_root () [inline, static, inherited]

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\(\)](#).

29.2.2.30 void Fl::focus (Fl_Widget *o) [static, inherited]

Sets the widget that will receive FL_KEYBOARD events.

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\(\)](#)).

See also:

[Fl_Widget::take_focus\(\)](#)

29.2.2.31 static Fl_Widget* Fl::focus () [inline, static, inherited]

Gets the current [Fl::focus\(\)](#) widget.

See also:

[Fl::focus\(Fl_Widget*\)](#)

29.2.2.32 int Fl::get_key (int key) [static, inherited]

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\(int\)](#)

29.2.2.33 static void Fl::get_mouse (int &, int &) [static, inherited]

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.

29.2.2.34 int Fl::handle (int e, Fl_Window * window) [static, inherited]

Sends the event to a window for processing.

Returns non-zero if any widget uses the event.

29.2.2.35 void Fl::pushed (Fl_Widget * o) [static, inherited]

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\(\)](#)).

29.2.2.36 static Fl_Widget* Fl::pushed () [inline, static, inherited]

Sets the widget that is being pushed.

See also:

[Fl_Widget* pushed\(Fl_Widget*\)](#)

29.2.2.37 int Fl::test_shortcut (int shortcut) [static, inherited]

Test the current event, which must be an FL_KEYBOARD or FL_SHORTCUT, against a shortcut value (described in [Fl_Button](#)).

Returns non-zero if there is a match. Not to be confused with [Fl_Widget::test_shortcut\(\)](#).

29.3 Selection & Clipboard functions

fl global copy/cut/paste functions

Functions

- static void `Fl::copy (const char *stuff, int len, int clipboard=0)`
Copies the data pointed to by stuff to the selection (0) or primary (1) clipboard.
- static void `Fl::paste (Fl_Widget &receiver, int clipboard)`
Pastes the data from the selection (0) or primary (1) clipboard into receiver.
- static int `Fl::dnd ()`
Initiate a Drag And Drop operation.
- 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 void `Fl::selection (Fl_Widget &owner, const char *, int len)`
Changes the current selection.
- static void `Fl::paste (Fl_Widget &receiver)`
Backward compatibility only: Set things up so the receiver widget will be called with an FL_PASTE event some time in the future for the specified clipboard.

29.3.1 Detailed Description

fl global copy/cut/paste functions

29.3.2 Function Documentation

29.3.2.1 static void `Fl::copy (const char * stuff, int len, int clipboard = 0)` [static, inherited]

Copies the data pointed to by stuff to the selection (0) or primary (1) clipboard.

The selection clipboard is used for middle-mouse pastes and for drag-and-drop selections. The primary clipboard is used for traditional copy/cut/paste operations.

29.3.2.2 int `Fl::dnd ()` [static, inherited]

Initiate a Drag And Drop operation.

drag and drop whatever is in the cut-copy-paste buffer

- create a selection first using: Fl::copy(const char *stuff, int len, 0)

drag and drop whatever is in the cut-copy-paste buffer

- create a selection first using: Fl::copy(const char *stuff, int len, 0)

The clipboard 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*.

29.3.2.3 void Fl::paste (Fl_Widget & receiver) [static, inherited]

Backward compatibility only: Set things up so the receiver widget will be called with an FL_PASTE event some time in the future for the specified clipboard.

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.

See also:

[Fl::paste\(Fl_Widget &receiver, int clipboard\)](#)

29.3.2.4 static void Fl::paste (Fl_Widget & receiver, int clipboard) [static, inherited]

Pastes the data from the selection (0) or primary (1) clipboard into receiver.

The selection clipboard is used for middle-mouse pastes and for drag-and-drop selections. The primary clipboard is used for traditional copy/cut/paste operations.

29.3.2.5 void Fl::selection (Fl_Widget & owner, const char * text, int len) [static, inherited]

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.

29.3.2.6 void Fl::selection_owner (Fl_Widget * owner) [static, inherited]

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.

29.3.2.7 static Fl_Widget* Fl::selection_owner () [inline, static, inherited]

back-compatibility only: Gets the widget owning the current selection

See also:

`Fl_Widget* selection_owner(Fl_Widget*)`

29.4 Screen functions

fl global screen functions

Functions

- static int `Fl::x()`
Returns the origin of the current screen, where 0 indicates the left side of the screen.
- static int `Fl::y()`
Returns the origin of the current screen, where 0 indicates the top edge of the screen.
- static int `Fl::w()`
Returns the width of the screen in pixels.
- static int `Fl::h()`
Returns the height of the screen in pixels.
- static int `Fl::screen_count()`
Gets the number of available screens.
- 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 in.
- 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 n)`
Gets the screen bounding rect for the given screen.

29.4.1 Detailed Description

fl global screen functions

29.4.2 Function Documentation

29.4.2.1 static int `Fl::h()` [static, inherited]

Returns the height of the screen in pixels.

29.4.2.2 void `Fl::screen_xywh(int & X, int & Y, int & W, int & H, int n)` [static, inherited]

Gets the screen bounding rect for the given screen.

Parameters:

→ X, Y, W, H the corresponding screen bounding box

← *n* 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)`

29.4.2.3 void Fl::screen_xywh (int & *X*, int & *Y*, int & *W*, int & *H*, int *mx*, int *my*) [static, inherited]

Gets the bounding box of a screen that contains the specified screen position *mx*, *my*.

Parameters:

→ *X,Y,W,H* the corresponding screen bounding box

← *mx,my* the absolute screen position

29.4.2.4 static void Fl::screen_xywh (int & *X*, int & *Y*, int & *W*, int & *H*) [inline, static, inherited]

Gets the bounding box of a screen that contains the mouse pointer in.

Parameters:

→ *X,Y,W,H* the corresponding screen bounding box

See also:

`void screen_xywh(int &x, int &y, int &w, int &h, int mx, int my)`

29.4.2.5 static int Fl::w () [static, inherited]

Returns the width of the screen in pixels.

29.4.2.6 static int Fl::x () [static, inherited]

Returns the origin of the current screen, where 0 indicates the left side of the screen.

29.4.2.7 static int Fl::y () [static, inherited]

Returns the origin of the current screen, where 0 indicates the top edge of the screen.

29.5 Color & Font functions

fl global color, font functions

Functions

- static void [Fl::set_color \(Fl_Color, uchar, uchar, uchar\)](#)
Sets an entry in the fl_color index table.
- static void [Fl::set_color \(Fl_Color, unsigned\)](#)
Sets an entry in the fl_color index table.
- static unsigned [Fl::get_color \(Fl_Color\)](#)
Returns the RGB value(s) for the given FLTK color index.
- static void [Fl::get_color \(Fl_Color, uchar &, uchar &, uchar &\)](#)
See [unsigned get_color\(Fl_Color c\)](#).
- static void [Fl::free_color \(Fl_Color, int overlay=0\)](#)
Frees the specified color from the colormap, if applicable.
- static const char * [Fl::get_font \(Fl_Font\)](#)
Get 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_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.

29.5.1 Detailed Description

fl global color, font functions

29.5.2 Function Documentation

29.5.2.1 void Fl::free_color (Fl_Color *i*, int *overlay* = 0) [static, inherited]

Frees the specified color from the colormap, if applicable.

If overlay is non-zero then the color is freed from the overlay colormap.

29.5.2.2 unsigned Fl::get_color (Fl_Color *i*) [static, inherited]

Returns the RGB value(s) for the given FLTK color index.

The first 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.

The second form returns the red, green, and blue values separately in referenced variables.

29.5.2.3 const char * Fl::get_font (Fl_Font *fnum*) [static, inherited]

Get 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.

29.5.2.4 const char * Fl::get_font_name (Fl_Font *fnum*, int * *attributes* = 0) [static, inherited]

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.

29.5.2.5 int Fl::get_font_sizes (Fl_Font *fnum*, int **&sizep*) [static, inherited]

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.

29.5.2.6 void Fl::set_color (Fl_Color *i*, unsigned *c*) [static, inherited]

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.

29.5.2.7 void Fl::set_color (Fl_Color *i*, uchar *red*, uchar *green*, uchar *blue*) [static, inherited]

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.

29.5.2.8 void Fl::set_font (Fl_Font *fnum*, Fl_Font *from*) [static, inherited]

Copies one face to another.

29.5.2.9 void Fl::set_font (Fl_Font *fnum*, const char * *name*) [static, inherited]

Changes a face.

The string pointer is simply stored, the string is not copied, so the string must be in static memory.

29.5.2.10 Fl_Font Fl::set_fonts (const char * *xstarname* = 0) [static, inherited]

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 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 WIN32 NULL selects fonts with ISO8859-1 encoding and non-NUL selects all fonts.

The return value is how many faces are in the table after this is done.

29.6 Multithreading support functions

fl multithreading support functions

Functions

- static void [Fl::lock \(\)](#)

The [lock\(\)](#) method blocks the current thread until it can safely access FLTK widgets and data.

- static void [Fl::unlock \(\)](#)

The [unlock\(\)](#) method releases the lock that was set using the [lock\(\)](#) method.

- static void [Fl::awake \(void *message=0\)](#)

The [awake\(\)](#) method 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::awake \(Fl_Awake_Handler cb, void *message=0\)](#)

See void [awake\(void message=0\)](#).*

- static void * [Fl::thread_message \(\)](#)

The [thread_message\(\)](#) method returns the last message that was sent from a child by the [awake\(\)](#) method.

29.6.1 Detailed Description

fl multithreading support functions

29.6.2 Function Documentation

29.6.2.1 int [Fl::awake \(Fl_Awake_Handler cb, void * message = 0\)](#) [static, inherited]

See void [awake\(void* message=0\)](#).

Let the main thread know an update is pending and have it call a specific function See void [awake\(void* message=0\)](#).

29.6.2.2 void [Fl::awake \(void * msg = 0\)](#) [static, inherited]

The [awake\(\)](#) method 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.

The second form of [awake\(\)](#) registers a function that will be called by the main thread during the next message handling cycle. [awake\(\)](#) will return 0 if the callback function was registered, and -1 if registration failed. Over a thousand awake callbacks can be registered simultaneously.

See also: multithreading.

29.6.2.3 void Fl::lock () [static, inherited]

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.

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.

See also: multithreading

29.6.2.4 static void* Fl::thread_message () [static, inherited]

The [thread_message\(\)](#) method returns the last message that was sent from a child by the [awake\(\)](#) method.

See also: multithreading

29.6.2.5 void Fl::unlock () [static, inherited]

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

29.7 Safe widget deletion support functions

fl multithreading support functions

Functions

- 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::watch_widget_pointer \(Fl_Widget *&w\)](#)
Adds a widget pointer to the watch list.
- static void [Fl::release_widget_pointer \(Fl_Widget *&w\)](#)
Releases a widget pointer to the watch list.
- static void [Fl::clear_widget_pointer \(Fl_Widget const *w\)](#)
Clears a widget pointer in the watch list.

29.7.1 Detailed Description

fl multithreading support functions

29.7.2 Function Documentation

29.7.2.1 void [Fl::delete_widget \(Fl_Widget * wi\)](#) [static, inherited]

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_ask\(\)](#), etc).

When deleting groups or windows, you must only delete the group or window widget and not the individual child widgets.

29.7.2.2 void [Fl::do_widget_deletion \(\)](#) [static, inherited]

Deletes widgets previously scheduled for deletion.

See [void Fl::delete_widget\(Fl_Widget *wi\)](#)

29.7.2.3 void [Fl::watch_widget_pointer \(Fl_Widget *& w\)](#) [static, inherited]

Adds a widget pointer to the watch list.

Todo

explain the role of the watch list, it may be related to invalid widget deletion crash fixes...

29.8 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 a pre-configured cairo fltk window.

Functions

- static `cairo_t * Fl::cairo_make_current (Fl_Window *w)`

Provides a corresponding cairo context for window wi.

- static void [Fl::cairo_autolink_context \(bool alink\)](#)

when HAVE_CAIRO is defined and `cairo_autolink_context()` is true, any current window dc is linked to a current context.

- static bool [Fl::cairo_autolink_context \(\)](#)

Gets the current autolink mode for cairo support.,

- 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 cairo current context to c, set own to true if you want fltk to handle this cc deletion.

29.8.1 Function Documentation

29.8.1.1 static bool [Fl::cairo_autolink_context \(\)](#) [inline, static, inherited]

Gets the current autolink mode for cairo support.,

Return values:

false if no cairo context autolink is made for each window.

true 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

29.8.1.2 static void Fl::cairo_autolink_context (bool *alink*) [inline, static, inherited]

when HAVE_CAIRO is defined and [cairo_autolink_context\(\)](#) is true, any current window dc is linked to a current 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 but 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

29.8.1.3 static void Fl::cairo_cc (cairo_t * *c*, bool *own* = false) [inline, static, inherited]

Sets the cairo current 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

29.8.1.4 static cairo_t* Fl::cairo_cc () [inline, static, inherited]

Gets the current cairo context linked with a fltk window.

29.8.1.5 cairo_t * Fl::cairo_make_current (Fl_Window * *wi*) [static, inherited]

Provides a corresponding 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_gc\(\)](#) 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.

29.9 Common Dialogs classes and functions

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_beep](#) (int type)

Emits a system beep message.

- void [fl_message](#) (const char *fmt,...)

Shows an information message dialog box.

- 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.

- int [fl_choice](#) (const char *fmt, const char *b0, const char *b1, const char *b2,...)

Shows a dialog displaying the fmt message, this dialog features up to 3 customizable choice buttons.

- [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\(\)](#).

- const char * [fl_input](#) (const char *fmt, const char *defstr,...)

Shows an input dialog displaying the fmt message.

- const char * [fl_password](#) (const char *fmt, const char *defstr,...)

Shows an input dialog displaying the fmt message, like [fl_input](#) except the input text is not shown, '' characters are displayed instead.*

- void [fl_file_chooser_callback](#) (void(*cb)(const char *))

- void [fl_file_chooser_ok_label](#) (const char *l)

- int [Fl_Color_Chooser::fl_color_chooser](#) (const char *name, double &r, double &g, double &b)

Pops up a window to let the user pick an arbitrary RGB color.

- int [Fl_Color_Chooser::fl_color_chooser](#) (const char *name, uchar &r, uchar &g, uchar &b)

Pops up a window to let the user pick an arbitrary RGB color.

- void [Fl_File_Chooser::fl_file_chooser_callback](#) (void(*cb)(const char *))

- void [Fl_File_Chooser::fl_file_chooser_ok_label](#) (const char *l)

- char * [Fl_File_Chooser::fl_file_chooser](#) (const char *message, const char *pat, const char *fname, int relative)

- char * [Fl_File_Chooser::fl_dir_chooser](#) (const char *message, const char *fname, int relative)

Variables

- static void(* `Fl::warning`)(const char *,...) = ::warning
FLTK calls this to print a warning message.
- static void(* `Fl::error`)(const char *,...) = ::error
FLTK calls this to print a normal error message.
- static void(* `Fl::fatal`)(const char *,...) = ::fatal
FLTK calls this to print a fatal error message.
- const char * `fl_no` = "No"
string pointer used in common dialogs, you can change it to a foreign language
- const char * `fl_yes` = "Yes"
string pointer used in common dialogs, you can change it to a foreign language
- const char * `fl_ok` = "OK"
string pointer used in common dialogs, you can change it to a foreign language
- const char * `fl_cancel` = "Cancel"
string pointer used in common dialogs, you can change it to a foreign language
- const char * `fl_close` = "Close"
string pointer used in common dialogs, you can change it to a foreign language

29.9.1 Function Documentation

29.9.1.1 void `fl_alert` (const char **fmt*, ...)

Shows an alert message dialog box.

Parameters:

← *fmt* can be used as an sprintf-like format and variables for the message text

29.9.1.2 int `fl_ask` (const char **fmt*, ...)

Shows a dialog displaying the *fmt* message, this dialog features 2 yes/no buttons.

Parameters:

← *fmt* 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

29.9.1.3 int fl_choice (const char **fmt*, const char **b0*, const char **b1*, const char **b2*, ...)

Shows a dialog displaying the *fmt* message, this dialog features up to 3 customizable choice buttons.

Parameters:

- ← *fmt* can be used as an sprintf-like format and variables for the message text
- ← *b0* text label of button 0
- ← *b1* text label of button 1
- ← *b2* text label of button 2

Return values:

- 0** if the first button with *b0* text is selected
- 1** if the second button with *b1* text is selected
- 2** if the third button with *b2* text is selected

29.9.1.4 int fl_color_chooser (const char **name*, uchar &*r*, uchar &*g*, uchar &*b*) [related, inherited]

Pops up a window to let the user pick an arbitrary RGB color.

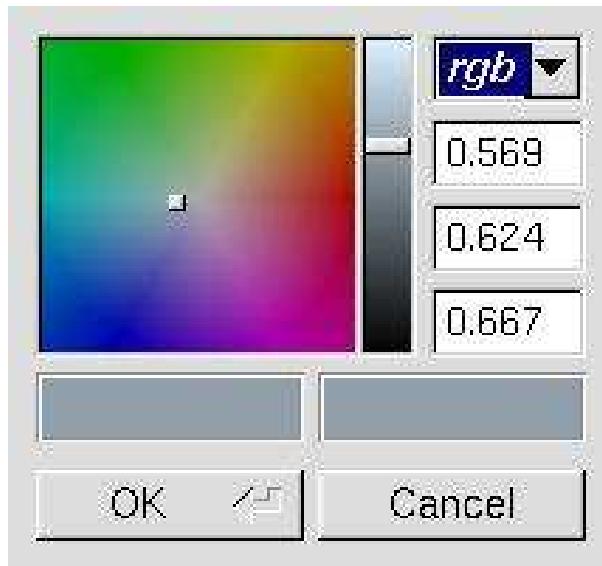


Figure 29.1: fl_color_chooser

Parameters:

- ← *name* title label for the window
- ↔ *r,g,b* color components in the range 0 to 255.

Return values:

- 1** if user confirms the selection
- 0** if user cancels the dialog

29.9.1.5 int fl_color_chooser (const char * *name*, double & *r*, double & *g*, double & *b*)
 [related, inherited]

Pops up a window to let the user pick an arbitrary RGB color.

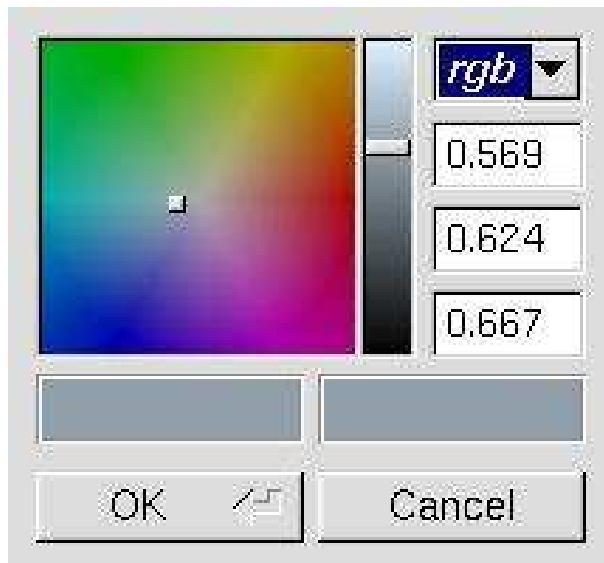


Figure 29.2: fl_color_chooser

Parameters:

- ← *name* title label for the window
- ↔ *r,g,b* color components in the range 0.0 to 1.0.

Return values:

- 1** if user confirms the selection
- 0** if user cancels the dialog

29.9.1.6 char * fl_dir_chooser (const char * *message*, const char * *fname*, int *relative*)
 [related, inherited]

Shows a file chooser dialog and get a directory.

Parameters:

- ← *message* title bar text
- ← *fname* initial/default directory name
- ← *relative* 0 for absolute path return, relative otherwise

Returns:

the directory path string choosen by the user or NULL if user cancels

29.9.1.7 `char * fl_file_chooser (const char * message, const char * pat, const char * fname, int relative)` [related, inherited]

Shows a file chooser dialog and get a filename.

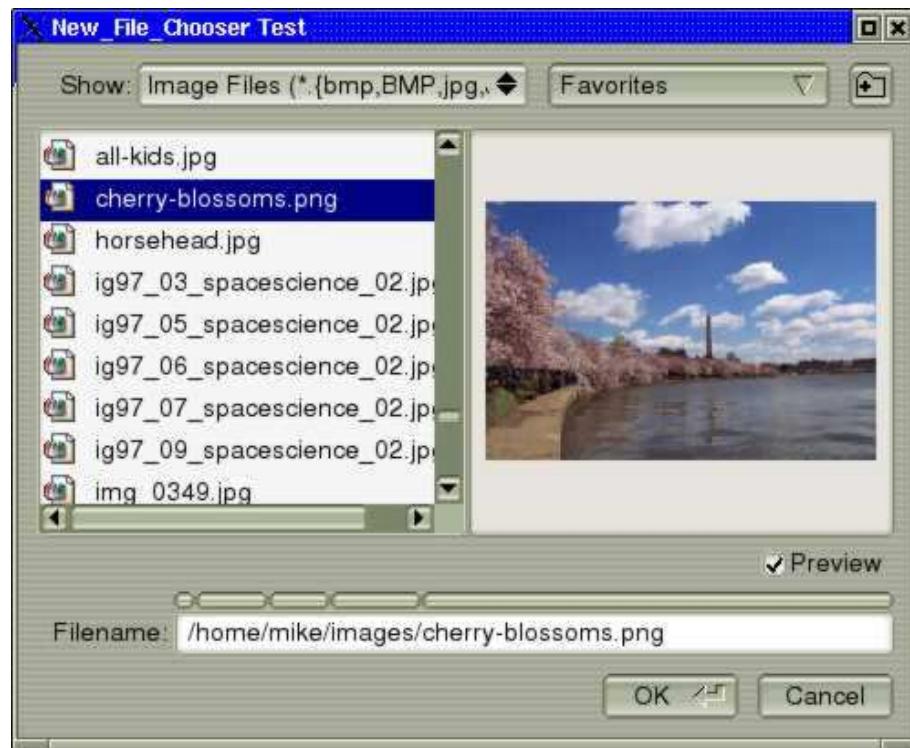


Figure 29.3: Fl_File_Chooser

Parameters:

- ← *message* text in title bar
- ← *pat* filename pattern filter
- ← *fname* initial/default filename selection
- ← *relative* 0 for absolute path name, relative path name otherwise

Returns:

the user selected filename, in absolute or relative format or NULL if user cancels

29.9.1.8 `void fl_file_chooser_callback (void(*)(const char *) cb)` [related, inherited]

Set the file chooser callback

29.9.1.9 `void fl_file_chooser_callback (void(*)(const char *) cb)`

Set the file chooser callback

29.9.1.10 void fl_file_chooser_ok_label (const char **l*) [related, inherited]

Set the "OK" button label

29.9.1.11 void fl_file_chooser_ok_label (const char **l*)

Set the "OK" button label

29.9.1.12 const char* fl_input (const char **fmt*, const char **defstr*, ...)

Shows an input dialog displaying the *fmt* message.

Parameters:

- ← *fmt* can be used as an sprintf-like format and variables for the message text
- ← *defstr* defines the default returned string if no text is entered

Returns:

the user string input if OK was pushed, NULL if Cancel was pushed

29.9.1.13 void fl_message (const char **fmt*, ...)

Shows an information message dialog box.

Parameters:

- ← *fmt* can be used as an sprintf-like format and variables for the message text

29.9.1.14 const char* fl_password (const char **fmt*, const char **defstr*, ...)

Shows an input dialog displaying the *fmt* message, like fl_input except the input text is not shown, '*' characters are displayed instead.

Parameters:

- ← *fmt* can be used as an sprintf-like format and variables for the message text
- ← *defstr* defines the default returned string if no text is entered

Returns:

the user string input if OK was pushed, NULL if Cancel was pushed

29.9.2 Variable Documentation

29.9.2.1 void(* Fl::error)(const char *format,...) (const char *, ...) = ::error [static, inherited]

FLTK calls this to print a normal error message.

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 shows an error dialog to stderr and returns.

29.9.2.2 void(* Fl::fatal)(const char *format,...) (const char *, ...) = ::fatal [static, inherited]

FLTK calls this to print a fatal error message.

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 shows a fatal dialog box and exits with status 1.

29.9.2.3 void(* Fl::warning)(const char *format,...) (const char *, ...) = ::warning [static, inherited]

FLTK calls this to print a warning message.

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.

Chapter 30

Class Documentation

30.1 Fl Class Reference

The `Fl` is the FLTK global (static) containing state information and global methods for the current application.

```
#include <Fl.h>
```

Static Public Member Functions

- static void `damage` (int d)
If true then `flush()` will do something.
- static int `add_awake_handler_` (Fl_Awake_Handler, void *)
Adds an awake handler for use in `awake()`.
- static int `get_awake_handler_` (Fl_Awake_Handler &, void * &)
Gets the last stored awake handler for use in `awake()`.
- static double `version` ()
Returns the compiled-in value of the `FL_VERSION` constant.
- static int `arg` (int, char **, int &)
Consume a single switch from argv, starting at word i.
- static int `args` (int, char **, int &, int(*)(int, char **, int &)=0)
Consume all switches from argv.
- static void `args` (int, char **)
*See `Fl::args(int argc, char **argv, int& i, int (*cb)(int,char**,int&))`.*
- static void `display` (const char *)
Sets the X display to use for all windows.
- static int `visual` (int)

Selects a visual so that your graphics are drawn correctly.

- 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 void [own_colormap](#) ()

Makes FLTK use its own colormap.

- 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 void [foreground](#) (uchar, uchar, uchar)

Changes fl_color(FL_FOREGROUND_COLOR).

- 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 int [scheme](#) (const char *)

Gets or sets the current widget scheme.

- static const char * [scheme](#) ()

*See void [scheme\(const char *name\)](#).*

- static int [reload_scheme](#) ()

Called by scheme according to scheme name.

- static int [scrollbar_size](#) ()

Gets the default scrollbar size that is used by the [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 int [wait](#) ()

Waits until "something happens" and then returns.

- static double [wait](#) (double time)

See int [wait\(\)](#).

- static int [check](#) ()

Same as [Fl::wait\(0\)](#).

- 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 int **run** ()

As long as any windows are displayed this calls [Fl::wait\(\)](#) repeatedly.

- static **Fl_Widget * readqueue** ()

All Fl_Widgets that don't have a callback defined use a default callback that puts a pointer to the widget in this queue, and this method reads the oldest widget out of this queue.

- static void **add_timeout** (double t, Fl_Timeout_Handler, void *=0)

Adds a one-shot timeout callback.

- static void **repeat_timeout** (double t, Fl_Timeout_Handler, void *=0)

This method repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.

- static int **has_timeout** (Fl_Timeout_Handler, void *=0)

Returns true if the timeout exists and has not been called yet.

- static void **remove_timeout** (Fl_Timeout_Handler, void *=0)

Removes a timeout callback.

- static void **add_check** (Fl_Timeout_Handler, void *=0)

FLTK will call this callback just before it flushes the display and waits for events.

- static int **has_check** (Fl_Timeout_Handler, void *=0)

Returns 1 if the check exists and has not been called yet, 0 otherwise.

- static void **remove_check** (Fl_Timeout_Handler, void *=0)

Removes a check callback.

- static void **add_fd** (int fd, int when, void(*cb)(int, void *), void *=0)

Add file descriptor fd to listen to.

- static void **add_fd** (int fd, void(*cb)(int, void *), void *=0)

*See void add_fd(int fd, int when, void (*cb)(int, void *), void* =0).*

- static void **remove_fd** (int, int when)

Removes a file descriptor handler.

- static void **remove_fd** (int)

Removes a file descriptor handler.

- static void **add_idle** (void(*cb)(void *), 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 int **has_idle** (void(*cb)(void *), void *data=0)

Returns true if the specified idle callback is currently installed.

- static void `remove_idle` (void(*cb)(void *), void *data=0)
Removes the specified idle callback, if it is installed.
- static int `damage` ()
If true then `flush()` will do something.
- static void `redraw` ()
Redraws all widgets.
- static void `flush` ()
Causes all the windows that need it to be redrawn and graphics forced out through the pipes.
- static `Fl_Window` * `first_window` ()
Returns the first top-level window in the list of `shown()` windows.
- static void `first_window` (`Fl_Window` *)
See `Fl_Window` `first_window()`.*
- static `Fl_Window` * `next_window` (const `Fl_Window` *)
Returns the next top-level window in the list of `shown()` windows.
- static `Fl_Window` * `modal` ()
Returns the top-most `modal()` window currently shown.
- static `Fl_Window` * `grab` ()
This is used when pop-up menu systems are active.
- static void `grab` (`Fl_Window` *)
Selects the window to grab.
- static int `event` ()
Returns the last event that was processed.
- static int `event_x` ()
Returns the mouse position of the event relative to the `Fl_Window` it was passed to.
- static int `event_y` ()
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_root` ()
Returns the mouse position on the screen of the event.
- 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 assoiated with the `FL_MOUSEWHEEL` event.

- static void [get_mouse](#) (int &, int &)
Return where the mouse is on the screen by doing a round-trip query to the server.
- 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 int [event_is_click](#) ()
The first form 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)
Only i=0 works! See int [event_is_click\(\)](#).
- static int [event_button](#) ()
Gets which particular mouse button caused the current event.
- static int [event_state](#) ()
This is a bitfield of what shift states were on and what mouse buttons were held down during the most recent event.
- static int [event_state](#) (int i)
See int [event_state\(\)](#).
- static int [event_key](#) ()
Gets which key on the keyboard was last pushed.
- static int [event_original_key](#) ()
If NumLock is deactivated, FLTK translates events from the numeric keypad into the corresponding arrow key events.
- static int [event_key](#) (int key)
Returns true if the given key was held down (or pressed) during the last event.
- static int [get_key](#) (int key)
Returns true if the given key is held down now.
- static const char * [event_text](#) ()
Returns the text associated with the current FL_PASTE or FL_DND_RELEASE event.
- static int [event_length](#) ()
Returns the length of the text in [Fl::event_text\(\)](#).
- 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 int [event_inside](#) (int, int, int, int)
Returns whether or not the mouse event is inside the given rectangle.
- static int [event_inside](#) (const [Fl_Widget](#) *)
Returns whether or not the mouse event is inside the given widget.
- static int [test_shortcut](#) (int)
Test the current event, which must be an [FL_KEYBOARD](#) or [FL_SHORTCUT](#), against a shortcut value (described in [Fl_Button](#)).
- static int [handle](#) (int, [Fl_Window](#) *)
Sends the event to a window for processing.
- 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 [Fl_Widget](#) * [pushed](#) ()
Sets the widget that is being pushed.
- static void [pushed](#) ([Fl_Widget](#) *)
Sets the widget that is being pushed.
- 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 [add_handler](#) (int(*h)(int))
Install a function to parse unrecognized events.
- static void [remove_handler](#) (int(*h)(int))
Removes a previously added event handler.
- static void [copy](#) (const char *stuff, int len, int clipboard=0)
Copies the data pointed to by stuff to the selection (0) or primary (1) clipboard.
- static void [paste](#) ([Fl_Widget](#) &receiver, int clipboard)
Pastes the data from the selection (0) or primary (1) clipboard into receiver.
- static int [dnd](#) ()
Initiate a Drag And Drop operation.
- 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 void [selection \(Fl_Widget &owner, const char *, int len\)](#)
Changes the current selection.
- static void [paste \(Fl_Widget &receiver\)](#)
Backward compatibility only: Set things up so the receiver widget will be called with an FL_PASTE event some time in the future for the specified clipboard.
- static int [x \(\)](#)
Returns the origin of the current screen, where 0 indicates the left side of the screen.
- static int [y \(\)](#)
Returns the origin of the current screen, where 0 indicates the top edge of the screen.
- static int [w \(\)](#)
Returns the width of the screen in pixels.
- static int [h \(\)](#)
Returns the height of the screen in pixels.
- static int [screen_count \(\)](#)
Gets the number of available screens.
- static void [screen_xywh \(int &X, int &Y, int &W, int &H\)](#)
Gets the bounding box of a screen that contains the mouse pointer in.
- 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 \(int &X, int &Y, int &W, int &H, int n\)](#)
Gets the screen bounding rect for the given screen.
- static void [set_color \(Fl_Color, uchar, uchar, uchar\)](#)
Sets an entry in the fl_color index table.
- static void [set_color \(Fl_Color, unsigned\)](#)
Sets an entry in the fl_color index table.
- static unsigned [get_color \(Fl_Color\)](#)
Returns the RGB value(s) for the given FLTK color index.
- static void [get_color \(Fl_Color, uchar &, uchar &, uchar &\)](#)
See [unsigned get_color\(Fl_Color c\)](#).
- static void [free_color \(Fl_Color, int overlay=0\)](#)
Frees the specified color from the colormap, if applicable.

- static const char * [get_font \(Fl_Font\)](#)
Get 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 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_labeltype \(Fl_Labeltype, Fl_Label_Draw_F *, Fl_Label_Measure_F *\)](#)
Sets the functions to call to draw and measure a specific labeltype.
- static void [set_labeltype \(Fl_Labeltype, Fl_Labeltype from\)](#)
Sets the functions to call to draw and measure a specific labeltype.
- static Fl_Box_Draw_F * [get_boxtype \(Fl_Boxtype\)](#)
Gets the current box drawing function for the specified box type.
- 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 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_dw \(Fl_Boxtype\)](#)
Returns the width offset for the given boxtype.
- static int [box_dh \(Fl_Boxtype\)](#)
Returns the height offset for the given boxtype.
- static int [draw_box_active \(\)](#)
Determines if the current draw box is active or inactive.
- static void [set_abort \(void\(*f\)\(const char *,...\)\)](#)

For back compatibility, sets the void [Fl::fatal](#) handler callback.

- static void [default_atclose](#) ([Fl_Window](#) *, void *)
Default callback for window widgets.
- static void [set_atclose](#) (void(*f)([Fl_Window](#) *, void *))
For back compatibility, sets the [Fl::atclose](#) handler callback.
- static int [event_shift](#) ()
Returns non-zero if the Shift key is pressed.
- static int [event_ctrl](#) ()
Returns non-zero if the Control key is pressed.
- static int [event_alt](#) ()
Returns non-zero if the Alt key is pressed.
- static int [event_buttons](#) ()
Returns the mouse buttons state bits; if non-zero, then at least one button is pressed now.
- 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 void [set_idle](#) (void(*cb)())
Sets an idle callback.
- static void [grab](#) ([Fl_Window](#) &win)
See [Fl_Window](#) [grab\(\)](#).*
- static void [release](#) ()
Releases the current grabbed window, equals grab(0).
- static void [visible_focus](#) (int v)
Gets or sets the visible keyboard focus on buttons and other non-text widgets.
- static int [visible_focus](#) ()
Gets or sets the visible keyboard focus on buttons and other non-text widgets.
- static void [dnd_text_ops](#) (int v)
Gets or sets whether drag and drop text operations are supported.
- static int [dnd_text_ops](#) ()
Gets or sets whether drag and drop text operations are supported.

- static void [lock \(\)](#)

The [lock\(\)](#) method blocks the current thread until it can safely access FLTK widgets and data.

- static void [unlock \(\)](#)

The [unlock\(\)](#) method releases the lock that was set using the [lock\(\)](#) method.

- static void [awake \(void *message=0\)](#)

The [awake\(\)](#) method 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 [awake \(Fl_Awake_Handler cb, void *message=0\)](#)

See void [awake\(void message=0\)](#).*

- static void * [thread_message \(\)](#)

The [thread_message\(\)](#) method returns the last message that was sent from a child by the [awake\(\)](#) method.

- static void [delete_widget \(Fl_Widget *w\)](#)

Schedules a widget for deletion at the next call to the event loop.

- static void [do_widget_deletion \(\)](#)

Deletes widgets previously scheduled for deletion.

- static void [watch_widget_pointer \(Fl_Widget *&w\)](#)

Adds a widget pointer to the watch list.

- static void [release_widget_pointer \(Fl_Widget *&&w\)](#)

Releases a widget pointer to the watch list.

- static void [clear_widget_pointer \(Fl_Widget const *w\)](#)

Clears a widget pointer in the watch list.

- static cairo_t * [cairo_make_current \(Fl_Window *w\)](#)

Provides a corresponding cairo context for window wi.

- static void [cairo_autolink_context \(bool alink\)](#)

when HAVE_CAIRO is defined and [cairo_autolink_context\(\)](#) is true, any current window dc is linked to a current context.

- static bool [cairo_autolink_context \(\)](#)

Gets the current autolink mode for cairo support.,

- 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 cairo current context to c, set own to true if you want fltk to handle this cc deletion.

Static Public Attributes

- static void(* **idle**)()

The currently executing idle callback function: DO NOT USE THIS DIRECTLY!
- static const char *const **help** = helpmsg+13

Usage string displayed if [Fl::args\(\)](#) detects an invalid argument.
- static void(* **warning**)(const char *,...) = ::**warning**

FLTK calls this to print a warning message.
- static void(* **error**)(const char *,...) = ::**error**

FLTK calls this to print a normal error message.
- static void(* **fatal**)(const char *,...) = ::**fatal**

FLTK calls this to print a fatal error message.
- static void(* **atclose**)(Fl_Window *, void *) = default_atclose

Back compatibility: default window callback handler.

30.1.1 Detailed Description

The **Fl** is the FLTK global (static) containing state information and global methods for the current application.

30.1.2 Member Function Documentation

30.1.2.1 int Fl::add_awake_handler_ (Fl_Awake_Handler *func*, void * *data*) [static]

Adds an awake handler for use in [awake\(\)](#).

30.1.2.2 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_computation();
    widget->redraw();
```

```

}

main() {
    Fl::add_check(callback);
    return Fl::run();
}

```

30.1.2.3 static void Fl::add_fd (int fd, int when, void(*)(int, void *) cb, void * = 0) [static]

Add 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.

The second 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 *any* file descriptor can be monitored (files, devices, pipes, sockets, etc.) Due to limitations in Microsoft Windows, WIN32 applications can only monitor sockets.

30.1.2.4 void Fl::add_idle (void(*)(void *) 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.

30.1.2.5 void Fl::add_timeout (double t, Fl_Timeout_Handler cb, void * argp = 0) [static]

Adds a one-shot timeout callback.

The function will be called by [Fl::wait\(\)](#) at *t* seconds after this function is called. The optional void* argument is passed to the callback.

You can have multiple timeout callbacks. To remove an timeout callback use [Fl::remove_timeout\(\)](#).

If you need more accurate, repeated timeouts, use [Fl::repeat_timeout\(\)](#) to reschedule the subsequent timeouts.

The following code will print "TICK" each second on stdout with a fair degree of accuracy:

```

void callback(void*) {
    puts("TICK");
    Fl::repeat_timeout(1.0, callback);
}

int main() {
    Fl::add_timeout(1.0, callback);
}

```

```
    return Fl::run();
}
```

30.1.2.6 int Fl::arg (int argc, char **argv, int & i) [static]

Consume 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. You can use this function if you prefer to control the incrementing through the arguments yourself.

30.1.2.7 int Fl::args (int argc, char **argv, int & i, int(*)(int, char **, int &) cb = 0) [static]

Consume all switches from argv.

Returns number of words eaten Returns zero on error. 'i' will either point at first word that does not start with '-' , at the error word, or after a '-' , or at argc. If your program does not take any word arguments you can report an error if i < argc.

FLTK provides an *entirely optional* command-line switch parser. You don't have to call it if you don't like them! 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.

callback lets you define your own switches. It is called with the same argc and argv, and with i the index of each word. The callback should return zero if the switch is unrecognized, and not change i. It should return non-zero if the switch is recognized, and add at least 1 to i (it can add more to consume words after the switch). This function is called *before* any other tests, so *you can override any FLTK switch* (this is why FLTK can use very short switches instead of the long ones all other toolkits force you to use).

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.

All switches except -bg2 may be abbreviated 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 WIN32 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 the 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\(\)](#).

The second form of [Fl::args\(\)](#) is useful if your program does not have command line switches of its own. It parses all the switches, and if any are not recognized it calls [Fl::abort\(Fl::help\)](#).

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.

30.1.2.8 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.

30.1.2.9 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](#).

30.1.2.10 int Fl::box_dh (Fl_Boxtype t) [static]

Returns the height offset for the given boxtyle.

See also:

[box_dy\(\)](#).

30.1.2.11 int Fl::box_dw (Fl_Boxtype t) [static]

Returns the width offset for the given boxtyle.

See also:

[box_dy\(\)](#).

30.1.2.12 int Fl::box_dx (Fl_Boxtype t) [static]

Returns the X offset for the given boxtyle.

See also:

[box_dy\(\)](#)

30.1.2.13 int Fl::box_dy (Fl_Boxtype t) [static]

Returns the Y offset for the given boxtyle.

These functions return the offset values necessary for a given boxtyle, useful for computing the area inside a box's borders, to prevent overrawing the borders.

For instance, in the case of a boxtyle 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().

30.1.2.14 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;
}

```

The 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).

30.1.2.15 static int Fl::damage () [inline, static]

If true then [flush\(\)](#) will do something.

30.1.2.16 void Fl::display (const char * d) [static]

Sets the X display to use for all windows.

Actually this just sets the environment variable \$DISPLAY to the passed string, so this only works before you show() the first window or otherwise open the display, and does nothing useful under WIN32.

30.1.2.17 static int Fl::dnd_text_ops () [inline, static]

Gets or 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.

30.1.2.18 static void Fl::dnd_text_ops (int v) [inline, static]

Gets or 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.

30.1.2.19 int Fl::draw_box_active () [static]

Determines if the current draw box is active or inactive.

If inactive, the box color is changed by the inactive color.

30.1.2.20 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.

30.1.2.21 void Fl::foreground (uchar r, uchar g, uchar b) [static]

Changes fl_color(FL_FOREGROUND_COLOR).

30.1.2.22 int Fl::get_awake_handler_ (Fl_Awake_Handler &func, void *& data) [static]

Gets the last stored awake handler for use in [awake\(\)](#).

30.1.2.23 Fl_Box_Draw_F * Fl::get_boxtype (Fl_Boxtype t) [static]

Gets the current box drawing function for the specified box type.

30.1.2.24 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.

30.1.2.25 int Fl::gl_visual (int mode, 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.

30.1.2.26 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.

30.1.2.27 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;
    }
}
```

30.1.2.28 static void Fl::release () [inline, static]

Releases the current grabbed window, equals grab(0).

See [Fl_Window* grab\(\)](#)

30.1.2.29 int Fl::reload_scheme () [static]

Called by scheme according to scheme name.

Loads or reloads the current scheme selection. See [void scheme\(const char *name\)](#)

30.1.2.30 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.

30.1.2.31 static void Fl::remove_fd (int) [static]

Removes a file descriptor handler.

30.1.2.32 static void Fl::remove_fd (int, int when) [static]

Removes a file descriptor handler.

30.1.2.33 void Fl::remove_timeout (Fl_Timeout_Handler cb, void *argp = 0) [static]

Removes a timeout callback.

It is harmless to remove a timeout callback that no longer exists.

30.1.2.34 void Fl::repeat_timeout (double t, Fl_Timeout_Handler cb, void *argp = 0) [static]

This method repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.

You may only call this method inside a timeout callback.

The following code will print "TICK" each second on stdout with a fair degree of accuracy:

```
void callback(void*) {
    puts("TICK");
    Fl::repeat_timeout(1.0, callback);
}

int main() {
    Fl::add_timeout(1.0, callback);
    return Fl::run();
}
```

30.1.2.35 int Fl::run () [static]

As long as any windows are displayed this calls [Fl::wait\(\)](#) repeatedly.

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\(\)](#);

30.1.2.36 int Fl::scheme (const char * s) [static]

Gets or 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
- "plastic" - This scheme is inspired by the Aqua user interface on Mac OS X
- "gtk+" - This scheme is inspired by the Red Hat Bluecurve theme

30.1.2.37 void Fl::set_boxtype (Fl_Boxtype to, Fl_Boxtype from) [static]

Copies the from boxtyle.

30.1.2.38 void Fl::set_boxtype (Fl_Boxtype t, Fl_Box_Draw_F *f, uchar a, uchar b, uchar c, uchar d) [static]

Sets the function to call to draw a specific boxtyle.

30.1.2.39 static void Fl::set_idle (void(*)() cb) [inline, static]

Sets an idle callback.

This method is obsolete - use the [add_idle\(\)](#) method instead.

30.1.2.40 static void Fl::set_labeltype (Fl_Labeltype, Fl_Labeltype from) [static]

Sets the functions to call to draw and measure a specific labeltype.

30.1.2.41 void Fl::set_labeltype (Fl_Labeltype t, Fl_Label_Draw_F *f, Fl_Label_Measure_F *m) [static]

Sets the functions to call to draw and measure a specific labeltype.

30.1.2.42 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.

30.1.2.43 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.

30.1.2.44 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.

30.1.2.45 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.

- **Fl::visual(FL_DOUBLE|FL_INDEX)**

Hardware double buffering. Call this if you are going to use [Fl_Double_Window](#).

- **Fl::visual(FL_DOUBLE|FL_RGB)**

- **Fl::visual(FL_DOUBLE|FL_RGB8)**

Hardware double buffering and full color.

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).

30.1.2.46 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.

The return value of the first form is non-zero if there are any visible windows - this may change in future versions of FLTK.

The second form waits a maximum of *time* seconds. *It can return much sooner if something happens.*

The return value is positive if an event or fd happens before the time elapsed. It is zero if nothing happens (on Win32 this will only return zero if *time* is zero). It is negative if an error occurs (this will happen on UNIX if a signal happens).

30.1.3 Member Data Documentation

30.1.3.1 **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.

30.1.3.2 **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_boxtype.cxx](#)
- Fl_Browser_.cxx
- Fl_Cairo.cxx
- [fl_color.cxx](#)
- fl_color_mac.cxx
- fl_color_win32.cxx
- Fl_compose.cxx
- Fl_display.cxx
- [fl_dnd_mac.cxx](#)
- fl_dnd_win32.cxx
- fl_dnd_x.cxx
- Fl_get_key.cxx
- Fl_get_key_mac.cxx
- Fl_get_key_win32.cxx
- Fl_get_system_colors.cxx
- Fl_grab.cxx

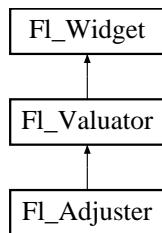
- fl_labeltype.cxx
- Fl_lock.hxx
- Fl_own_colormap.cxx
- fl_set_font.cxx
- fl_set_fonts_mac.cxx
- fl_set_fonts_win32.cxx
- fl_set_fonts_x.cxx
- fl_set_fonts_xft.cxx
- fl_shortcut.cxx
- Fl_visual.cxx
- Fl_Widget.cxx
- Fl_Window.cxx
- gl_start.cxx
- screen_xywh.cxx

30.2 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.
- void [soft](#) (int s)
If "soft" is turned on, the user is allowed to drag the value outside the range.
- int [soft](#) () const
If "soft" is turned on, the user is allowed to drag the value outside the range.

Protected Member Functions

- void [draw](#) ()
Draw the widget.
- int [handle](#) (int)
Handles the specified event.
- void [value_damage](#) ()
Asks for partial redraw.

30.2.1 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 30.1: 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 * step()`, the next by `10 * step()` and that smallest button by `step()`. Clicking on the buttons increments by 10 times the amount dragging by a pixel does. Shift + click decrements by 10 times the amount.

30.2.2 Constructor & Destructor Documentation

30.2.2.1 `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.

30.2.3 Member Function Documentation

30.2.3.1 `void Fl_Adjuster::draw () [protected, virtual]`

Draw 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.

Implements `Fl_Widget`.

30.2.3.2 `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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.2.3.3 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.

30.2.3.4 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.

The documentation for this class was generated from the following files:

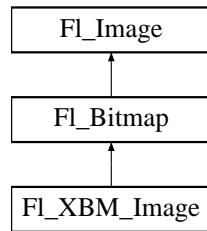
- [Fl_Adjuster.H](#)
- [Fl_Adjuster.cxx](#)

30.3 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

- [Fl_Bitmap](#) (const uchar *bits, 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.
- virtual [~Fl_Bitmap](#) ()
The destructor free all memory and server resources that are used by the bitmap.
- virtual [Fl_Image * copy](#) (int W, int H)
The [copy\(\)](#) method creates a copy of the specified image.
- [Fl_Image * copy](#) ()
The [copy\(\)](#) method creates a copy of the specified image.
- virtual void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0)
The [draw\(\)](#) methods draw the image.
- void [draw](#) (int X, int Y)
The [draw\(\)](#) methods draw the image.
- virtual void [label](#) ([Fl_Widget](#) *w)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [label](#) ([Fl_Menu_Item](#) *m)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [uncache](#) ()
If the image has been cached for display, delete the cache data.

Public Attributes

- const uchar * **array**
pointer to raw bitmap data
- int **alloc_array**
Non-zero if array points to bitmap data allocated internally.
- unsigned **id**
for internal use

30.3.1 Detailed Description

The [Fl_Bitmap](#) class supports caching and drawing of mono-color (bitmap) images.

Images are drawn using the current color.

30.3.2 Constructor & Destructor Documentation

30.3.2.1 [Fl_Bitmap::Fl_Bitmap \(const uchar * bits, int W, int H\)](#) [inline]

The constructors create a new bitmap from the specified bitmap data.

30.3.2.2 [Fl_Bitmap::Fl_Bitmap \(const char * array, int W, int H\)](#) [inline]

The constructors create a new bitmap from the specified bitmap data.

30.3.3 Member Function Documentation

30.3.3.1 [Fl_Image* Fl_Bitmap::copy \(\)](#) [inline]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.3.3.2 [Fl_Image * Fl_Bitmap::copy \(int W, int H\)](#) [virtual]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.3.3.3 void Fl_Bitmap::draw (int X, int Y) [inline]

The [draw\(\)](#) methods draw the image.

This form specifies the upper-lefthand corner of the image

Reimplemented from [Fl_Image](#).

30.3.3.4 void Fl_Bitmap::draw (int X, int Y, int W, int H, int cx = 0, int cy = 0) [virtual]

The [draw\(\)](#) methods draw the image.

This form specifies a bounding box for the image, with the origin (upper-lefthand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Image](#).

30.3.3.5 void Fl_Bitmap::label (Fl_Menu_Item * m) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

30.3.3.6 void Fl_Bitmap::label (Fl_Widget * widget) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

30.3.3.7 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:

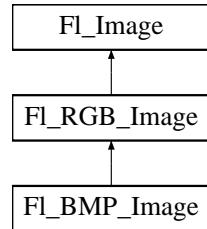
- [Fl_Bitmap.H](#)
- [Fl_Bitmap.cxx](#)

30.4 Fl_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)

The constructor loads the named BMP image from the given bmp filename.

30.4.1 Detailed Description

The [Fl_BMP_Image](#) class supports loading, caching, and drawing of Windows Bitmap (BMP) image files.

30.4.2 Constructor & Destructor Documentation

30.4.2.1 Fl_BMP_Image::Fl_BMP_Image (const char * *bmp*)

The constructor loads the named BMP image from the given bmp filename.

The inherited destructor free all memory and server resources that are used by the image.

The destructor free all memory and server resources that are used by the image

The documentation for this class was generated from the following files:

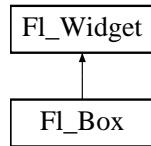
- [Fl_BMP_Image.H](#)
- [Fl_BMP_Image.cxx](#)

30.5 Fl_Box Class Reference

This widget simply draws its box, and possibly it's label.

```
#include <Fl_Box.H>
```

Inheritance diagram for Fl_Box::



Public Member Functions

- [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.*
- [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)`.*
- virtual int [handle \(int\)](#)
 - Handles the specified event.*

Protected Member Functions

- void [draw \(\)](#)
 - Draw the widget.*

30.5.1 Detailed Description

This widget simply draws its box, and possibly it's label.

Putting it before some other widgets and making it big enough to surround them will let you draw a frame around them.

30.5.2 Constructor & Destructor Documentation

30.5.2.1 [Fl_Box::Fl_Box \(int X, int Y, int W, int H, const char *l = 0\) \[inline\]](#)

- 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.

30.5.3 Member Function Documentation

30.5.3.1 void Fl_Box::draw () [protected, virtual]

Draw 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.

Implements [Fl_Widget](#).

30.5.3.2 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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:

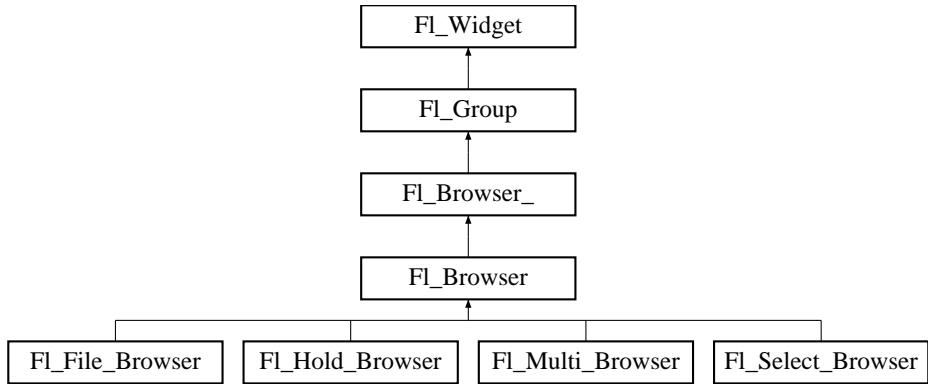
- [Fl_Box.H](#)
- [Fl_Box.cxx](#)

30.6 Fl_Browser Class Reference

The [Fl_Browser](#) widget displays a scrolling list of text lines, and manages all the storage for the text.

```
#include <Fl_Browser.h>
```

Inheritance diagram for Fl_Browser::



Public Types

- enum [Fl_Line_Position](#) { **TOP**, **BOTTOM**, **MIDDLE** }

For internal use only?

Public Member Functions

- void [remove](#) (int)

Remove line n and make the browser one line shorter.
- void [add](#) (const char *, void *=0)

Add a new line to the end of the browser.
- void [insert](#) (int, const char *, void *=0)

Insert a new entry before given line.
- void [move](#) (int to, int from)

Line from is removed and reinserted at to; to is calculated after the line is removed.
- int [load](#) (const char *filename)

Clears the browser and reads the file, adding each line from the file to the browser.
- void [swap](#) (int a, int b)

Swaps two lines in the browser.
- void [clear](#) ()

Remove all the lines in the browser.

- int **size** () const
Returns how many lines are in the browser.
- void **size** (int W, int H)
Change the size of the widget.
- int **topline** () const
Returns the current top line in the browser.
- void **lineposition** (int, **Fl_Line_Position**)
Update browser so that line is shown at given position.
- void **topline** (int l)
Scrolls the browser so the top line in the browser is n.
- void **bottomline** (int l)
Scrolls the browser so the bottom line in the browser is n.
- void **middleline** (int l)
Scrolls the browser so the middle line in the browser is n.
- int **select** (int, int=1)
Sets the selection state of entry.
- int **selected** (int) const
Return 1 if line n is selected, 0 if it not selected.
- void **show** (int n)
Makes line n visible for selection.
- void **show** ()
Makes a widget visible.
- void **hide** (int n)
Makes line n invisible, preventing selection by the user.
- void **hide** ()
Makes a widget invisible.
- int **visible** (int n) const
Returns a non-zero value if line is visible.
- int **value** () const
Gets browser value.
- void **value** (int v)
Sets the browser's value, i.e.
- const char * **text** (int) const
Returns data entry for line line, or NULL if out of range.

- void **text** (int, const char *)
Sets the text for line n to text newtext.
- void * **data** (int) const
Returns the data for line n, or NULL is n is out of range.
- void **data** (int, void *v)
Sets the data for line n to d.
- **Fl_Browser** (int, int, int, int, const char *=0)
The constructor makes an empty browser.
- **~Fl_Browser** ()
The destructor deletes all list items and destroys the 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.
- 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 *l)
Sets the current array to w.
- int **displayed** (int n) const
Returns non-zero if line n is visible.
- void **make_visible** (int n)
Redisplays so that line n is visible.
- void **replace** (int a, const char *b)
For back compatibility only.
- void **display** (int, int=1)
For back compatibility.

Protected Member Functions

- `void * item_first () const`
This method must be provided by the subclass to return the first item in the list.
- `void * item_next (void *) const`
This method must be provided by the subclass to return the item in the list after p.
- `void * item_prev (void *) const`
This method must be provided by the subclass to return the item in the list before p.
- `int item_selected (void *) const`
This method must be implemented by the subclass if it supports multiple selections in the browser.
- `void item_select (void *, int)`
This method must be implemented by the subclass if it supports multiple selections in the browser.
- `int item_height (void *) const`
Returns height of line lv.
- `int item_width (void *) const`
This method must be provided by the subclass to return the width of the item p in pixels.
- `void item_draw (void *, int, int, int, int) const`
This method must be provided by the subclass to draw the item p in the area indicated by x, y, w, and h.
- `int full_height () const`
This method may be provided by the subclass to indicate the full height of the item list in pixels.
- `int incr_height () const`
This method may be provided to return the average height of all items, to be used for scrolling.
- `FL_BLINE * find_line (int) const`
Return entry for line number line.
- `FL_BLINE * _remove (int)`
Remove entry for given line number.
- `void insert (int, FL_BLINE *)`
Insert a new line t before line n.
- `int lineno (void *) const`
Returns line number corresponding to data v, zero if not found.
- `void swap (FL_BLINE *a, FL_BLINE *b)`
Swap two lines, a and b.

30.6.1 Detailed Description

The [Fl_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.

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 <= 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 does nothing when the user clicks on it. The subclasses [Fl_Select_Browser](#), [Fl_Hold_Browser](#), and [Fl_Multi_Browser](#) react to user clicks to select lines in the browser and do callbacks.

The base called [Fl_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 [Fl_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 subof [Fl_Browser](#).

30.6.2 Constructor & Destructor Documentation

30.6.2.1 [Fl_Browser::Fl_Browser \(int X, int Y, int W, int H, const char * L = 0\)](#)

The constructor makes an empty browser.

Parameters:

← *X,Y,W,H* position and size.

← *L* label string, may be NULL.

30.6.2.2 [Fl_Browser::~Fl_Browser \(\) \[inline\]](#)

The destructor deletes all list items and destroys the browser.

30.6.3 Member Function Documentation

30.6.3.1 [FL_BLINE * Fl_Browser::_remove \(int line\) \[protected\]](#)

Remove entry for given line number.

Parameters:

← *line* line number. Must be in range!

Returns:

pointer to browser entry.

30.6.3.2 void Fl_Browser::add (const char * newtext, void * d = 0)

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. The void * argument is returned as the [data\(\)](#) of the new item.

30.6.3.3 void Fl_Browser::bottomline (int l) [inline]

Scrolls the browser so the bottom line in the browser is n.

30.6.3.4 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\(\)](#).

30.6.3.5 char Fl_Browser::column_char () const [inline]

Gets the current column separator character.

By default this is '\t' (tab).

30.6.3.6 void Fl_Browser::column_widths (const int * l) [inline]

Sets the current array to w.

Make sure the last entry is zero.

See also:

`const int *Fl_Browser::column_widths() const`

30.6.3.7 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 its 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.

30.6.3.8 void Fl_Browser::data (int line, void * d)

Sets the data for line n to d.

Does nothing if

is out of range.

30.6.3.9 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:

[uchar Fl_Browser::format_char\(\) const](#)

30.6.3.10 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
- '@@' Print rest of line starting with '@'
- '@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
- '@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.

30.6.3.11 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.

Reimplemented from [Fl_Browser_](#).

30.6.3.12 void Fl_Browser::hide () [inline]

Makes a widget invisible.

See also:

[show\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented from [Fl_Widget](#).

30.6.3.13 void Fl_Browser::hide (int *line*)

Makes line n invisible, preventing selection by the user.

The line can still be selected under program control.

30.6.3.14 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.

Reimplemented from [Fl_Browser_](#).

30.6.3.15 void Fl_Browser::insert (int *line*, const char * *newtext*, void * *d* = 0)

Insert a new entry *before* given line.

Parameters:

← *line* if line > [size\(\)](#), the entry will be added at the end.

← *newtext* text entry for the new line.

← *d* pointer to data associated with the new line.

30.6.3.16 void Fl_Browser::insert (int *line*, FL_BLINE * *t*) [protected]

Insert a new line *t* *before* line n.

If n > [size\(\)](#) then the line is added to the end.

30.6.3.17 void * Fl_Browser::item_first () const [protected, virtual]

This method must be provided by the subclass to return the first item in the list.

Implements [Fl_Browser_](#).

30.6.3.18 void * Fl_Browser::item_next (void *) const [protected, virtual]

This method must be provided by the subclass to return the item in the list after p.

Implements [Fl_Browser_](#).

30.6.3.19 void * Fl_Browser::item_prev (void *) const [protected, virtual]

This method must be provided by the subclass to return the item in the list before p.

Implements [Fl_Browser_](#).

30.6.3.20 void Fl_Browser::item_select (void *, int) [protected, virtual]

This method must be implemented by the subclass if it supports multiple selections in the browser.

The s argument specifies the selection state for item p: 0 = off, 1 = on.

Reimplemented from [Fl_Browser_](#).

30.6.3.21 int Fl_Browser::item_selected (void *l) const [protected, virtual]

This method must be implemented by the subclass if it supports multiple selections in the browser.

The method should return 1 if p is selected and 0 otherwise.

Reimplemented from [Fl_Browser_](#).

30.6.3.22 int Fl_Browser::item_width (void *) const [protected, virtual]

This method must be provided by the subclass to return the width of the item p in pixels.

Allow for two additional pixels for the list selection box.

Implements [Fl_Browser_](#).

30.6.3.23 void Fl_Browser::lineposition (int line, Fl_Line_Position pos)

Update browser so that line is shown at given position.

Parameters:

← *line* line number.

← *pos* position.

30.6.3.24 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.

30.6.3.25 void Fl_Browser::make_visible (int n) [inline]

Redisplays so that line n is visible.

If n is out of range, redisplay top or bottom of list as appropriate.

30.6.3.26 void Fl_Browser::middleline (int *l*) [inline]

Scrolls the browser so the middle line in the browser is n.

30.6.3.27 void Fl_Browser::replace (int *a*, const char **b*) [inline]

For back compatibility only.

30.6.3.28 int Fl_Browser::select (int *line*, int *v* = 1)

Sets the selection state of entry.

Parameters:

← *line* line number.

← *v* new selection state.

Returns:

1 if the state changed, 0 if not.

30.6.3.29 int Fl_Browser::selected (int *line*) const

Return 1 if line n is selected, 0 if it not selected.

30.6.3.30 void Fl_Browser::show () [inline]

Makes a widget visible.

An invisible widget never gets redrawn and does not get events. 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](#).

30.6.3.31 void Fl_Browser::show (int *line*)

Makes line n visible for selection.

30.6.3.32 void Fl_Browser::size (int *W*, int *H*) [inline]

Change the size of the widget.

size(w,h) is a shortcut for *resize(x0,y0,w,h)*.

Parameters:

← *W,H* new size

See also:

[position\(int, int\)](#), [resize\(int, int, int, int\)](#)

Reimplemented from [Fl_Widget](#).

30.6.3.33 int Fl_Browser::size () const [inline]

Returns how many lines are in the browser.

The last line number is equal to this.

30.6.3.34 void Fl_Browser::swap (int *ai*, int *bi*)

Swaps two lines in the browser.

30.6.3.35 void Fl_Browser::text (int *line*, const char * *newtext*)

Sets the text for line *line* to text *newtext*.

Does nothing if *line* is out of range.

30.6.3.36 void Fl_Browser::topline (int *l*) [inline]

Scrolls the browser so the top line in the browser is *n*.

30.6.3.37 int Fl_Browser::topline () const

Returns the current top line in the browser.

If there is no vertical scrollbar then this will always return 1.

30.6.3.38 void Fl_Browser::value (int *v*) [inline]

Sets the browser's value, i.e.

selected line, to *v*

30.6.3.39 int Fl_Browser::value () const

Gets browser value.

Returns:

line number of current selection, or 0 if no selection.

The documentation for this class was generated from the following files:

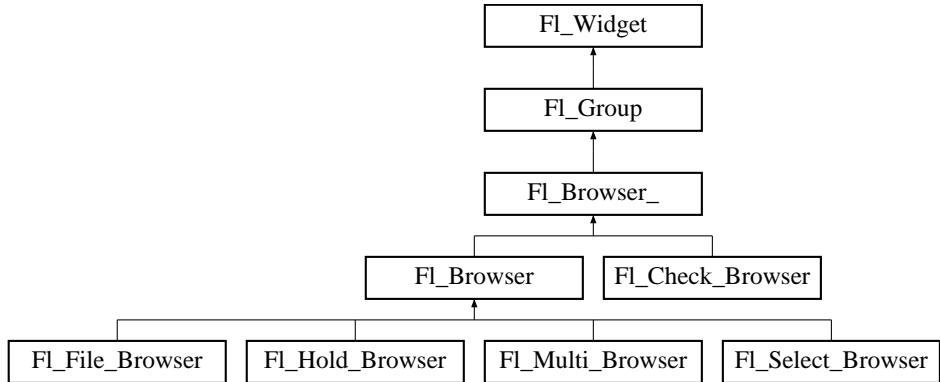
- Fl_Browser.H
- Fl_Browser.cxx
- Fl_Browser_load.cxx

30.7 Fl_Browser_ Class Reference

This is the base 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 }

Public Member Functions

- int **handle** (int)
Handles an event within the normal widget bounding box.
- void **resize** (int, int, int, int)
Repositions and/or resizes the browser.
- int **select** (void *, int=1, int docallbacks=0)
Sets the selection state of item p to s and returns 1 if the state changed or 0 if it did not.
- int **select_only** (void *, int docallbacks=0)
Selects item p and returns 1 if the state changed or 0 if it did not.
- int **deselect** (int docallbacks=0)
Deselects all items in the list and returns 1 if the state changed or 0 if it did not.
- int **position** () const
Gets or sets the vertical scrolling position of the list, which is the pixel offset of the list items within the list area.
- int **hposition** () const

Gets or sets the horizontal scrolling position of the list, which is the pixel offset of the list items within the list area.

- void **position** (int)

Gets or sets the vertical scrolling position of the list, which is the pixel offset of the list items within the list area.

- void **hposition** (int)

Gets or sets the horizontal scrolling position of the list, which is the pixel offset of the list items within the list area.

- void **display** (void *)

Displays item p, scrolling the list as necessary.

- uchar **has_scrollbar** () const

See [Fl_Browser_::has_scrollbar\(uchar\)](#).

- void **has_scrollbar** (uchar i)

By default you can scroll in both directions, and the scrollbars disappear if the data will fit in the widget.

- **Fl_Font textfont** () const

Gets the default text font for the lines in the browser.

- void **textfont** (Fl_Font s)

Sets the default text font to font s.

- **Fl_Fontsize textsize** () const

Gets the default text size for the lines in the browser.

- void **textsize** (Fl_Fontsize s)

Sets the default text size to size s.

- **Fl_Color textcolor** () const

Gets the default text color for the lines in the browser.

- void **textcolor** (unsigned n)

Sets the default text color to color n.

- void **scrollbar_right** ()

Moves the vertical scrollbar to the righthand side of the list.

- void **scrollbar_left** ()

Moves the vertical scrollbar to the lefthand side of the list.

Static Public Member Functions

- static int **scrollbar_width** ()

Gets the width of any scrollbars that are used.

- static void **scrollbar_width** (int b)
Sets the width of any scrollbars that are used to b.

Public Attributes

- **Fl_Scrollbar scrollbar**
Vertical scrollbar.
- **Fl_Scrollbar h-scrollbar**
Horizontal scrollbar.

Protected Member Functions

- virtual void * **item_first** () const =0
This method must be provided by the subclass to return the first item in the list.
- virtual void * **item_next** (void *) const =0
This method must be provided by the subclass to return the item in the list after p.
- virtual void * **item_prev** (void *) const =0
This method must be provided by the subclass to return the item in the list before p.
- virtual int **item_height** (void *) const =0
This method must be provided by the subclass to return the height of the item p in pixels.
- virtual int **item_width** (void *) const =0
This method must be provided by the subclass to return the width of the item p in pixels.
- virtual int **item_quick_height** (void *) const
This method may be provided by the subclass to return the height of the item p in pixels.
- virtual void **item_draw** (void *, int, int, int, int) const =0
This method must be provided by the subclass to draw the item p in the area indicated by x, y, w, and h.
- 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 **full_height** () const
This method may be provided by the subclass to indicate the full height 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.
- virtual void **item_select** (void *, int=1)
This method must be implemented by the subclass if it supports multiple selections in the browser.
- virtual int **item_selected** (void *) const

This method must be implemented by the subclass if it supports multiple selections in the browser.

- `void * top () const`
Returns the item the appears at the top of the list.
- `void * selection () const`
Returns the item currently selected, or NULL if there is no selection.
- `void new_list ()`
This method should be called when the list data is completely replaced or cleared.
- `void deleting (void *a)`
This method should be used when an item is deleted from the list.
- `void replacing (void *a, void *b)`
This method should be used when an item is replaced in the list.
- `void swapping (void *a, void *b)`
Exchange pointers a and b.
- `void inserting (void *a, void *b)`
This method should be used when an item is added to the list.
- `int displayed (void *) const`
This method returns non-zero if item p is currently visible in the list.
- `void redraw_line (void *)`
This method should be called when the contents of an item have changed but not changed the height of the item.
- `void redraw_lines ()`
This method will cause the entire list to be redrawn.
- `void bbox (int &, int &, int &, int &) const`
This method returns the bounding box for the interior of the list, inside the scrollbars.
- `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 * find_item (int my)`
This method returns the item under mouse at my.
- `void draw (int, int, int, int)`
Draws the contents of the browser within the specified bounding box.
- `void draw ()`
Draws the list within the normal widget bounding box.
- `Fl_Browser_ (int, int, int, int, const char *=0)`
The constructor makes an empty browser.

30.7.1 Detailed Description

This is the base 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.

30.7.2 Constructor & Destructor Documentation

30.7.2.1 `Fl_Browser_::Fl_Browser_ (int X, int Y, int W, int H, const char * l = 0)` [protected]

The constructor makes an empty browser.

30.7.3 Member Function Documentation

30.7.3.1 `void Fl_Browser_::deleting (void * l)` [protected]

This method should be used when an item is deleted from the list.

It allows the `Fl_Browser_` to discard any cached data it has on the item.

30.7.3.2 `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 docb is non-zero, deselect tries to call the callback function for the widget.

30.7.3.3 `void Fl_Browser_::display (void * p)`

Displays item p, scrolling the list as necessary.

30.7.3.4 `void Fl_Browser_::draw (int, int, int, int)` [protected]

Draws the contents of the browser within the specified bounding box.

Todo

Find the implementation, if any, and document it there!

30.7.3.5 `void * Fl_Browser_::find_item (int my)` [protected]

This method returns the item under mouse at my.

If no item is displayed at that position then NULL is returned.

30.7.3.6 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.

Reimplemented in [Fl_Browser](#).

30.7.3.7 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.

30.7.3.8 int Fl_Browser_::handle (int event) [virtual]

Handles an event within the normal widget bounding box.

Reimplemented from [Fl_Group](#).

Reimplemented in [Fl_Check_Browser](#).

30.7.3.9 void Fl_Browser_::has_scrollbar (uchar i) [inline]

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 h:

- 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.

30.7.3.10 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.

Reimplemented in [Fl_Browser](#).

30.7.3.11 void Fl_Browser_::inserting (void * a, void * b) [protected]

This method should be used when an item is added to the list.

It allows the [Fl_Browser](#) to update its cache data as needed.

30.7.3.12 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.

Implemented in [Fl_Browser](#).

30.7.3.13 virtual int Fl_Browser_::item_height (void *) const [protected, pure virtual]

This method must be provided by the subclass to return the height of the item p in pixels.

Allow for two additional pixels for the list selection box.

Implemented in [Fl_Browser](#).

30.7.3.14 virtual void* Fl_Browser_::item_next (void *) const [protected, pure virtual]

This method must be provided by the subclass to return the item in the list after p.

Implemented in [Fl_Browser](#).

30.7.3.15 virtual void* Fl_Browser_::item_prev (void *) const [protected, pure virtual]

This method must be provided by the subclass to return the item in the list before p.

Implemented in [Fl_Browser](#).

30.7.3.16 int Fl_Browser_::item_quick_height (void * l) const [protected, virtual]

This method may be provided by the subclass to return the height of the item p 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.

30.7.3.17 void Fl_Browser_::item_select (void *, int = 1) [protected, virtual]

This method must be implemented by the subclass if it supports multiple selections in the browser.

The s argument specifies the selection state for item p: 0 = off, 1 = on.

Reimplemented in [Fl_Browser](#).

30.7.3.18 int Fl_Browser_::item_selected (void * l) const [protected, virtual]

This method must be implemented by the subclass if it supports multiple selections in the browser.

The method should return 1 if p is selected and 0 otherwise.

Reimplemented in [Fl_Browser](#).

30.7.3.19 virtual int Fl_Browser_::item_width (void *) const [protected, pure virtual]

This method must be provided by the subclass to return the width of the item p in pixels.

Allow for two additional pixels for the list selection box.

Implemented in [Fl_Browser](#).

30.7.3.20 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.

30.7.3.21 void Fl_Browser_::redraw_lines () [inline, protected]

This method will cause the entire list to be redrawn.

30.7.3.22 void Fl_Browser_::replacing (void * a, void * b) [protected]

This method should be used when an item is replaced in the list.

It allows the [Fl_Browser_](#) to update its cache data as needed.

30.7.3.23 void Fl_Browser_::resize (int X, int Y, int W, int H) [virtual]

Repositions and/or resizes the browser.

Reimplemented from [Fl_Group](#).

30.7.3.24 void Fl_Browser_::scrollbar_left () [inline]

Moves the vertical scrollbar to the lefthand side of the list.

For back compatibility.

30.7.3.25 void Fl_Browser_::scrollbar_right () [inline]

Moves the vertical scrollbar to the righthand side of the list.

For back compatibility.

30.7.3.26 int Fl_Browser_::select (void * l, int i = 1, int docallbacks = 0)

Sets the selection state of item p to s and returns 1 if the state changed or 0 if it did not.

If docb is non-zero, select tries to call the callback function for the widget.

30.7.3.27 int Fl_Browser_::select_only (void * l, int docallbacks = 0)

Selects item p and returns 1 if the state changed or 0 if it did not.

Any other items in the list are deselected.

If docb is non-zero, select_only tries to call the callback function for the widget.

30.7.3.28 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.

30.7.3.29 void* Fl_Browser_::top () const [inline, protected]

Returns the item the appears at the top of the list.

30.7.4 Member Data Documentation

30.7.4.1 Fl_Scrollbar Fl_Browser_::scrollbar

Vertical scrollbar.

The documentation for this class was generated from the following files:

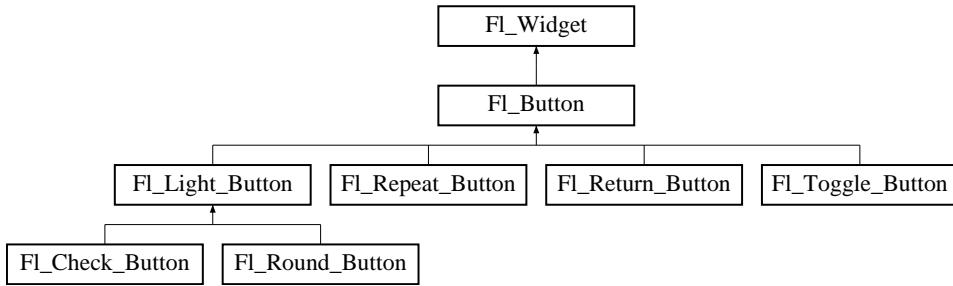
- [Fl_Browser_.H](#)
- [Fl_Browser_.cxx](#)

30.8 Fl_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

- virtual int **handle** (int)

Handles the specified event.
- **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 **value** (int v)

Sets the current value of the button.
- char **value** () const

Returns the current value of the button (0 or 1).
- int **set** ()

Same as value(1).
- int **clear** ()

Same as value(0).
- 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** (int s)

Sets the shortcut key to s.
- **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.

- void [shortcut \(const char *s\)](#)

(for backwards compatibility)

- [Fl_Color down_color \(\) const](#)

(for backwards compatibility)

- void [down_color \(unsigned c\)](#)

(for backwards compatibility)

Protected Member Functions

- virtual void [draw \(\)](#)

Draw the widget.

30.8.1 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\(\)](#). 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.

[Todo](#)

Refactor the doxygen comments for [Fl_Button type\(\)](#) documentation.

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.

[Todo](#)

Refactor the doxygen comments for [Fl_Button when\(\)](#) documentation.

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.
- [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).

30.8.2 Constructor & Destructor Documentation

30.8.2.1 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.

Parameters:

← *X,Y,W,H* position and size of the widget
← *L* widget label, default is no label

30.8.3 Member Function Documentation

30.8.3.1 int Fl_Button::clear () [inline]

Same as [value\(0\)](#).

See also:

[value\(int v\)](#)

30.8.3.2 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\(\)](#).

Parameters:

← *b* down box type

30.8.3.3 Fl_Boxtype Fl_Button::down_box () const [inline]

Returns the current down box type, which is drawn when [value\(\)](#) is non-zero.

Return values:

Fl_Boxtype

30.8.3.4 void Fl_Button::draw () [protected, virtual]

Draw 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.

Implements [Fl_Widget](#).

Reimplemented in [Fl_Light_Button](#), and [Fl_Return_Button](#).

30.8.3.5 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#), and [Fl_Return_Button](#).

30.8.3.6 int Fl_Button::set () [inline]

Same as `value(1)`.

See also:

[value\(int v\)](#)

30.8.3.7 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:

← *s* bitwise OR of key and shift flags

30.8.3.8 int Fl_Button::shortcut () const [inline]

Returns the current shortcut key for the button.

Return values:

int

30.8.3.9 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:

$\leftarrow v$ button value.

See also:

[set\(\)](#), [clear\(\)](#)

The documentation for this class was generated from the following files:

- [Fl_Button.H](#)
- [Fl_Button.cxx](#)

30.9 Fl_Cairo_State Class Reference

Contains all the necessary info on the current cairo context.

```
#include <Fl_Cairo.H>
```

Public Member Functions

- `cairo_t * cc () const`
Gets the current cairo context.
- `bool autolink () const`
Sets the autolink option. See [Fl::cairo_autolink_context\(bool\)](#).
- `void cc (cairo_t *c, bool own=true)`
Sets the current cairo context, own indicates cc deletion is handle externally by user.
- `void autolink (bool b)`
Gets the autolink option.
- `void window (void *w)`
Sets the window w to keep track on.
- `void * window () const`
Gets the last window attached to a cc.
- `void * gc (void *c)`
Sets the gc c to keep track on.
- `void * gc () const`
Gets the last gc attached to a cc.

30.9.1 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 option

The documentation for this class was generated from the following file:

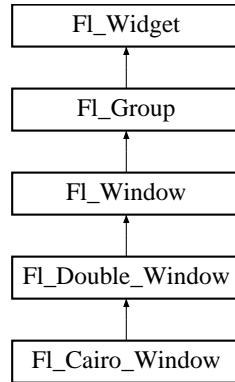
- `Fl_Cairo.H`

30.10 Fl_Cairo_Window Class Reference

This defines a pre-configured cairo fltk window.

```
#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)`

This defines the cairo draw callback prototype that you must further.

Public Member Functions

- `Fl_Cairo_Window (int w, int h)`
- `void draw ()`

Overloaded to provide cairo callback support.

- `void set_draw_cb (cairo_draw_cb cb)`

You must provide a draw callback which will implement your cairo rendering, This method will permit you to set your cb cairo callback.

30.10.1 Detailed Description

This defines a pre-configured cairo fltk window.

This class overloads for you the virtual `draw()` method, so that the only thing you have to do is to provide your cairo code. All cairo context handling is achieved transparently.

Note:

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 it only when your window is the current window.

See also:

[Fl_Window::current\(\)](#)

The documentation for this class was generated from the following file:

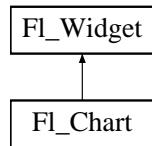
- Fl_Cairo_Window.H

30.11 Fl_Chart Class Reference

[Fl_Chart](#) displays simple charts.

```
#include <Fl_Chart.H>
```

Inheritance diagram for Fl_Chart::



Public Member Functions

- [**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.
- [**~Fl_Chart**](#) ()
Destroys the [Fl_Chart](#) widget and all of its data.
- void [**clear**](#) ()
Removes all values from the chart.
- void [**add**](#) (double val, const char *str=0, unsigned col=0)
Add the data value `val` with optional label `str` and color `col` to the chart.
- void [**insert**](#) (int ind, double val, const char *str=0, unsigned col=0)
Inserts a data value `val` at the given position `ind`.
- void [**replace**](#) (int ind, double val, const char *str=0, unsigned col=0)
Replace a data value `val` at the given position `ind`.
- 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.
- int [**size**](#) () const
Returns the number of data values in the chart.
- void [**size**](#) (int W, int H)
Change the size of the widget.
- int [**maxsize**](#) () const
Gets the maximum number of data values for a chart.
- void [**maxsize**](#) (int m)

Set the maximum number of data values for a chart.

- **Fl_Font textfont () const**
Gets the chart's text font.
- **void textfont (Fl_Font s)**
Sets the chart's text font to s.
- **Fl_Fontsize textsize () const**
Gets the chart's text size.
- **void textsize (Fl_Fontsize s)**
gets the chart's text size to s.
- **Fl_Color textcolor () const**
Gets the chart's text color.
- **void textcolor (unsigned n)**
gets the chart's text color to n.
- **uchar autosize () const**
Get whether the chart will automatically adjust the bounds of the chart.
- **void autosize (uchar n)**
Set whether the chart will automatically adjust the bounds of the chart.

Protected Member Functions

- **void draw ()**
Draw the widget.

30.11.1 Detailed Description

Fl_Chart displays simple charts.

It is provided for Forms compatibility.

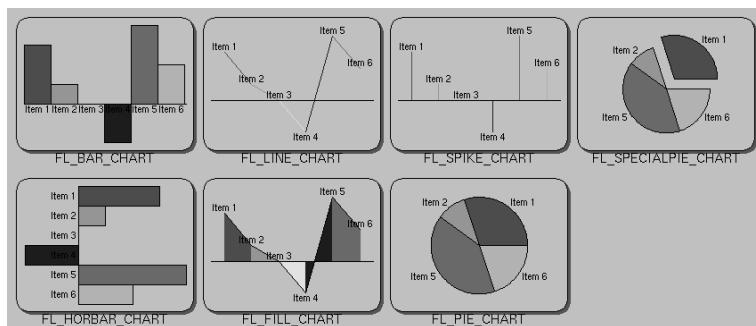


Figure 30.2: Fl_Chart

Todo

Refactor `Fl_Chart::type()` information.

The type of an `Fl_Chart` object can be set using `type(uchar t)` to:

- `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 `FL_PIE_CHART`, but the first slice is separated from the pie.
- `FL_SPIKE_CHART`: Each sample value is drawn as a vertical line.

30.11.2 Constructor & Destructor Documentation

30.11.2.1 `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:

- ← `X,Y,W,H` position and size of the widget
- ← `L` widget label, default is no label

30.11.3 Member Function Documentation

30.11.3.1 `void Fl_Chart::add (double val, const char * str = 0, unsigned col = 0)`

Add the data value `val` with optional label `str` and color `col` to the chart.

Parameters:

- ← `val` data value
- ← `str` optional data label
- ← `col` optional data color

30.11.3.2 `void Fl_Chart::autosize (uchar n) [inline]`

Set whether the chart will automatically adjust the bounds of the chart.

Parameters:

- ← `n` non-zero to enable automatic resizing, zero to disable.

30.11.3.3 uchar Fl_Chart::autosize () const [inline]

Get whether the chart will automatically adjust the bounds of the chart.

Returns:

non-zero if auto-sizing is enabled and zero if disabled.

30.11.3.4 void Fl_Chart::bounds (double *a*, double *b*)

Sets the lower and upper bounds of the chart values.

Parameters:

← *a,b* are used to set lower, upper

30.11.3.5 void Fl_Chart::bounds (double **a*, double **b*) const [inline]

Gets the lower and upper bounds of the chart values.

Parameters:

→ *a,b* are set to lower, upper

30.11.3.6 void Fl_Chart::draw () [protected, virtual]

Draw 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.

Implements [Fl_Widget](#).

30.11.3.7 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:

← *ind* insertion position

← *val* data value

← *str* optional data label

← *col* optional data color

30.11.3.8 void Fl_Chart::maxsize (int *m*)

Set 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:

← *m* maximum number of data values allowed.

30.11.3.9 void Fl_Chart::replace (int *ind*, double *val*, const char * *str* = 0, unsigned *col* = 0)

Replace a data value *val* at the given position *ind*.

Position 1 is the first data value.

Parameters:

← *ind* insertion position

← *val* data value

← *str* optional data label

← *col* optional data color

30.11.3.10 void Fl_Chart::size (int *W*, int *H*) [inline]

Change the size of the widget.

size(w,h) is a shortcut for *resize(x(),y(),w,h)*.

Parameters:

← *W,H* new size

See also:

[position\(int, int\)](#), [resize\(int, int, int, int\)](#)

Reimplemented from [Fl_Widget](#).

30.11.3.11 void Fl_Chart::textcolor (unsigned *n*) [inline]

gets the chart's text color to *n*.

30.11.3.12 void Fl_Chart::textfont (Fl_Font *s*) [inline]

Sets the chart's text font to *s*.

30.11.3.13 void Fl_Chart::textsize (Fl_Fontsize s) [inline]

gets the chart's text size to *s*.

The documentation for this class was generated from the following files:

- [Fl_Chart.H](#)
- [Fl_Chart.cxx](#)

30.12 FL_CHART_ENTRY Struct Reference

For internal use only.

```
#include <Fl_Chart.H>
```

Public Attributes

- float `val`
For internal use only.
- unsigned `col`
For internal use only.
- char `str` [FL_CHART_LABEL_MAX+1]
For internal use only.

30.12.1 Detailed Description

For internal use only.

30.12.2 Member Data Documentation

30.12.2.1 unsigned FL_CHART_ENTRY::col

For internal use only.

30.12.2.2 char FL_CHART_ENTRY::str[FL_CHART_LABEL_MAX+1]

For internal use only.

30.12.2.3 float FL_CHART_ENTRY::val

For internal use only.

The documentation for this struct was generated from the following file:

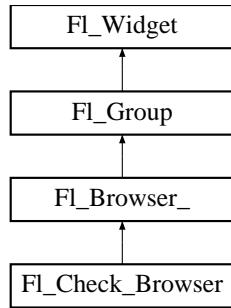
- Fl_Chart.H

30.13 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

- [Fl_Check_Browser](#) (int x, int y, int w, int h, const char *l=0)
The constructor makes an empty browser.
- [~Fl_Check_Browser](#) ()
The destructor deletes all list items and destroys the browser.
- int [add](#) (char *s)
Add a new unchecked line to the end of the browser.
- int [add](#) (char *s, int b)
*See int [Fl_Check_Browser::add\(char *s\)](#).*
- int [remove](#) (int item)
Remove line n and make the browser one line shorter.
- 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 [clear](#) ()
Remove every item from the browser.
- int [nitems](#) () const
Returns how many lines are in the browser.
- int [nchecked](#) () const
Returns how many items are currently checked.

- 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 **set_checked** (int item)
Equivalent to Fl_Check_Browser::checked(item, 1).
- void **check_all** ()
Sets all the items checked.
- void **check_none** ()
Sets all the items unchecked.
- int **value** () const
Returns the index of the currently selected item.
- char * **text** (int item) const
Return a pointer to an internal buffer holding item item's text.

Protected Member Functions

- int **handle** (int)
Handles an event within the normal widget bounding box.

30.13.1 Detailed Description

The **Fl_Check_Browser** widget displays a scrolling list of text lines that may be selected and/or checked by the user.

30.13.2 Constructor & Destructor Documentation

30.13.2.1 **Fl_Check_Browser::Fl_Check_Browser (int X, int Y, int W, int H, const char * l = 0)**

The constructor makes an empty browser.

30.13.2.2 **Fl_Check_Browser::~Fl_Check_Browser () [inline]**

The destructor deletes all list items and destroys the browser.

30.13.3 Member Function Documentation

30.13.3.1 int Fl_Check_Browser::add (char * s)

Add a new unchecked 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. The second form can set the item checked.

30.13.3.2 void Fl_Check_Browser::check_all ()

Sets all the items checked.

30.13.3.3 void Fl_Check_Browser::check_none ()

Sets all the items unchecked.

30.13.3.4 void Fl_Check_Browser::checked (int i, int b)

Sets the check status of item item to b.

30.13.3.5 int Fl_Check_Browser::checked (int i) const

Gets the current status of item item.

30.13.3.6 void Fl_Check_Browser::clear ()

Remove every item from the browser.

Reimplemented from [Fl_Group](#).

30.13.3.7 int Fl_Check_Browser::handle (int event) [protected, virtual]

Handles an event within the normal widget bounding box.

Reimplemented from [Fl_Browser_](#).

30.13.3.8 int Fl_Check_Browser::nchecked () const [inline]

Returns how many items are currently checked.

30.13.3.9 int Fl_Check_Browser::nitems () const [inline]

Returns how many lines are in the browser.

The last line number is equal to this.

30.13.3.10 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.

30.13.3.11 void Fl_Check_Browser::set_checked (int *item*) [inline]

Equivalent to Fl_Check_Browser::checked(item, 1).

30.13.3.12 char * Fl_Check_Browser::text (int *i*) const

Return a pointer to an internal buffer holding item item's text.

30.13.3.13 int Fl_Check_Browser::value () const

Returns the index of the currently selected item.

The documentation for this class was generated from the following files:

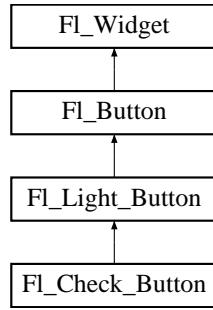
- Fl_Check_Browser.H
- Fl_Check_Browser.cxx

30.14 Fl_Check_Button Class Reference

A button with an "checkmark" to show its status.

```
#include <Fl_Check_Button.H>
```

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.

30.14.1 Detailed Description

A button with an "checkmark" to show its status.

Figure 30.3: Fl_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 [Fl_Check_Button](#) subclass displays its "ON" state by showing a "checkmark" rather than drawing itself pushed in.

Todo

Refactor [Fl_Check_Button](#) doxygen comments (add `color()` info etc?)

Todo

Generate Fl_Check_Button.gif with visible checkmark.

30.14.2 Constructor & Destructor Documentation

30.14.2.1 [Fl_Check_Button::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.

Parameters:

- ← *X,Y,W,H* position and size of the widget
- ← *L* widget label, default is no label

The documentation for this class was generated from the following files:

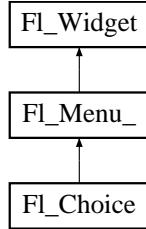
- [Fl_Check_Button.H](#)
- [Fl_Check_Button.cxx](#)

30.15 Fl_Choice Class Reference

A button that is used to pop up a menu.

```
#include <Fl_Choice.h>
```

Inheritance diagram for Fl_Choice::



Public Member Functions

- int [handle](#) (int)
Handles the specified event.
- [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.
- int [value](#) () const
Gets the index of the last item chosen by the user.
- int [value](#) (int v)
Sets the currently selected value using the index into the menu item array.
- int [value](#) (const [Fl_Menu_Item](#) *v)
Sets the currently selected value using a pointer to menu item.

Protected Member Functions

- void [draw](#) ()
Draw the widget.

30.15.1 Detailed Description

A button that is used to pop up a menu.

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 picks an item off the menu the `value()` is set to that item and then the item's callback is done with the `menu_button` as the `Fl_Widget*` argument. If the item does not have a callback the `menu_button`'s callback is done instead.

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.

Figure 30.4: Fl_Choice

Todo

Refactor the doxygen comments for `Fl_Choice changed()` documentation.

- `int Fl_Widget::changed() const` This value is true 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.
- `Fl_Boxtype Fl_Choice::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_Choice::down_box(Fl_Boxtype b)` Sets the current down box type to `b`.

30.15.2 Constructor & Destructor Documentation

30.15.2.1 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 boxtyle is `FL_UP_BOX`.

The constructor sets `menu()` to NULL. See `Fl_Menu_` for the methods to set or change the menu.

Parameters:

- ← `X,Y,W,H` position and size of the widget
- ← `L` widget label, default is no label

30.15.3 Member Function Documentation

30.15.3.1 void Fl_Choice::draw () [protected, virtual]

Draw 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.

Implements [Fl_Widget](#).

30.15.3.2 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.15.3.3 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:

← *v* pointer to menu item in the menu item array.

Returns:

non-zero if the new value is different to the old one.

Reimplemented from [Fl_Menu_](#).

30.15.3.4 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:

← *v* index of value in the menu item array.

Returns:

non-zero if the new value is different to the old one.

Reimplemented from [Fl_Menu_](#).

30.15.3.5 int Fl_Choice::value () const [inline]

Gets the index of the last item chosen by the user.

The index is zero initially.

Reimplemented from [Fl_Menu_](#).

The documentation for this class was generated from the following files:

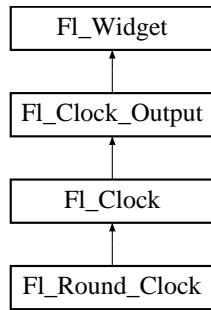
- [Fl_Choice.H](#)
- [Fl_Choice.cxx](#)

30.16 Fl_Clock Class Reference

This widget provides a round analog clock display.

```
#include <Fl_Clock.H>
```

Inheritance diagram for Fl_Clock::



Public Member Functions

- int [handle](#) (int)

Handles the specified event.

- void [update](#) ()

Undefined.

- [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 boxtyle, position, size, and label string.

- [~Fl_Clock](#) ()

The destructor removes the clock.

30.16.1 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 the clock with [type\(\)](#), see below.

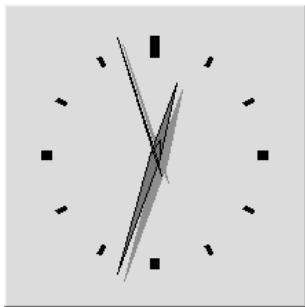


Figure 30.5: FL_SQUARE_CLOCK type

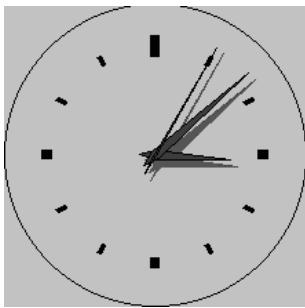


Figure 30.6: FL_ROUND_CLOCK type

30.16.2 Constructor & Destructor Documentation

30.16.2.1 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 boxtyle is `FL_NO_BOX`.

Parameters:

$\leftarrow X, Y, W, H$ position and size of the widget

$\leftarrow L$ widget label, default is no label

30.16.2.2 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 boxtyle, position, size, and label string.

Parameters:

$\leftarrow t$ boxtyle

$\leftarrow X, Y, W, H$ position and size of the widget

$\leftarrow L$ widget label, default is no label

30.16.3 Member Function Documentation

30.16.3.1 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.16.3.2 void Fl_Clock::update ()

Undefined.

Todo

Find [Fl_Clock::update\(\)](#) implementation, if any, and document it.

The documentation for this class was generated from the following files:

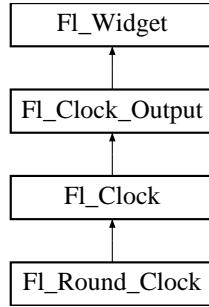
- [Fl_Clock.H](#)
- [Fl_Clock.cxx](#)

30.17 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.
- void **value** (ulong v)
Set the displayed time.
- void **value** (int H, int m, int s)
Set the displayed time.
- ulong **value** () const
Returns the displayed time.
- 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).

Protected Member Functions

- void **draw** ()
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.

30.17.1 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.

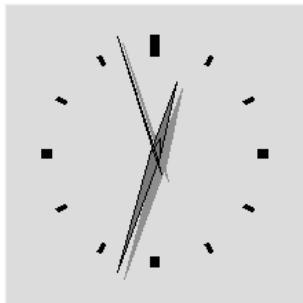


Figure 30.7: FL_SQUARE_CLOCK type

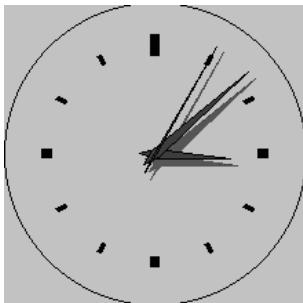


Figure 30.8: FL_ROUND_CLOCK type

30.17.2 Constructor & Destructor Documentation

30.17.2.1 [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 boxtyle is [FL_NO_BOX](#).

Parameters:

$\leftarrow X, Y, W, H$ position and size of the widget

$\leftarrow L$ widget label, default is no label

30.17.3 Member Function Documentation

30.17.3.1 [void Fl_Clock_Output::draw \(int X, int Y, int W, int H\) \[protected\]](#)

Draw clock with the given position and size.

Parameters:

$\leftarrow X, Y, W, H$ position and size

30.17.3.2 int Fl_Clock_Output::hour () const [inline]

Returns the displayed hour (0 to 23).

See also:

[value\(\)](#), [minute\(\)](#), [second\(\)](#)

30.17.3.3 int Fl_Clock_Output::minute () const [inline]

Returns the displayed minute (0 to 59).

See also:

[value\(\)](#), [hour\(\)](#), [second\(\)](#)

30.17.3.4 int Fl_Clock_Output::second () const [inline]

Returns the displayed second (0 to 60, 60=leap second).

See also:

[value\(\)](#), [hour\(\)](#), [minute\(\)](#)

30.17.3.5 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\(ulong\)](#)

30.17.3.6 void Fl_Clock_Output::value (int *H*, int *m*, int *s*)

Set the displayed time.

Set the time in hours, minutes, and seconds.

Parameters:

$\leftarrow H, m, s$ displayed time

See also:

[hour\(\)](#), [minute\(\)](#), [second\(\)](#)

30.17.3.7 void Fl_Clock_Output::value (ulong v)

Set the displayed time.

Set the time in seconds since the UNIX epoch (January 1, 1970).

Parameters:

$\leftarrow v$ seconds since epoch

See also:

[value\(\)](#)

The documentation for this class was generated from the following files:

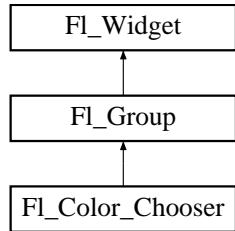
- [Fl_Clock.H](#)
- [Fl_Clock.cxx](#)

30.18 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

- int **mode** ()

Returns which [Fl_Color_Chooser](#) variant is currently active.
- double **hue** () const

Returns the current hue.
- double **saturation** () const

Returns the saturation.
- double **value** () const

Returns the value/brightness.
- double **r** () const

Returns the current red value.
- double **g** () const

Returns the current green value.
- double **b** () const

Returns the current blue value.
- int **hsv** (double H, double S, double V)

Set the hsv values.
- int **rgb** (double R, double G, double B)

Sets the current rgb color values.
- **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.

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.

Related Functions

(Note that these are not member functions.)

- int [fl_color_chooser](#) (const char *name, double &r, double &g, double &b)

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)

Pops up a window to let the user pick an arbitrary RGB color.

30.18.1 Detailed Description

The [Fl_Color_Chooser](#) widget provides a standard RGB color chooser.

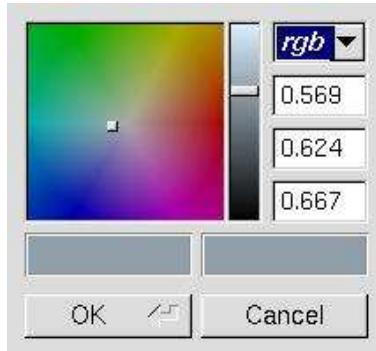


Figure 30.9: `fl_color_chooser()`

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).

`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.

30.18.2 Constructor & Destructor Documentation

30.18.2.1 `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:

← `X,Y,W,H` position and size of the widget

← `L` widget label, default is no label

30.18.3 Member Function Documentation

30.18.3.1 `double Fl_Color_Chooser::b () const [inline]`

Returns the current blue value.

$0 \leq b \leq 1$.

30.18.3.2 `double Fl_Color_Chooser::g () const [inline]`

Returns the current green value.

$0 \leq g \leq 1$.

30.18.3.3 `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:

← `H,S,V` color components.

Returns:

1 if a new hsv value was set, 0 if the hsv value was the previous one.

30.18.3.4 `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:

$\leftarrow H, S, V$ color components
 $\rightarrow R, G, B$ color components

30.18.3.5 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.*

30.18.3.6 double Fl_Color_Chooser::r () const [inline]

Returns the current red value.

$0 \leq r \leq 1$.

30.18.3.7 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:

$\leftarrow R, G, B$ color components.

Returns:

1 if a new rgb value was set, 0 if the rgb value was the previous one.

30.18.3.8 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:

$\leftarrow R, G, B$ color components
 $\rightarrow H, S, V$ color components

30.18.3.9 double Fl_Color_Chooser::saturation () const [inline]

Returns the saturation.

$0 \leq \text{saturation} \leq 1$.

30.18.3.10 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:

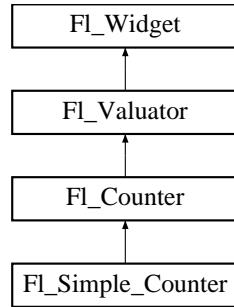
- [Fl_Color_Chooser.H](#)
- [Fl_Color_Chooser.cxx](#)

30.19 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

- int [handle](#) (int)
Handles the specified event.
- [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.
- [~Fl_Counter](#) ()
Destroys thevaluator.
- void [lstep](#) (double a)
Sets the increment for the large step buttons.
- void [step](#) (double a, double b)
Sets the increments for the normal and large step buttons.
- void [step](#) (double a)
Sets the increment for the normal step buttons.
- [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_Color textcolor \(\) const](#)

Gets the font color.

- [void textcolor \(unsigned s\)](#)

Sets the font color to s.

Protected Member Functions

- [void draw \(\)](#)

Draw the widget.

30.19.1 Detailed Description

Controls a single floating point value with button (or keyboard) arrows.

Double arrows buttons achieve larger steps than simple arrows.

See also:

[Fl_Spinner](#) for [value](#) input with vertical [step](#) arrows.

Figure 30.10: Fl_Counter

Todo

Refactor the doxygen comments for [Fl_Counter type\(\)](#) documentation.

The type of an [Fl_Counter](#) object can be set using [type\(uchar t\)](#) to:

- [FL_NORMAL_COUNTER](#): Displays a counter with 4 arrow buttons.
- [FL_SIMPLE_COUNTER](#): Displays a counter with only 2 arrow buttons.

30.19.2 Constructor & Destructor Documentation

30.19.2.1 **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.

The default type is FL_NORMAL_COUNTER.

Parameters:

- ← *X,Y,W,H* position and size of the widget
- ← *L* widget label, default is no label

30.19.3 Member Function Documentation

30.19.3.1 **void Fl_Counter::draw () [protected, virtual]**

Draw 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.

Implements [Fl_Widget](#).

30.19.3.2 **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 new 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.

Parameters:

- ← *event* 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](#).

30.19.3.3 **void Fl_Counter::lstep (double a) [inline]**

Sets the increment for the large step buttons.

The default value is 1.0.

Parameters:

← *a* large step increment.

30.19.3.4 void Fl_Counter::step (double *a*) [inline]

Sets the increment for the normal step buttons.

Parameters:

← *a* normal step increment.

Reimplemented from [Fl_Valuator](#).

30.19.3.5 void Fl_Counter::step (double *a*, double *b*) [inline]

Sets the increments for the normal and large step buttons.

Parameters:

← *a,b* normal and large step increments.

The documentation for this class was generated from the following files:

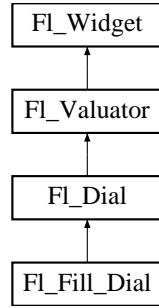
- [Fl_Counter.H](#)
- [Fl_Counter.cxx](#)

30.20 Fl_Dial Class Reference

The [Fl_Dial](#) widget provides a circular dial to control a single floating point value.

```
#include <Fl_Dial.H>
```

Inheritance diagram for [Fl_Dial](#)::



Public Member Functions

- int [handle](#) (int)
Allow subclasses to handle event based on current position and size.
- [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.
- 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.

Protected Member Functions

- 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.

- void [draw \(\)](#)
Draws dial at current position and size.

30.20.1 Detailed Description

The [Fl_Dial](#) widget provides a circular dial to control a single floating point value.

Figure 30.11: Fl_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.

30.20.2 Constructor & Destructor Documentation

30.20.2.1 [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.

Creates a new [Fl_Dial](#) widget using the given position, size, and label string.

The default type is FL_NORMAL_DIAL.

30.20.3 Member Function Documentation

30.20.3.1 [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.

30.20.3.2 void Fl_Dial::draw (int *X*, int *Y*, int *W*, int *H*) [protected]

Draws dial at given position and size.

Parameters:

← *X,Y,W,H* position and size

30.20.3.3 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:

← *event,X,Y,W,H* event to handle, related position and size.

The documentation for this class was generated from the following files:

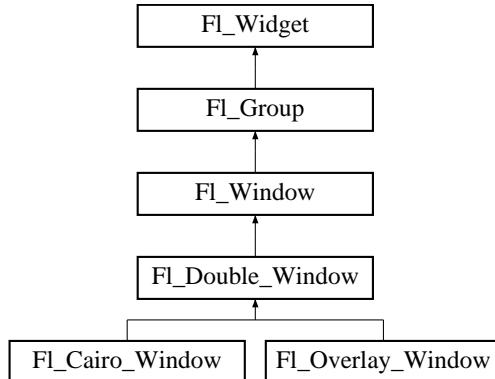
- Fl_Dial.H
- Fl_Dial.cxx

30.21 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

- void [show \(\)](#)

Put the window on the screen.

- void [show \(int a, char **b\)](#)

See virtual void [Fl_Window::show\(\)](#).

- void [flush \(\)](#)

Forces the window to be redrawn.

- void [resize \(int, int, int, int\)](#)

Changes the size and position of the window.

- void [hide \(\)](#)

Remove the window from the screen.

- [~Fl_Double_Window \(\)](#)

The destructor also deletes all the children.

- [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\(int w, int h, const char *label = 0\)](#).*

Protected Member Functions

- void [flush \(int eraseoverlay\)](#)

Forces the window to be redrawn.

Protected Attributes

- char [force_doublebuffering_](#)

Force double buffering, even if the OS already buffers windows (overlays need that on MacOS and Windows2000).

30.21.1 Detailed Description

The [Fl_Double_Window](#) provides a double-buffered window.

If possible this will use the X double buffering extension (Xdbe). If not, it will draw the window data into an off-screen pixmap, and then copy it to the on-screen window.

It is highly recommended that you put the following code before the first [show\(\)](#) of *any* window in your program:

```
Fl::visual(FL_DOUBLE|FL_INDEX)
```

This makes sure you can use Xdbe on servers where double buffering does not exist for every visual.

30.21.2 Constructor & Destructor Documentation

30.21.2.1 [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.

30.21.3 Member Function Documentation

30.21.3.1 [void Fl_Double_Window::flush \(int eraseoverlay\) \[protected\]](#)

Forces the window to be redrawn.

Parameters:

← *eraseoverlay* non-zero to erase overlay, zero to ignore

[Fl_Overlay_Window](#) relies on flush(1) copying the back buffer to the front everywhere, even if [damage\(\) == 0](#), thus erasing the overlay, and leaving the clip region set to the entire window.

30.21.3.2 void Fl_Double_Window::hide () [virtual]

Remove 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](#).

Reimplemented in [Fl_Overlay_Window](#).

30.21.3.3 void Fl_Double_Window::resize (int, int, int, int) [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_Widget](#).

Reimplemented in [Fl_Overlay_Window](#).

30.21.3.4 void Fl_Double_Window::show () [virtual]

Put the window on the screen.

Usually this has the side effect of opening the display. The second form is used for top-level windows and allow standard arguments to be parsed from the command-line.

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.

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](#)

30.22 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\(\)](#).

30.22.1 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)
{ }
```

The documentation for this class was generated from the following file:

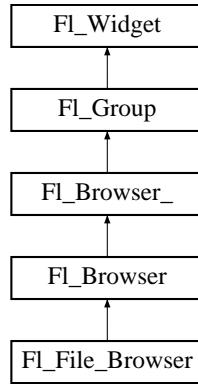
- [Fl_Group.H](#)

30.23 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 Member Functions

- [Fl_File_Browser](#) (int, int, int, int, const char *==0)
The constructor creates the [Fl_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.
- [void filter \(const char *pattern\)](#)
Sets or gets the filename filter.
- [const char * filter \(\) const](#)
Sets or gets the filename filter.
- [int load \(const char *directory, Fl_File_Sort_F *sort=fl_numericsort\)](#)
Loads the specified directory into the browser.
- [Fl_Fontsize fontsize \(\) const](#)
Gets the default text size for the lines in the browser.
- [void fontsize \(Fl_Fontsize s\)](#)
Sets the default text size to size s.

- 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.

30.23.1 Detailed Description

The [Fl_File_Browser](#) widget displays a list of filenames, optionally with file-specific icons.

30.23.2 Constructor & Destructor Documentation

30.23.2.1 [Fl_File_Browser::Fl_File_Browser \(int X, int Y, int W, int H, const char * l = 0\)](#)

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.

30.23.3 Member Function Documentation

30.23.3.1 [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.

30.23.3.2 [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.

30.23.3.3 [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.

30.23.3.4 [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.

30.23.3.5 [void Fl_File_Browser::iconsize \(uchar s\) \[inline\]](#)

Sets or gets the size of the icons.

The default size is 20 pixels.

30.23.3.6 uchar Fl_File_Browser::iconsize () const [inline]

Sets or gets the size of the icons.

The default size is 20 pixels.

30.23.3.7 int Fl_File_Browser::load (const char * *directory*, Fl_File_Sort_F * *sort* = fl_numericsort)

Loads the specified directory into the browser.

If icons have been loaded then the correct icon is associated with each file in the list.

The sort argument specifies a sort function to be used with fl_filename_list().

The documentation for this class was generated from the following files:

- Fl_File_Browser.H
- Fl_File_Browser.cxx

30.24 Fl_File_Chooser Class Reference

The [Fl_File_Chooser](#) widget displays a standard file selection dialog that supports various selection modes.

Public Types

- enum { **SINGLE** = 0, **MULTI** = 1, **CREATE** = 2, **DIRECTORY** = 4 }

Public Member Functions

- [**Fl_File_Chooser**](#) (const char *d, const char *p, int t, const char *title)
The constructor creates the [Fl_File_Chooser](#) dialog shown.
- [**~Fl_File_Chooser**](#) ()
Destroys the widget and frees all memory used by it.
- void [**callback**](#) (void(*cb)([Fl_File_Chooser](#) *, void *), void *d=0)
Sets the file chooser callback cb and associated data d.
- void [**color**](#) ([Fl_Color](#) c)
Sets or gets the background color of the [Fl_File_Browser](#) list.
- [**Fl_Color color**](#) ()
Sets or gets the background color of the [Fl_File_Browser](#) list.
- int [**count**](#) ()
Returns the number of selected files.
- void [**directory**](#) (const char *d)
Sets or gets the current directory.
- char * [**directory**](#) ()
Sets or gets the current directory.
- void [**filter**](#) (const char *p)
Sets or gets the current filename filter patterns.
- const char * [**filter**](#) ()
*See void [filter\(const char *pattern\)](#).*
- int [**filter_value**](#) ()
Sets or gets the current filename filter selection.
- void [**filter_value**](#) (int f)
Sets or gets the current filename filter selection.
- void [**hide**](#) ()
Hides the [Fl_File_Chooser](#) window.

- **void iconszie (uchar s)**
Sets or gets the size of the icons in the Fl_File_Browser.
- **uchar iconszie ()**
Sets or gets the size of the icons in the Fl_File_Browser.
- **void label (const char *l)**
Sets or gets the title bar text for the Fl_File_Chooser.
- **const char * label ()**
Sets or gets the title bar text for the Fl_File_Chooser.
- **void ok_label (const char *l)**
Sets or gets the label for the "ok" button in the Fl_File_Chooser.
- **const char * ok_label ()**
Sets or gets the label for the "ok" button in the Fl_File_Chooser.
- **void preview (int e)**
Enable or disable the preview tile.
- **int preview () const**
Returns the current state of the preview box.
- **void rescan ()**
Reloads the current directory in the Fl_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 show ()**
Shows the Fl_File_Chooser window.
- **int shown ()**
Returns non-zero if the file chooser main window `show()` has been called (but not `hide()`) see Fl_Window::shown().
- **void textcolor (Fl_Color c)**
Sets or gets the current Fl_File_Browser text color.
- **Fl_Color textcolor ()**
Sets or gets the current Fl_File_Browser text color.
- **void textfont (Fl_Font f)**
Sets or gets the current Fl_File_Browser text font.
- **Fl_Font textfont ()**
Sets or gets the current Fl_File_Browser text font.
- **void textsize (Fl_Fontsize s)**

Sets or gets the current [Fl_File_Browser](#) text size.

- [Fl_Fontsize](#) `textsize ()`

Sets or gets the current [Fl_File_Browser](#) text size.

- `void type (int t)`

Sets or gets the current type of [Fl_File_Chooser](#).

- `int type ()`

Sets or gets the current type of [Fl_File_Chooser](#).

- `void * user_data () const`

Gets the file chooser user data d.

- `void user_data (void *d)`

Sets the file chooser user data d.

- `const char * value (int f=1)`

*See `const char *value(const char *pathname)`.*

- `void value (const char *filename)`

Sets or gets the current value of the selected file.

- `int visible ()`

Returns 1 if the [Fl_File_Chooser](#) window is visible.

- [Fl_Widget](#) * `add_extra (Fl_Widget *gr)`

Adds extra widget at the bottom of [Fl_File_Chooser](#) window.

Public Attributes

- [Fl_Button](#) * `newButton`

The "new directory" button is exported so that application developers can control the appearance and use.

- [Fl_Check_Button](#) * `previewButton`

The "preview" button is exported so that application developers can control the appearance and use.

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** = "File Systems"
[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 Fl_File_Sort_F * **sort** = fl_numericsort
the sort function that is used when loading the contents of a directory.

Related Functions

(Note that these are not member functions.)

- void **fl_file_chooser_callback** (void(*cb)(const char *))
- void **fl_file_chooser_ok_label** (const char *l)
- char * **fl_file_chooser** (const char *message, const char *pat, const char *fname, int relative)
- char * **fl_dir_chooser** (const char *message, const char *fname, int relative)

30.24.1 Detailed Description

The [Fl_File_Chooser](#) widget displays a standard file selection dialog that supports various selection modes.

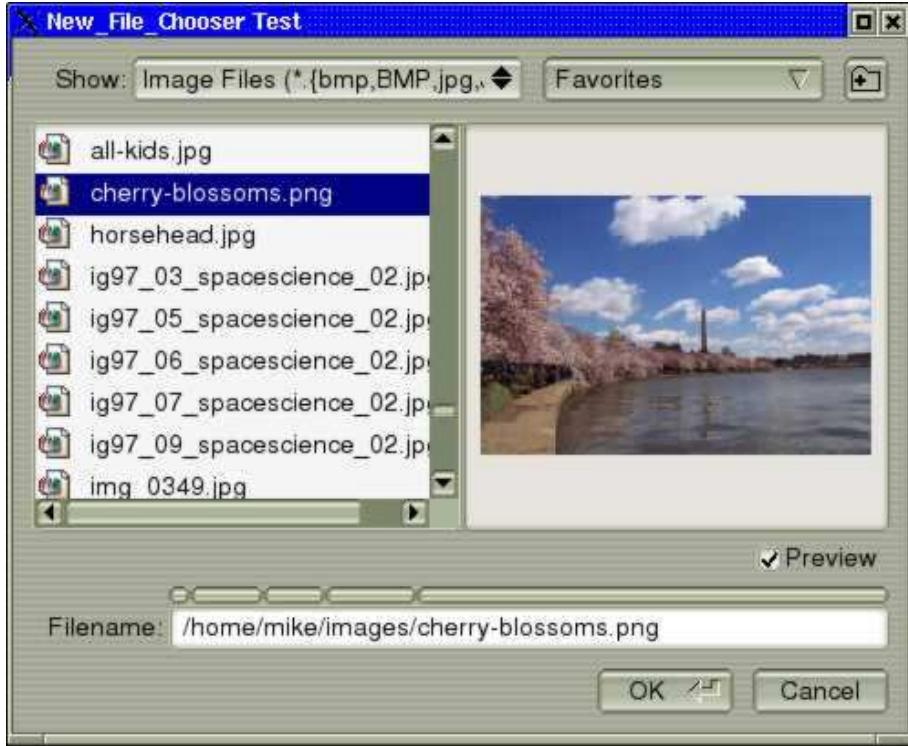


Figure 30.12: Fl_File_Chooser

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
addFavorites_label	"Add to Favorites"
allFiles_label	"All Files (*)"
customFilter_label	"Custom Filter"
existingFile_label	"Please choose an existing file!"
favorites_label	"Favorites"
filename_label	"Filename:"
filesystems_label	"My Computer" (WIN32) "File Systems" (all others)
manageFavorites_label	"Manage Favorites"
newDirectory_label	"New Directory?"
newDirectory_tooltip	"Create a new directory."
preview_label	"Preview"
save_label	"Save"
show_label	"Show:"
sort	fl_numericsort

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. For more complex customization, consider copying the FLTK file chooser code and changing it accordingly.

30.24.2 Constructor & Destructor Documentation

30.24.2.1 `Fl_File_Chooser::Fl_File_Chooser (const char * pathname, const char * pattern, int type, 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 argument can be one of the following:

- SINGLE - allows the user to select a single, existing file.
- MULTI - allows the user to select one or more existing files.
- CREATE - allows the user to select a single, existing file or specify a new filename.
- DIRECTORY - allows the user to select a single, existing directory.

The title argument is used to set the title bar text for the `Fl_File_Chooser` window.

30.24.2.2 `Fl_File_Chooser::~Fl_File_Chooser ()`

Destroys the widget and frees all memory used by it.

30.24.3 Member Function Documentation

30.24.3.1 `Fl_Widget * Fl_File_Chooser::add_extra (Fl_Widget * gr)`

Adds extra widget at the bottom of `Fl_File_Chooser` window.

Returns pointer for previous extra widget or NULL if not set previously. If argument is NULL only remove previous extra widget.

Note:

`Fl_File_Chooser` does **not** delete extra widget in destructor! To prevent memory leakage, don't forget to delete unused extra widgets

30.24.3.2 Fl_Color Fl_File_Chooser::color ()

Sets or gets the background color of the [Fl_File_Browser](#) list.

30.24.3.3 void Fl_File_Chooser::color (Fl_Color *c*)

Sets or gets the background color of the [Fl_File_Browser](#) list.

30.24.3.4 int Fl_File_Chooser::count ()

Returns the number of selected files.

30.24.3.5 const char * Fl_File_Chooser::directory ()

Sets or gets the current directory.

30.24.3.6 void Fl_File_Chooser::directory (const char * *pathname*)

Sets or gets the current directory.

30.24.3.7 void Fl_File_Chooser::filter (const char * *pattern*)

Sets or gets 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.

30.24.3.8 void Fl_File_Chooser::filter_value (int *f*)

Sets or gets the current filename filter selection.

30.24.3.9 int Fl_File_Chooser::filter_value ()

Sets or gets the current filename filter selection.

30.24.3.10 void Fl_File_Chooser::hide ()

Hides the [Fl_File_Chooser](#) window.

30.24.3.11 uchar Fl_File_Chooser::iconsize ()

Sets or gets the size of the icons in the [Fl_File_Browser](#).

By default the icon size is set to 1.5 times the [textsize\(\)](#).

30.24.3.12 void Fl_File_Chooser::iconsize (uchar s)

Sets or gets the size of the icons in the [Fl_File_Browser](#).

By default the icon size is set to 1.5 times the [textsize\(\)](#).

30.24.3.13 const char * Fl_File_Chooser::label ()

Sets or gets the title bar text for the [Fl_File_Chooser](#).

30.24.3.14 void Fl_File_Chooser::label (const char * l)

Sets or gets the title bar text for the [Fl_File_Chooser](#).

30.24.3.15 int Fl_File_Chooser::preview () const [inline]

Returns the current state of the preview box.

30.24.3.16 void Fl_File_Chooser::preview (int e)

Enable or disable the preview tile.

1 = enable preview, 0 = disable preview.

30.24.3.17 void Fl_File_Chooser::rescan ()

Reloads the current directory in the [Fl_File_Browser](#).

30.24.3.18 void Fl_File_Chooser::show ()

Shows the [Fl_File_Chooser](#) window.

30.24.3.19 Fl_Color Fl_File_Chooser::textcolor ()

Sets or gets the current [Fl_File_Browser](#) text color.

30.24.3.20 void Fl_File_Chooser::textcolor (Fl_Color c)

Sets or gets the current [Fl_File_Browser](#) text color.

30.24.3.21 Fl_Font Fl_File_Chooser::textfont ()

Sets or gets the current [Fl_File_Browser](#) text font.

30.24.3.22 void Fl_File_Chooser::textfont (Fl_Font f)

Sets or gets the current [Fl_File_Browser](#) text font.

30.24.3.23 Fl_Fontsize Fl_File_Chooser::textsize ()

Sets or gets the current [Fl_File_Browser](#) text size.

30.24.3.24 void Fl_File_Chooser::textsize (Fl_Fontsize s)

Sets or gets the current [Fl_File_Browser](#) text size.

30.24.3.25 int Fl_File_Chooser::type ()

Sets or gets the current type of [Fl_File_Chooser](#).

30.24.3.26 void Fl_File_Chooser::type (int t)

Sets or gets the current type of [Fl_File_Chooser](#).

30.24.3.27 void Fl_File_Chooser::value (const char * pathname)

Sets or gets the current value of the selected file.

In the second form, *file* 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);
    ...
}
```

30.24.3.28 int Fl_File_Chooser::visible ()

Returns 1 if the [Fl_File_Chooser](#) window is visible.

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](#)

30.25 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

- `Fl_File_Icon (const char *p, int t, int nd=0, short *d=0)`
Creates a new `Fl_File_Icon` with the specified information.
- `~Fl_File_Icon ()`
The destructor destroys the icon and frees all memory that has been allocated for it.
- `short * add (short d)`
Adds a keyword value to the icon array, returning a pointer to it.
- `short * add_color (Fl_Color c)`
Adds a color 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.
- `short * add_vertex (float x, float 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, Fl_Color ic, int active=1)`
Draws an icon in the indicated area.
- `void label (Fl_Widget *w)`
Applies the icon to the widget, registering the `Fl_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.

- **Fl_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.

Static Public Member Functions

- static void **labeltype** (const **Fl_Label** **o*, int *x*, int *y*, int *w*, int *h*, **Fl_Align** *a*)

Draw the icon label.

- static **Fl_File_Icon * find** (const char *filename, int filetype=ANY)

Finds an icon that matches the given filename and file type.

- static **Fl_File_Icon * first** ()

Returns a pointer to the first icon in the list.

- static void **load_system_icons** (void)

Loads all system-defined icons.

30.25.1 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.

30.25.2 Constructor & Destructor Documentation

30.25.2.1 **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:

← *p* filename pattern

← *t* file type
← *nd* number of data values
← *d* data values

30.25.3 Member Function Documentation

30.25.3.1 short * Fl_File_Icon::add (short *d*)

Adds a keyword value to the icon array, returning a pointer to it.

Parameters:

← *d* data value

30.25.3.2 short* Fl_File_Icon::add_color (Fl_Color *c*) [inline]

Adds a color value to the icon array, returning a pointer to it.

Parameters:

← *c* color value

30.25.3.3 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-lefthand corner of the icon.

Parameters:

← *x,y* vertex coordinates

30.25.3.4 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-lefthand corner of the icon.

Parameters:

← *x,y* vertex coordinates

30.25.3.5 void Fl_File_Icon::clear () [inline]

Clears all icon data from the icon.

30.25.3.6 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:

- ← *x,y,w,h* position and size
- ← *ic* icon color
- ← *active* status, default is active [non-zero]

30.25.3.7 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:

- ← *filename* name of file
- ← *filetype* enumerated file type

Returns:

matching file icon or NULL

30.25.3.8 static Fl_File_Icon* Fl_File_Icon::first () [inline, static]

Returns a pointer to the first icon in the list.

30.25.3.9 void Fl_File_Icon::label (Fl_Widget **w*)

Applies the icon to the widget, registering the [Fl_File_Icon](#) label type as needed.

Parameters:

- ← *w* widget for which this icon will become the label

30.25.3.10 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:

- ← *o* label data
- ← *x,y,w,h* position and size of label
- ← *a* label alignment [not used]

30.25.3.11 void Fl_File_Icon::load (const char **f*)

Loads the specified icon image.

The format is deduced from the filename.

Parameters:

← *f* filename

30.25.3.12 int Fl_File_Icon::load_fti (const char **fti*)

Loads an SGI icon file.

Parameters:

← *fti* icon filename

Returns:

0 on success, non-zero on error

30.25.3.13 int Fl_File_Icon::load_image (const char **ifile*)

Load an image icon file from an image filename.

Parameters:

← *ifile* image filename

Returns:

0 on success, non-zero on error

30.25.3.14 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();
```

30.25.3.15 Fl_File_Icon* Fl_File_Icon::next () [inline]

Returns next file icon object.

See [Fl_File_Icon::first\(\)](#)

30.25.3.16 const char* Fl_File_Icon::pattern () [inline]

Returns the filename matching pattern for the icon.

30.25.3.17 int Fl_File_Icon::size () [inline]

Returns the number of words of data used by the icon.

30.25.3.18 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.

30.25.3.19 short* Fl_File_Icon::value () [inline]

Returns the data array for the icon.

The documentation for this class was generated from the following files:

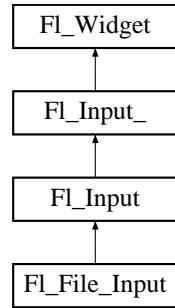
- Fl_File_Icon.H
- Fl_File_Icon.cxx
- Fl_File_Icon2.cxx

30.26 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

- **[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.
- virtual int **[handle](#)** (int event)
Handle events in the widget.
- virtual void **[draw](#)** ()
Draws the file input widget.
- **[Fl_Boxtype down_box](#)** () const
Gets the box type used for the navigation bar.
- void **[down_box](#)** ([Fl_Boxtype](#) b)
Sets the box type to use for the navigation bar.
- **[Fl_Color errorcolor](#)** () const
Gets the current error color.
- void **[errorcolor](#)** ([Fl_Color](#) c)
Sets the current error color to c.
- 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.
- 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.

30.26.1 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 that the current one.

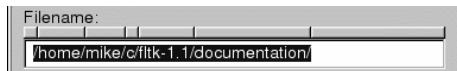


Figure 30.13: Fl_File_Input

Note:

As all [Fl_Input](#) derived objects, [Fl_File_Input](#) may call its callback when loosing 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.

30.26.2 Constructor & Destructor Documentation

30.26.2.1 [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 boxtyle is [FL_DOWN_BOX](#).

Parameters:

- ← *X,Y,W,H* position and size of the widget
- ← *L* widget label, default is no label

30.26.3 Member Function Documentation

30.26.3.1 [void Fl_File_Input::down_box \(Fl_Boxtype b\) \[inline\]](#)

Sets the box type to use for the navigation bar.

30.26.3.2 [Fl_Boxtype Fl_File_Input::down_box \(\) const \[inline\]](#)

Gets the box type used for the navigation bar.

30.26.3.3 [Fl_Color Fl_File_Input::errorcolor \(\) const \[inline\]](#)

Gets the current error color.

Todo

Better docs for [Fl_File_Input::errorcolor\(\)](#) - is it even used?

30.26.3.4 int Fl_File_Input::handle (int *event*) [virtual]

Handle events in the widget.

Return non zero if event is handled.

Parameters:

← *event*

Reimplemented from [Fl_Input](#).

30.26.3.5 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:

← *str* new string value

← *len* length of value

Reimplemented from [Fl_Input_](#).

30.26.3.6 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:

← *str* new string value

Reimplemented from [Fl_Input_](#).

The documentation for this class was generated from the following files:

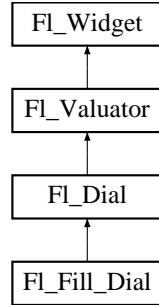
- [Fl_File_Input.H](#)
- [Fl_File_Input.cxx](#)

30.27 Fl_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 \(int x, int y, int w, int h, const char *l=0\)](#)
Creates a filled dial, also setting its type to FL_FILL_DIAL.

30.27.1 Detailed Description

Draws a dial with a filled arc.

30.27.2 Constructor & Destructor Documentation

30.27.2.1 [Fl_Fill_Dial::Fl_Fill_Dial \(int x, int y, int w, int h, const char * l = 0\)](#) [inline]

Creates a filled dial, also setting its type to FL_FILL_DIAL.

The documentation for this class was generated from the following file:

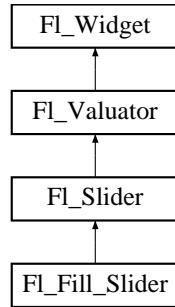
- [Fl_Fill_Dial.H](#)

30.28 Fl_Fill_Slider Class Reference

Widget that draws a filled horizontal slider, useful as a progress or value meter.

```
#include <Fl_Fill_Slider.H>
```

Inheritance diagram for Fl_Fill_Slider::



Public Member Functions

- [Fl_Fill_Slider](#) (int x, int y, int w, int h, const char *l=0)
Creates the slider from its position, size and optional title.

30.28.1 Detailed Description

Widget that draws a filled horizontal slider, useful as a progress or value meter.

30.28.2 Constructor & Destructor Documentation

30.28.2.1 [Fl_Fill_Slider::Fl_Fill_Slider \(int x, int y, int w, int h, const char * l = 0\)](#) [inline]

Creates the slider from its position, size and optional title.

The documentation for this class was generated from the following file:

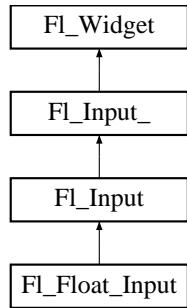
- Fl_Fill_Slider.H

30.29 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.

30.29.1 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).

30.29.2 Constructor & Destructor Documentation

30.29.2.1 [Fl_Float_Input::Fl_Float_Input](#) (int X, int Y, int W, int H, const char * l = 0) [inline]

Creates a new [Fl_Float_Input](#) widget using the given position, size, and label string.

The default boxtyle 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 file:

- [Fl_Float_Input.H](#)

30.30 Fl_Font_Descriptor Class Reference

This a structure for an actual system font, with junk to help choose it and info on character sizes.

```
#include <Fl_Font.H>
```

Public Attributes

- `Fl_Font_Descriptor * next`
linked list for this Fl_Fontdesc

30.30.1 Detailed Description

This a structure for an actual system font, with junk to help choose it and info on character sizes.

Each Fl_Fontdesc has a linked list of these. These are created the first time each system font/size combination is used.

The documentation for this class was generated from the following file:

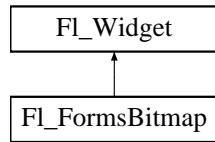
- `Fl_Font.H`

30.31 Fl_FormsBitmap Class Reference

Forms compatibility Bitmap Image Widget.

```
#include <Fl_FormsBitmap.H>
```

Inheritance diagram for Fl_FormsBitmap::



Public Member Functions

- **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.
- void **bitmap (Fl_Bitmap *B)**
Sets a new bitmap.
- **Fl_Bitmap * bitmap () const**
Gets a the current associated [Fl_Bitmap](#) objects.

Protected Member Functions

- void **draw ()**
Draws the bitmap and its associated box.

30.31.1 Detailed Description

Forms compatibility Bitmap Image Widget.

30.31.2 Member Function Documentation

30.31.2.1 **Fl_Bitmap* Fl_FormsBitmap::bitmap () const [inline]**

Gets a the current associated [Fl_Bitmap](#) objects.

30.31.2.2 **void Fl_FormsBitmap::bitmap (Fl_Bitmap * B) [inline]**

Sets a new bitmap.

30.31.2.3 void Fl_FormsBitmap::draw (void) [protected, virtual]

Draws the bitmap and its associated box.

Implements [Fl_Widget](#).

30.31.2.4 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:

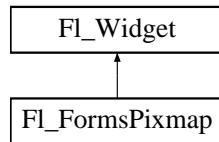
- [Fl_FormsBitmap.H](#)
- [forms_bitmap.cxx](#)

30.32 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](#) widet using the given box type, position, size and label string.
- void **set (char *const *bits)**
Set/create the internal pixmap using raw data.
- void **Pixmap (Fl_Pixmap *B)**
Set the internal pixmap pointer to an existing pixmap.
- **Fl_Pixmap * Pixmap () const**
Get the internal pixmap pointer.

Protected Member Functions

- void **draw ()**
Draw the widget.

30.32.1 Detailed Description

Forms pixmap drawing routines.

30.32.2 Constructor & Destructor Documentation

30.32.2.1 **Fl_FormsPixmap::Fl_FormsPixmap (Fl_Boxtype t, int X, int Y, int W, int H, const char * L = 0)**

Creates a new [Fl_FormsPixmap](#) widet using the given box type, position, size and label string.

Parameters:

← *t* box type

← *X,Y,W,H* position and size
← *L* widget label, default is no label

30.32.3 Member Function Documentation

30.32.3.1 void Fl_FormsPixmap::draw () [protected, virtual]

Draw 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.

Implements [Fl_Widget](#).

30.32.3.2 Fl_Pixmap* Fl_FormsPixmap::Pixmap () const [inline]

Get the internal pixmap pointer.

30.32.3.3 void Fl_FormsPixmap::Pixmap (Fl_Pixmap * *B*) [inline]

Set the internal pixmap pointer to an existing pixmap.

Parameters:

← *B* existing pixmap

30.32.3.4 void Fl_FormsPixmap::set (char *const * *bits*)

Set/create the internal pixmap using raw data.

Parameters:

← *bits* raw data

The documentation for this class was generated from the following files:

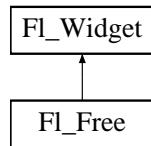
- Fl_FormsPixmap.H
- forms_pixmap.cxx

30.33 Fl_Free Class Reference

Emulation of the Forms "free" widget.

```
#include <Fl_Free.H>
```

Inheritance diagram for Fl_Free::



Public Member Functions

- int [handle \(int e\)](#)
Handles the specified event.
- [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.
- [~Fl_Free \(\)](#)
The destructor will call the handle function with the event [FL_FREE_MEM](#).

Protected Member Functions

- void [draw \(\)](#)
Draw the widget.

30.33.1 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](#).

30.33.2 Constructor & Destructor Documentation

30.33.2.1 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:

- ← *t* type
- ← *X,Y,W,H* position and size
- ← *L* widget label
- ← *hdl* 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 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
```

30.33.3 Member Function Documentation

30.33.3.1 void Fl_Free::draw () [protected, virtual]

Draw 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.

Implements [Fl_Widget](#).

30.33.3.2 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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:

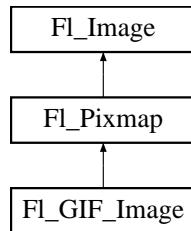
- [Fl_Free.H](#)
- [forms_free.cxx](#)

30.34 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::



Public Member Functions

- [Fl_GIF_Image](#) (const char *filename)
The constructor loads the named GIF image.

30.34.1 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.

30.34.2 Constructor & Destructor Documentation

30.34.2.1 [Fl_GIF_Image::Fl_GIF_Image](#) (const char * *infilename*)

The constructor loads the named GIF image.

The inherited destructor free all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

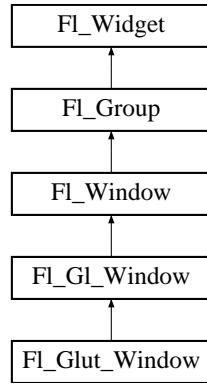
- [Fl_GIF_Image.H](#)
- [Fl_GIF_Image.cxx](#)

30.35 Fl_Gl_Window Class Reference

The [Fl_Gl_Window](#) widget sets things up so OpenGL works, and also keeps an OpenGL "context" for that window, so that changes to the lighting and projection may be reused between redraws.

```
#include <Fl_Gl_Window.h>
```

Inheritance diagram for Fl_Gl_Window::



Public Member Functions

- void [show \(\)](#)
Put the window on the screen.
- void [show \(int a, char **b\)](#)
See virtual void [Fl_Window::show\(\)](#).
- void [flush \(\)](#)
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- void [hide \(\)](#)
Hides the window and destroys the OpenGL context.
- void [resize \(int, int, int, int\)](#)
Changes the size and position of the window.
- 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](#).
- void [invalidate \(\)](#)
The [invalidate\(\)](#) method turns off [valid\(\)](#) and is equivalent to calling [value\(0\)](#).
- 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.

- int **can_do** ()

Returns non-zero if the hardware supports the given or current OpenGL mode.

- Fl_Mode **mode** () const

Set or change the OpenGL capabilites of the window.

- int **mode** (int a)

See Fl_Mode mode() const.

- int **mode** (const int *a)

See Fl_Mode mode() const.

- void * **context** () const

void See void context(void v, int destroy_flag)*

- void **context** (void *, int destroy_flag=0)

Returns or sets a pointer to the GLContext that this window is using.

- void **make_current** ()

The make_current() method selects the OpenGL context for the widget.

- void **swap_buffers** ()

The swap_buffers() method swaps the back and front buffers.

- void **ortho** ()

Set the projection so 0,0 is in the lower left of the window and each pixel is 1 unit wide/tall.

- int **can_do_overlay** ()

Returns true if the hardware overlay is possible.

- void **redraw_overlay** ()

This method causes draw_overlay to be called at a later time.

- void **hide_overlay** ()

Hides the window if it is not this window, does nothing in WIN32.

- void **make_overlay_current** ()

The make_overlay_current() method selects the OpenGL context for the widget's overlay.

- ~**Fl_Gl_Window** ()

The destructor removes the widget and destroys the OpenGL context associated with it.

- **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.

- virtual void [draw\(\)](#)

You must subclass [Fl_Gl_Window](#) and provide an implementation for [draw\(\)](#).

Static Public Member Functions

- static int [can_do](#) (int m)

Returns non-zero if the hardware supports the given or current OpenGL mode.

- static int [can_do](#) (const int *m)

Returns non-zero if the hardware supports the given or current OpenGL mode.

Friends

- class [_Fl_Gl_Overlay](#)

30.35.1 Detailed Description

The [Fl_Gl_Window](#) widget sets things up so OpenGL works, and also keeps an OpenGL "context" for that window, so that changes to the lighting and projection may be reused between redraws.

[Fl_Gl_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 [Fl_Gl_Window](#). All drawing should be done using OpenGL calls exclusively. Even though [Fl_Gl_Window](#) is derived from [Fl_Group](#), it is not useful to add other FLTK Widgets as children, unless those Widgets are modified to draw using OpenGL calls.

30.35.2 Constructor & Destructor Documentation

30.35.2.1 [Fl_Gl_Window::Fl_Gl_Window](#) (int W, int H, const char * l = 0) [inline]

Creates a new [Fl_Gl_Window](#) widget using the given size, and label string.

The default boxtyle is [FL_NO_BOX](#). The default mode is [FL_RGB|FL_DOUBLE|FL_DEPTH](#).

30.35.2.2 [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 boxtyle is [FL_NO_BOX](#). The default mode is [FL_RGB|FL_DOUBLE|FL_DEPTH](#).

30.35.3 Member Function Documentation

30.35.3.1 int Fl_Gl_Window::can_do () [inline]

Returns non-zero if the hardware supports the given or current OpenGL mode.

30.35.3.2 static int Fl_Gl_Window::can_do (const int * m) [inline, static]

Returns non-zero if the hardware supports the given or current OpenGL mode.

30.35.3.3 static int Fl_Gl_Window::can_do (int m) [inline, static]

Returns non-zero if the hardware supports the given or current OpenGL mode.

30.35.3.4 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.

30.35.3.5 void Fl_Gl_Window::context (void * v, int destroy_flag = 0)

Returns or 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.

30.35.3.6 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.

30.35.3.7 void Fl_Gl_Window::draw (void) [virtual]

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.

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Glut_Window](#).

30.35.3.8 void Fl_Gl_Window::flush () [virtual]

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

Reimplemented from [Fl_Window](#).

30.35.3.9 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.

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Glut_Window](#).

30.35.3.10 void Fl_Gl_Window::make_overlay_current ()

The [make_overlay_current\(\)](#) method selects the OpenGL context for the widget's overlay.

It 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.

30.35.3.11 Fl_Mode Fl_Gl_Window::mode () const [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_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!

30.35.3.12 void Fl_Gl_Window::ortho ()

Set 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.

30.35.3.13 void Fl_Gl_Window::redraw_overlay ()

This method 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.

30.35.3.14 void Fl_Gl_Window::resize (int, int, int, int) [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_Window`.

30.35.3.15 void Fl_Gl_Window::show () [virtual]

Put the window on the screen.

Usually this has the side effect of opening the display. The second form is used for top-level windows and allow standard arguments to be parsed from the command-line.

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.

Reimplemented from `Fl_Window`.

30.35.3.16 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.

30.35.3.17 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,w(),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

30.36 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](#)

30.36.1 Detailed Description

fltk glut font/size attributes used in the glutXXX functions

The documentation for this struct was generated from the following file:

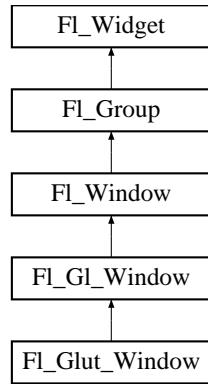
- [glut.H](#)

30.37 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

- void [make_current \(\)](#)
The [make_current\(\)](#) method selects the OpenGL context for the widget.
- [Fl_Glut_Window \(int w, int h, const char *\)](#)
Creates a glut windows, registers to the glut windows list.
- [Fl_Glut_Window \(int x, int y, int w, int h, const char *\)](#)
Creates a glut windows, registers to the glut windows list.
- [~Fl_Glut_Window \(\)](#)
Destroys the glut window, first unregister it from the glut windows list.

Public Attributes

- int **number**
- int **menu** [3]
- void(* **display**)()
- void(* **overlaydisplay**)()
- void(* **reshape**)(int w, int h)
- void(* **keyboard**)(uchar, int x, int y)
- void(* **mouse**)(int b, int state, int x, int y)
- void(* **motion**)(int x, int y)
- void(* **passivemotion**)(int x, int y)
- void(* **entry**)(int)
- void(* **visibility**)(int)
- void(* **special**)(int, int x, int y)

Protected Member Functions

- void `draw ()`

You must subclass `Fl_Gl_Window` and provide an implementation for `draw()`.

- void `draw_overlay ()`

You must implement this virtual function if you want to draw into the overlay.

- int `handle (int)`

Handles the specified event.

30.37.1 Detailed Description

GLUT is emulated using this window class and these static variables (plus several more static variables hidden in `glut_compatibility.cxx`):

30.37.2 Constructor & Destructor Documentation

30.37.2.1 `Fl_Glut_Window::Fl_Glut_Window (int W, int H, const char * t)`

Creates a glut windows, registers to the glut windows list.

30.37.2.2 `Fl_Glut_Window::Fl_Glut_Window (int X, int Y, int W, int H, const char * t)`

Creates a glut windows, registers to the glut windows list.

30.37.3 Member Function Documentation

30.37.3.1 `void Fl_Glut_Window::draw (void) [protected, virtual]`

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.

Reimplemented from `Fl_Gl_Window`.

30.37.3.2 `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](#).

30.37.3.3 int Fl_Glut_Window::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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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_Window](#).

30.37.3.4 void Fl_Glut_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 feed-back and/or selection within the [handle\(\)](#) method.

Reimplemented from [Fl_Gl_Window](#).

The documentation for this class was generated from the following files:

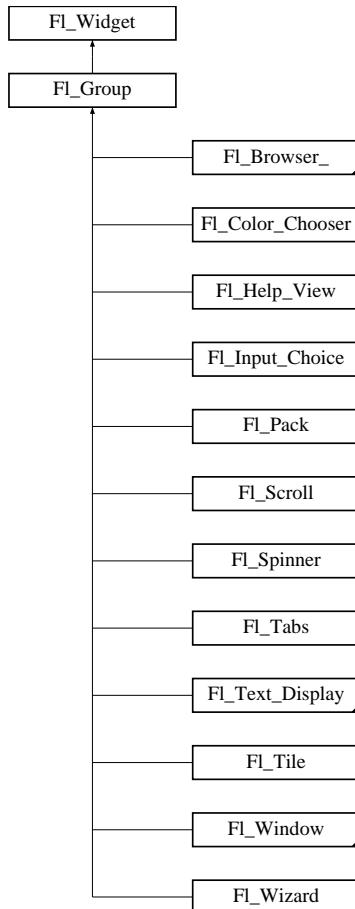
- glut.H
- glut_compatibility.cxx

30.38 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

- int [handle](#) (int)

Handles the specified event.

- void [begin](#) ()

Sets the current group so you can build the widget tree by just constructing the widgets.

- void [end](#) ()

Exactly the same as `current(this->parent())`.

- int [children](#) () const

Returns how many child widgets the group has.

- **Fl_Widget * child** (int n) const
Returns array()[n].
- int **find** (const Fl_Widget *) const
Searches the child array for the widget and returns the index.
- int **find** (const Fl_Widget &o) const
*See int Fl_Group::find(const Fl_Widget *w) const.*
- Fl_Widget *const * **array** () const
Returns a pointer to the array of children.
- void **resize** (int, int, int, int)
This resizes the Fl_Group widget and all of its children.
- Fl_Group (int, int, int, int, const char *==0)
Creates a new Fl_Group widget using the given position, size, and label string.
- virtual ~**Fl_Group** ()
The destructor also deletes all the children.
- void **add** (Fl_Widget &)
The widget is removed from it's 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 **insert** (Fl_Widget &, int i)
The widget is removed from it's current group (if any) and then inserted into this group.
- void **insert** (Fl_Widget &o, Fl_Widget *before)
This does insert(w, find(beforethis)).
- 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 **clear** ()
The clear() method deletes all child widgets from memory recursively.
- void **resizable** (Fl_Widget &o)
*See void Fl_Group::resizable(Fl_Widget *box).*
- void **resizable** (Fl_Widget *o)
The resizable widget defines the resizing box for the group.
- Fl_Widget * **resizable** () const
*See void Fl_Group::resizable(Fl_Widget *box).*

- void [add_resizable \(Fl_Widget &o\)](#)
Adds a widget to the group and makes it the resizable widget.
- void [init_sizes \(\)](#)
This resets the internal array of widget sizes and positions.
- void [focus \(Fl_Widget *W\)](#)
- [Fl_Widget *& _ddfdesign_kludge \(\)](#)
This is for forms compatibility only.
- void [forms_end \(\)](#)
This is for forms compatibility only.

Static Public Member Functions

- static [Fl_Group * current \(\)](#)
Returns the currently active group.
- static void [current \(Fl_Group *g\)](#)
*See static [Fl_Group *Fl_Group::current\(\)](#).*

Protected Types

- enum { **CLIP_CHILDREN** = 2048 }

Protected Member Functions

- void [clip_children \(int c\)](#)
The first method controls whether the group widget clips the drawing of child widgets to its bounding box.
- int [clip_children \(\)](#)
See void [Fl_Group::clip_children\(int c\)](#).
- void [draw \(\)](#)
Draw the widget.
- void [draw_child \(Fl_Widget &\) const](#)
Forces a child to redraw.
- void [draw_children \(\)](#)
This draws all children of the group.
- void [draw_outside_label \(const Fl_Widget &\) const](#)
Parents normally call this to draw outside labels of child widgets.
- void [update_child \(Fl_Widget &\) const](#)

Draws a child only if it needs it.

- `int * sizes ()`

This returns the internal array of widget sizes and positions.

30.38.1 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.

30.38.2 Constructor & Destructor Documentation

30.38.2.1 `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 boxtyle is `FL_NO_BOX`.

30.38.2.2 `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. A kludge has been done so the `Fl_Group` and all of its children can be automatic (local) variables, but you must declare the `Fl_Group` first, so that it is destroyed last.

30.38.3 Member Function Documentation

30.38.3.1 `Fl_Widget *const * Fl_Group::array () const`

Returns a pointer to the array of children.

This pointer is only valid until the next time a child is added or removed.

30.38.3.2 `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!

30.38.3.3 `Fl_Widget* Fl_Group::child (int n) const [inline]`

Returns `array()[n]`.

No range checking is done!

30.38.3.4 void Fl_Group::clear ()

The [clear\(\)](#) method 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.

Reimplemented in [Fl_Browser](#), [Fl_Check_Browser](#), [Fl_Input_Choice](#), and [Fl_Scroll](#).

30.38.3.5 void Fl_Group::clip_children (int c) [inline, protected]

The first method controls whether the group widget clips the drawing of child widgets to its bounding box.

The second method returns the current clipping mode.

The default is to not clip (0) the drawing of child widgets.

30.38.3.6 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\(0\)](#).

Reimplemented in [Fl_Window](#).

30.38.3.7 void Fl_Group::draw () [protected, virtual]

Draw 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.

Implements [Fl_Widget](#).

Reimplemented in [Fl_Browser](#), [Fl_Cairo_Window](#), [Fl_Gl_Window](#), [Fl_Pack](#), [Fl_Scroll](#), [Fl_Tabs](#), [Fl_Text_Display](#), [Fl_Window](#), and [Fl_Glut_Window](#).

30.38.3.8 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.

30.38.3.9 void Fl_Group::draw_children () [protected]

This 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.

30.38.3.10 void Fl_Group::draw_outside_label (const Fl_Widget & *widget*) const [protected]

Parents normally call this to draw outside labels of child widgets.

30.38.3.11 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.

30.38.3.12 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.

30.38.3.13 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\(\);](#)

30.38.3.14 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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_Browser_](#), [Fl_Check_Browser](#), [Fl_Scroll](#), [Fl_Spinner](#), [Fl_Tabs](#), [Fl_Text_Display](#), [Fl_Text_Editor](#), [Fl_Tile](#), [Fl_Window](#), and [Fl_Glut_Window](#).

30.38.3.15 void Fl_Group::init_sizes ()

This 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.

See also:

[sizes\(\)](#)

30.38.3.16 void Fl_Group::insert (Fl_Widget & o, Fl_Widget * before) [inline]

This does insert(w, find(beforethis)).

This will append the widget if beforethis is not in the group.

30.38.3.17 void Fl_Group::insert (Fl_Widget & o, int index)

The widget is removed from it's 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.

30.38.3.18 void Fl_Group::remove (Fl_Widget * o) [inline]

Removes the widget o from the group.

See also:

[void remove\(Fl_Widget&\)](#)

30.38.3.19 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.

30.38.3.20 void Fl_Group::resizable (Fl_Widget * o) [inline]

The resizable widget defines the resizing box for the group.

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.

In these examples the gray area is the resizable:



Figure 30.14: before resize

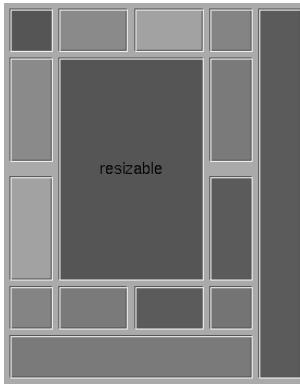


Figure 30.15: after resize

The resizable may be set to the group itself (this is the default value for an [Fl_Group](#), although NULL is the default for [Fl_Window](#) and [Fl_Pack](#)), in which case all the contents are resized. If the resizable is NULL then all widgets remain a fixed size and distance from the top-left corner.

It is possible to achieve any type of resize behavior by using an invisible [Fl_Box](#) as the resizable and/or by using a hierarchy of child [Fl_Group](#)'s.

30.38.3.21 void Fl_Group::resize (int X, int Y, int W, int H) [virtual]

This 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_Widget](#).

Reimplemented in [Fl_Browser_](#), [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Help_View](#), [Fl_Input_Choice](#), [Fl_Overlay_Window](#), [Fl_Scroll](#), [Fl_Spinner](#), [Fl_Text_Display](#), [Fl_Tile](#), and [Fl_Window](#).

30.38.3.22 int * Fl_Group::sizes () [protected]

This returns the internal array of widget sizes and positions.

If the [sizes\(\)](#) array does not exist, it will be allocated and filled with the current widget sizes and positions.

Note:

You should never need to use this method directly, unless you have special needs to rearrange the children of a [Fl_Group](#). [Fl_Tile](#) uses this to rearrange its widget positions.

Todo

should the internal representation of the [sizes\(\)](#) array be documented?

30.38.3.23 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](#)

30.39 Fl_Help_Dialog Class Reference

The [Fl_Help_Dialog](#) widget displays a standard help dialog window using the [Fl_Help_View](#) widget.

Public Member Functions

- [Fl_Help_Dialog \(\)](#)

The constructor creates the dialog pictured above.

- [~Fl_Help_Dialog \(\)](#)

The destructor destroys the widget and frees all memory that has been allocated for the current file.

- [int h \(\)](#)

Returns the position and size of the help dialog.

- [void hide \(\)](#)

Hides the [Fl_Help_Dialog](#) window.

- [void load \(const char *f\)](#)

Loads the specified HTML file into the [Fl_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 [Fl_Help_Dialog](#) window.

- [void show \(int argc, char **argv\)](#)

*Shows the main Help Dialog Window Delegates call to encapsulated window_ void [Fl_Window::show\(int argc, char **argv\)](#) instance method.*

- [void fontsize \(Fl_Fontsize s\)](#)

Sets or gets the default text size for the help view.

- [Fl_Fontsize fontsize \(\)](#)

Sets or gets the default text size for the help view.

- [void topline \(const char *n\)](#)

Sets the top line in the [Fl_Help_View](#) widget to the named or numbered line.

- [void topline \(int n\)](#)

Sets the top line in the [Fl_Help_View](#) widget to the named or numbered line.

- [void value \(const char *f\)](#)

The first form sets the current buffer to the string provided and reformats the text.

- const char * [value \(\) const](#)

The first form sets the current buffer to the string provided and reformats the text.

- int [visible \(\)](#)

Returns 1 if the [Fl_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.

30.39.1 Detailed Description

The [Fl_Help_Dialog](#) widget displays a standard help dialog window using the [Fl_Help_View](#) widget.

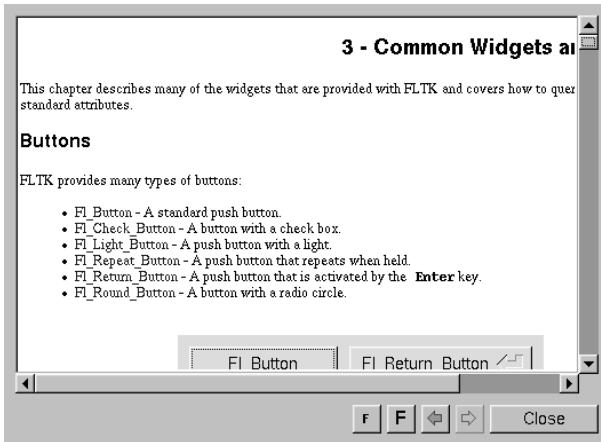


Figure 30.16: [Fl_Help_Dialog](#)

30.39.2 Constructor & Destructor Documentation

30.39.2.1 [Fl_Help_Dialog::Fl_Help_Dialog \(\)](#)

The constructor creates the dialog pictured above.

30.39.3 Member Function Documentation

30.39.3.1 [int Fl_Help_Dialog::h \(\)](#)

Returns the position and size of the help dialog.

30.39.3.2 void Fl_Help_Dialog::hide ()

Hides the [Fl_Help_Dialog](#) window.

30.39.3.3 void 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").

30.39.3.4 void Fl_Help_Dialog::position (int x, int y)

Set the screen position of the dialog.

30.39.3.5 void Fl_Help_Dialog::resize (int xx, int yy, int ww, int hh)

Change the position and size of the dialog.

30.39.3.6 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.

30.39.3.7 uchar Fl_Help_Dialog::textsize ()

Sets or gets the default text size for the help view.

30.39.3.8 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

30.39.3.9 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.

30.39.3.10 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.

30.39.3.11 int Fl_Help_Dialog::visible ()

Returns 1 if the [Fl_Help_Dialog](#) window is visible.

30.39.3.12 int Fl_Help_Dialog::w ()

Returns the position and size of the help dialog.

30.39.3.13 int Fl_Help_Dialog::x ()

Returns the position and size of the help dialog.

30.39.3.14 int Fl_Help_Dialog::y ()

Returns the position and size of the help dialog.

The documentation for this class was generated from the following files:

- Fl_Help_Dialog.H
- Fl_Help_Dialog.cxx
- Fl_Help_Dialog_Dox.cxx

30.40 Fl_Help_Link Struct Reference

Definition of a link for the html viewer.

```
#include <Fl_Help_View.H>
```

Public Attributes

- char **filename** [192]
Reference filename.
- char **name** [32]
Link target (blank if none).
- int **x**
X offset of link text.
- int **y**
Y offset of link text.
- int **w**
Width of link text.
- int **h**
Height of link text.

30.40.1 Detailed Description

Definition of a link for the html viewer.

The documentation for this struct was generated from the following file:

- Fl_Help_View.H

30.41 Fl_Help_Target Struct Reference

[Fl_Help_Target](#) structure.

```
#include <Fl_Help_View.H>
```

Public Attributes

- char [name](#) [32]

Target name.

- int [y](#)

Y offset of target.

30.41.1 Detailed Description

[Fl_Help_Target](#) structure.

The documentation for this struct was generated from the following file:

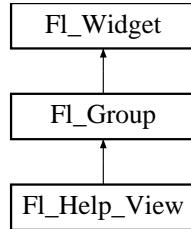
- [Fl_Help_View.H](#)

30.42 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

- [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.
- [~Fl_Help_View](#) ()
Destroy a [Fl_Help_View](#) widget.
- const char * [directory](#) () const
This method returns the current directory for the text in the buffer.
- const char * [filename](#) () const
This method returns the current filename for the text in the buffer.
- int [find](#) (const char *s, int p=0)
Find the specified string s at starting position p, return the matching pos or -1 if not found.
- 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)
Load the specified file.
- void [resize](#) (int, int, int)
Resize the help widget.
- int [size](#) () const
Gets the size of the Help view.
- void [size](#) (int W, int H)
Change the size of the widget.
- void [textcolor](#) (Fl_Color c)

Sets the default text color.

- **Fl_Color textcolor () const**

Returns the current default text color.

- **void textfont (Fl_Font f)**

Sets the default text font.

- **Fl_Font textfont () const**

Returns the current default text font.

- **void textsize (Fl_Fontsize s)**

Sets the default text size.

- **Fl_Fontsize textsize () const**

Gets the default text size.

- **const char * title ()**

Returns the current document title, or NULL if there is no title.

- **void topline (const char *n)**

Scroll the text to the indicated position, given a named destination.

- **void topline (int)**

Scroll the text to the indicated position, given a pixel line.

- **int topline () const**

Returns the current top line in pixels.

- **void leftline (int)**

Sets the left position.

- **int leftline () const**

Gets the left position.

- **void value (const char *v)**

Sets the current help text buffer to the string provided and reformats the text.

- **const char * value () const**

Returns the current buffer contents.

- **void clear_selection ()**

Removes the current text selection.

- **void select_all ()**

Selects All the text in the view.

30.42.1 Detailed Description

The [Fl_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.

30.42.2 Constructor & Destructor Documentation

30.42.2.1 [Fl_Help_View::~Fl_Help_View\(\)](#)

Destroy a [Fl_Help_View](#) widget.

The destructor destroys the widget and frees all memory that has been allocated for the current file.

30.42.3 Member Function Documentation

30.42.3.1 [void Fl_Help_View::clear_selection\(\)](#)

Removes the current text selection.

30.42.3.2 [const char* Fl_Help_View::directory\(\) const \[inline\]](#)

This method returns the current directory for the text in the buffer.

30.42.3.3 [const char* Fl_Help_View::filename\(\) const \[inline\]](#)

This method returns the current filename for the text in the buffer.

30.42.3.4 [int Fl_Help_View::leftline\(\) const \[inline\]](#)

Gets the left position.

30.42.3.5 [void Fl_Help_View::leftline\(int l\)](#)

Sets the left position.

30.42.3.6 [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.

30.42.3.7 int Fl_Help_View::load (const char **f*)

Load the specified file.

This method loads the specified file or URL.

30.42.3.8 void Fl_Help_View::resize (int *xx*, int *yy*, int *ww*, int *hh*) [virtual]

Resize the help widget.

Reimplemented from [Fl_Group](#).

30.42.3.9 void Fl_Help_View::select_all ()

Selects All the text in the view.

30.42.3.10 void Fl_Help_View::size (int *W*, int *H*) [inline]

Change the size of the widget.

size(w,h) is a shortcut for *resize(x(),y(),w,h)*.

Parameters:

← *W,H* new size

See also:

[position\(int, int\)](#), [resize\(int, int, int, int\)](#)

Reimplemented from [Fl_Widget](#).

30.42.3.11 Fl_Color Fl_Help_View::textcolor () const [inline]

Returns the current default text color.

30.42.3.12 void Fl_Help_View::textcolor (Fl_Color *c*) [inline]

Sets the default text color.

30.42.3.13 Fl_Font Fl_Help_View::textfont () const [inline]

Returns the current default text font.

30.42.3.14 void Fl_Help_View::textfont (Fl_Font *f*) [inline]

Sets the default text font.

30.42.3.15 Fl_Fontsize Fl_Help_View::textsize () const [inline]

Gets the default text size.

30.42.3.16 void Fl_Help_View::textsize (Fl_Fontsize *s*) [inline]

Sets the default text size.

30.42.3.17 const char* Fl_Help_View::title () [inline]

Returns the current document title, or NULL if there is no title.

30.42.3.18 int Fl_Help_View::topline () const [inline]

Returns the current top line in pixels.

30.42.3.19 void Fl_Help_View::topline (int *t*)

Scroll the text to the indicated position, given a pixel line.

30.42.3.20 const char* Fl_Help_View::value () const [inline]

Returns the current buffer contents.

30.42.3.21 void Fl_Help_View::value (const char * *v*)

Sets the current help text buffer to the string provided and reformats the text.

The documentation for this class was generated from the following files:

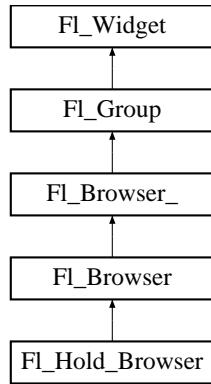
- Fl_Help_View.H
- Fl_Help_View.cxx

30.43 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.

30.43.1 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.

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.

30.43.2 Constructor & Destructor Documentation

30.43.2.1 Fl_Hold_Browser::Fl_Hold_Browser (int X, int Y, int W, int H, const char * l = 0) [inline]

Creates a new [Fl_Hold_Browser](#) widget using the given position, size, and label string.

The default boxtyle 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 file:

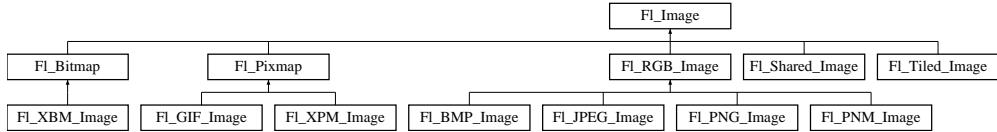
- [Fl_Hold_Browser.H](#)

30.44 Fl_Image Class Reference

[Fl_Image](#) is the base class used for caching and drawing all kinds of images in FLTK.

```
#include <Fl_Image.H>
```

Inheritance diagram for Fl_Image::



Public Member Functions

- int [w\(\)](#) const

See void [Fl_Image::w\(int\)](#).

- int [h\(\)](#) const

See void [Fl_Image::h\(int\)](#).

- int [d\(\)](#) const

The first form of the [d\(\)](#) method returns the current image depth.

- int [ld\(\)](#) const

The first form of the [ld\(\)](#) method returns the current line data size in bytes.

- int [count\(\)](#) const

The [count\(\)](#) method returns the number of data values associated with the image.

- const char *const * [data\(\)](#) const

The first form of the [data\(\)](#) method returns a pointer to the current image data array.

- [Fl_Image](#) (int W, int H, int D)

The constructor creates an empty image with the specified width, height, and depth.

- virtual [~Fl_Image](#) ()

The destructor is a virtual method that frees all memory used by the image.

- virtual [Fl_Image](#) * [copy](#) (int W, int H)

The [copy\(\)](#) method creates a copy of the specified image.

- [Fl_Image](#) * [copy](#) ()

The [copy\(\)](#) method creates a copy of the specified image.

- virtual void [color_average](#) (Fl_Color c, float i)

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value [c](#).

- void [inactive](#) ()

The [inactive\(\)](#) method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.

- virtual void [desaturate \(\)](#)

The [desaturate\(\)](#) method converts an image to grayscale.

- virtual void [label \(Fl_Widget *w\)](#)

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

- virtual void [label \(Fl_Menu_Item *m\)](#)

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

- virtual void [draw \(int X, int Y, int W, int H, int cx=0, int cy=0\)](#)

The [draw\(\)](#) methods draw the image.

- void [draw \(int X, int Y\)](#)

The [draw\(\)](#) methods draw the image.

- virtual void [uncache \(\)](#)

If the image has been cached for display, delete the cache data.

Protected Member Functions

- void [w \(int W\)](#)

The first form of the [w\(\)](#) method returns the current image width in pixels.

- void [h \(int H\)](#)

The first form of the [h\(\)](#) method returns the current image height in pixels.

- void [d \(int D\)](#)

The first form of the [d\(\)](#) method returns the current image depth.

- void [ld \(int LD\)](#)

See int [ld\(\)](#).

- void [data \(const char *const *p, int c\)](#)

See `const char * const *data()`.

- void [draw_empty \(int X, int Y\)](#)

The protected method [draw_empty\(\)](#) draws a box with an X in it.

Static Protected Member Functions

- static void [labeltype \(const Fl_Label *lo, int lx, int ly, int lw, int lh, Fl_Align la\)](#)
- static void [measure \(const Fl_Label *lo, int &lw, int &lh\)](#)

30.44.1 Detailed Description

[Fl_Image](#) is the base class used for caching 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.

Since the [Fl_Image](#) class does not support image drawing by itself, calling the [draw\(\)](#) method results in a box with an X in it being drawn instead.

30.44.2 Constructor & Destructor Documentation

30.44.2.1 [Fl_Image::Fl_Image \(int W, int H, int D\)](#) [inline]

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.

30.44.3 Member Function Documentation

30.44.3.1 [void Fl_Image::color_average \(Fl_Color c, float i\)](#) [virtual]

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.

The i 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. *The original image data is not altered by this method.*

Reimplemented in [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), and [Fl_Tiled_Image](#).

30.44.3.2 [Fl_Image* Fl_Image::copy \(\)](#) [inline]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), and [Fl_Tiled_Image](#).

30.44.3.3 [Fl_Image * Fl_Image::copy \(int W, int H\)](#) [virtual]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), and [Fl_Tiled_Image](#).

30.44.3.4 [int Fl_Image::count \(\) const](#) [inline]

The [count\(\)](#) method 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.

30.44.3.5 int Fl_Image::d () const [inline]

The first form of the [d\(\)](#) method returns the current image depth.

The return value will be 0 for bitmaps, 1 for pixmaps, and 1 to 4 for color images.

The second form is a protected method that sets the current image depth.

30.44.3.6 void Fl_Image::d (int D) [inline, protected]

The first form of the [d\(\)](#) method returns the current image depth.

The return value will be 0 for bitmaps, 1 for pixmaps, and 1 to 4 for color images.

The second form is a protected method that sets the current image depth.

30.44.3.7 const char* const* Fl_Image::data () const [inline]

The first form of the [data\(\)](#) method returns a pointer to the current image data array.

Use the [count\(\)](#) method to find the size of the data array.

The second form is a protected method that sets the current array pointer and count of pointers in the array.

30.44.3.8 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. *This method does not alter the original image data.*

Reimplemented in [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), and [Fl_Tiled_Image](#).

30.44.3.9 void Fl_Image::draw (int X, int Y) [inline]

The [draw\(\)](#) methods draw the image.

This form specifies the upper-lefthand corner of the image

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), and [Fl_Tiled_Image](#).

30.44.3.10 void Fl_Image::draw (int X, int Y, int W, int H, int cx = 0, int cy = 0) [virtual]

The [draw\(\)](#) methods draw the image.

This form specifies a bounding box for the image, with the origin (upper-lefthand corner) of the image offset by the cx and cy arguments.

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), [Fl_Shared_Image](#), and [Fl_Tiled_Image](#).

30.44.3.11 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.

30.44.3.12 void Fl_Image::h (int H) [inline, protected]

The first form of the [h\(\)](#) method returns the current image height in pixels.

The second form is a protected method that sets the current image height.

30.44.3.13 void Fl_Image::inactive () [inline]

The [inactive\(\)](#) method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.

This method does not alter the original image data.

30.44.3.14 void Fl_Image::label (Fl_Menu_Item * m) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), and [Fl_Pixmap](#).

30.44.3.15 void Fl_Image::label (Fl_Widget * widget) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented in [Fl_Bitmap](#), [Fl_RGB_Image](#), and [Fl_Pixmap](#).

30.44.3.16 int Fl_Image::ld () const [inline]

The first form of the [ld\(\)](#) method returns the current line data size in bytes.

Line data is extra data that is included after each line of color image data and is normally not present.

The second form is a protected method that sets the current line data size in bytes.

30.44.3.17 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_Bitmap](#), [Fl_RGB_Image](#), [Fl_Pixmap](#), and [Fl_Shared_Image](#).

30.44.3.18 void Fl_Image::w (int W) [inline, protected]

The first form of the [w\(\)](#) method returns the current image width in pixels.

The second form is a protected method that sets the current image width.

The documentation for this class was generated from the following files:

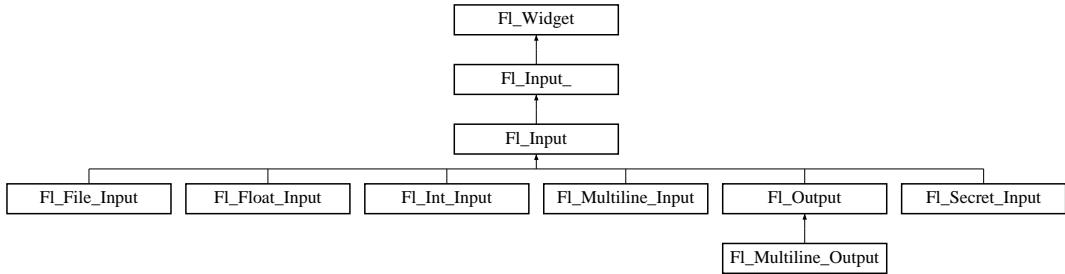
- [Fl_Image.H](#)
- [Fl_Image.cxx](#)

30.45 Fl_Input Class Reference

This is the FLTK text input widget.

```
#include <Fl_Input.H>
```

Inheritance diagram for Fl_Input::



Public Member Functions

- void [draw \(\)](#)

Draw the widget.

- int [handle \(int\)](#)

Handles the specified event.

- [Fl_Input \(int, int, int, int, const char *=0\)](#)

Creates a new [Fl_Input](#) widget using the given position, size, and label string.

30.45.1 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 (even 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-8859-1 character set.

Mouse button 1	Moves the cursor to this point. Drag selects characters. Double click selects words. Triple click selects all text. Shift+click extends the selection. When you select text it is automatically copied to the clipboard.
Mouse button 2	Insert the clipboard at the point clicked. You can also select a region and replace it with the clipboard 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.
Enter	May cause the callback, see when() .
^A or Home	Go to start of line.
^B or Left	Move left
^C	Copy the selection to the clipboard
^D or Delete	Deletes one character to the right or deletes the selected region.
^E or End	Go to the end of line.
^F or Right	Move right
^K	Delete to the end of line (next \n character) or deletes a single \n character. These deletions are all concatenated into the clipboard.
^N or Down	Move down (for Fl_Multiline_Input only, otherwise it moves to the next input field).
^P or Up	Move up (for Fl_Multiline_Input only, otherwise it moves to the previous input field).
^U	Delete everything.
^V or ^Y	Paste the clipboard
^X or ^W	Copy the region to the clipboard and delete it.
^Z or ^_	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+move	Move the cursor but also extend the selection.
RightCtrl or Compose	<p>Start a compose-character sequence. The next one or two keys typed define the character to insert (see table that follows.)</p> <p>For instance, to type "ä" type [compose][a]['] or [compose][''][a].</p> <p>The character "nbsp" (non-breaking space) is typed by using [compose][space].</p> <p>The single-character sequences may be followed by a space if necessary to remove ambiguity. For instance, if you really want to type "ö" rather than "ä" you must type [compose][a][space][~].</p> <p>The same key may be used to "quote" control characters into the text. If you need a ^Q character you can get one by typing [compose][Control+Q].</p> <p>X may have a key on the keyboard defined as XK_Multi_key. If so this key may be used as well as the right-hand control key. You can set this up with the program xmodmap.</p> <p>If your keyboard is set to support a foreign language you should also be able to type "dead key" prefix characters. On X you will actually be able to see what dead key you typed, and if you</p>

Keys	Char	Keys	Char	Keys	Char	Keys	Char	Keys	Char	Keys	Char
sp ^ a ,	nbsp ' A o	*	~ N # : A	' A ' a 3 : a	~ n ^ o	D - % ~ A	' a ' O	- 2 ~ a	! o	A ^ \$	+ - ' O
y =	u			* A	~ O	* a	~ o				
	p			A E	: O	a e	o				
&	.			, C	x	, c	:				
:	,			E '	O /	' e	/				
c	l			' E	' U	' e	u				
a	o			^ E	' U	^ e	u				
< <	> >			: E	^ U	: e	^ u				
~	1 4			' I	: U	' i	u				
-	1 2			' I	' Y	' i	y				
r	3 4			^ I	T H	^ i	h				
_	?			: I	s s	: i	y				

Table 30.1: Character Composition Table

30.45.2 Constructor & Destructor Documentation

30.45.2.1 `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 boxtyle is `FL_DOWN_BOX`.

30.45.3 Member Function Documentation

30.45.3.1 `void Fl_Input::draw () [virtual]`

Draw 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.

Implements [Fl_Widget](#).

Reimplemented in [Fl_File_Input](#).

30.45.3.2 `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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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_File_Input](#).

The documentation for this class was generated from the following files:

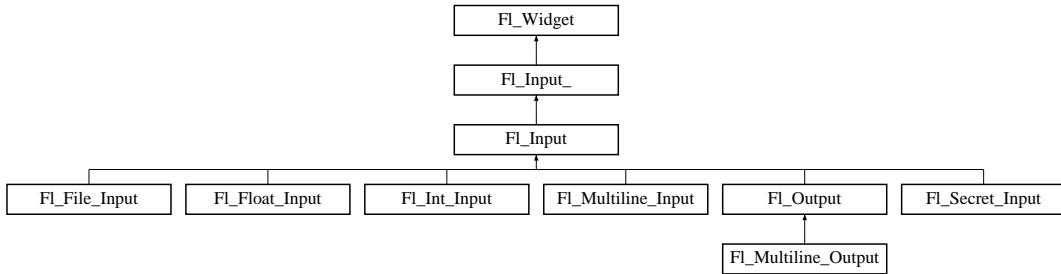
- [Fl_Input.H](#)
- [Fl_Input.cxx](#)

30.46 Fl_Input_ Class Reference

This is a virtual base class below [Fl_Input](#).

```
#include <Fl_Input_.h>
```

Inheritance diagram for [Fl_Input_](#):



Public Member Functions

- void [resize](#) (int, int, int, int)
Change the size or position of the widget.
- [Fl_Input_](#) (int, int, int, const char *=0)
Creates a new [Fl_Input_](#) widget using the given position, size, and label string.
- int [value](#) (const char *)
*See const char *[Fl_Input_value\(\)](#) const.*
- int [value](#) (const char *, int)
*See const char *[Fl_Input_value\(\)](#) const.*
- int [static_value](#) (const char *)
Change the text and set the mark and the point to the end of it.
- int [static_value](#) (const char *, int)
See int [Fl_Input::static_value\(const char\)](#).*
- const char * [value](#) () const
The first form returns the current value, which is a pointer to the internal buffer and is valid only until the next event is handled.
- char [index](#) (int i) const
Same as [value\(\) \[n\]](#), but may be faster in plausible implementations.
- int [size](#) () const
Returns the number of characters in [value\(\)](#).
- void [size](#) (int W, int H)
Change the size of the widget.

- int **maximum_size** () const
Gets the maximum length of the input field.
- void **maximum_size** (int m)
Sets the maximum length of the input field.
- int **position** () const
The input widget maintains two pointers into the string.
- int **mark** () const
Gets the current selection mark.
- int **position** (int p, int m)
See int [Fl_Input_::position\(\)](#) const.
- int **position** (int p)
See int [Fl_Input_::position\(\)](#) const.
- int **mark** (int m)
Sets the current selection mark.
- int **replace** (int, int, const char *, int=0)
This call does all editing of the text.
- int **cut** ()
Deletes the current selection.
- int **cut** (int n)
See int [Fl_Input_::cut\(\)](#).
- int **cut** (int a, int b)
See int [Fl_Input_::cut\(\)](#).
- int **insert** (const char *t, int l=0)
Insert the string t at the current position, and leave the mark and position after it.
- int **copy** (int clipboard)
Put the current selection between [mark\(\)](#) and [position\(\)](#) into the specified clipboard.
- int **undo** ()
Does undo of several previous calls to [replace\(\)](#).
- int **copy_cuts** ()
Copy all the previous contiguous cuts from the undo information to the clipboard.
- int **shortcut** () const
The first form returns the current shortcut key for the Input.
- void **shortcut** (int s)
See int [shortcut\(\)](#) const.

- `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.
- `Fl_Color textcolor () const`
Gets the color of the text in the input field.
- `void textcolor (unsigned n)`
Sets the color of the text in the input field.
- `Fl_Color cursor_color () const`
Gets the color of the cursor.
- `void cursor_color (unsigned n)`
Sets the color of the cursor.
- `int input_type () const`
Gets the input field type.
- `void input_type (int t)`
Sets the input field type.
- `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 wrap () const`
Gets the word wrapping state of the input field.
- `void wrap (int b)`
Sets the word wrapping state of the input field.

Protected Member Functions

- `int word_start (int i) const`
- `int word_end (int i) const`
- `int line_start (int i) const`

- int **line_end** (int i) const
- void **drawtext** (int, int, int, int)

Draw the text in the passed bounding box.
- int **up_down_position** (int, int keepmark=0)

Do the correct thing for arrow keys.
- void **handle_mouse** (int, int, int, int, int keepmark=0)
- int **handletext** (int e, int, int, int, int)
- void **maybe_do_callback** ()
- int **xscroll** () const
- int **yscroll** () const

30.46.1 Detailed Description

This is a virtual base class below [Fl_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.

This can act like any of the subclasses of [Fl_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)
```

30.46.2 Constructor & Destructor Documentation

30.46.2.1 [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 boxtyle is [FL_DOWN_BOX](#).

30.46.3 Member Function Documentation

30.46.3.1 [int Fl_Input::copy \(int clipboard\)](#)

Put the current selection between [mark\(\)](#) and [position\(\)](#) into the specified clipboard.

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.

30.46.3.2 int Fl_Input_::copy_cuts ()

Copy all the previous contiguous cuts from the undo information to the clipboard.

This is used to make ^K work.

30.46.3.3 void Fl_Input_::cursor_color (unsigned n) [inline]

Sets the color of the cursor.

This is black by default.

30.46.3.4 Fl_Color Fl_Input_::cursor_color () const [inline]

Gets the color of the cursor.

This is black by default.

30.46.3.5 int Fl_Input_::cut () [inline]

Deletes the current selection.

cut(n) deletes n characters after the [position\(\)](#). cut(-n) deletes n characters before the [position\(\)](#). cut(a,b) deletes the characters between offsets a and b. A, b, and n are all clamped to the size of the string. The mark and point are left where the deleted text was.

If you want the data to go into the clipboard, do [Fl_Input_::copy\(\)](#) before calling [Fl_Input_::cut\(\)](#), or do [Fl_Input_::copy_cuts\(\)](#) afterwards.

30.46.3.6 void Fl_Input_::drawtext (int X, int Y, int W, int H) [protected]

Draw 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.

30.46.3.7 char Fl_Input_::index (int i) const [inline]

Same as [value\(\)](#)[n], but may be faster in plausible implementations.

No bounds checking is done.

30.46.3.8 void Fl_Input_::input_type (int t) [inline]

Sets the input field type.

30.46.3.9 int Fl_Input_::input_type () const [inline]

Gets the input field type.

30.46.3.10 int Fl_Input_::insert (const char *t, int l = 0) [inline]

Insert the string t at the current position, and leave the mark and position after it.

If l is not zero then it is assumed to be strlen(t).

30.46.3.11 int Fl_Input_::mark (int m) [inline]

Sets the current selection mark.

mark(n) is the same as position([position\(\)](#),n).

30.46.3.12 int Fl_Input_::mark () const [inline]

Gets the current selection mark.

mark(n) is the same as position([position\(\)](#),n).

30.46.3.13 void Fl_Input_::maximum_size (int m) [inline]

Sets the maximum length of the input field.

30.46.3.14 int Fl_Input_::maximum_size () const [inline]

Gets the maximum length of the input field.

30.46.3.15 int Fl_Input_::position () const [inline]

The input widget maintains two pointers into the string.

The "position" is where the cursor is. The "mark" 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. The return value is non-zero if the new position is different than the old one. position(n) is the same as position(n,n). mark(n) is the same as position([position\(\)](#),n).

30.46.3.16 void Fl_Input_::readonly (int b) [inline]

Sets the read-only state of the input field.

30.46.3.17 int Fl_Input_::readonly () const [inline]

Gets the read-only state of the input field.

30.46.3.18 int Fl_Input_::replace (int b, int e, const char *text, int ilen = 0)

This call does all editing of the text.

It deletes the region between a and b (either one may be less or equal to the other), and then inserts the string insert at that point and leaves the [mark\(\)](#) and [position\(\)](#) after the insertion. Does the callback if [when\(\)](#) & `FL_WHEN_CHANGED` and there is a change.

Set start and end equal to not delete anything. Set insert to NULL to not insert anything.

length must be zero or `strlen(insert)`, this 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 or a string containing nul's.

a and b are clamped to the `0..size()` range, so it is safe to pass any values.

[cut\(\)](#) and [insert\(\)](#) are just inline functions that call [replace\(\)](#).

30.46.3.19 void Fl_Input ::resize (int x, int y, int w, int h) [virtual]

Change 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:

← `x,y` new position relative to the parent window
 ← `w,h` new size

See also:

[position\(int, int\)](#), [size\(int, int\)](#)

Reimplemented from [Fl_Widget](#).

30.46.3.20 int Fl_Input ::shortcut () const [inline]

The first form returns the current shortcut key for the Input.

The second form sets the shortcut key to key. 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).

30.46.3.21 void Fl_Input ::size (int W, int H) [inline]

Change the size of the widget.

`size(w,h)` is a shortcut for `resize(x(),y(),w,h)`.

Parameters:

← W, H new size

See also:

[position\(int, int\)](#), [resize\(int, int, int\)](#)

Reimplemented from [Fl_Widget](#).

30.46.3.22 int Fl_Input_::size () const [inline]

Returns the number of characters in [value\(\)](#).

This may be greater than [strlen\(value\(\)\)](#) if there are nul characters in it.

30.46.3.23 int Fl_Input_::static_value (const char * str)

Change the text and set 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.

30.46.3.24 void Fl_Input_::textcolor (unsigned n) [inline]

Sets the color of the text in the input field.

30.46.3.25 Fl_Color Fl_Input_::textcolor () const [inline]

Gets the color of the text in the input field.

30.46.3.26 void Fl_Input_::textfont (Fl_Font s) [inline]

Sets the font of the text in the input field.

30.46.3.27 Fl_Font Fl_Input_::textfont () const [inline]

Gets the font of the text in the input field.

30.46.3.28 void Fl_Input_::textsize (Fl_Fontsize s) [inline]

Sets the size of the text in the input field.

30.46.3.29 Fl_Fontsize Fl_Input_::textsize () const [inline]

Gets the size of the text in the input field.

30.46.3.30 int Fl_Input_::undo ()

Does undo of several previous calls to [replace\(\)](#).

Returns non-zero if any change was made.

30.46.3.31 int Fl_Input_::up_down_position (int *i*, int *keepmark* = 0) [protected]

Do the correct thing for arrow keys.

Sets the position (and mark if *keepmark* is zero) to somewhere in the same line as *i*, such that pressing the arrows repeatedly will cause the point to move up and down.

30.46.3.32 const char* Fl_Input_::value () const [inline]

The first form returns the current value, which is a pointer to the internal buffer and is valid only until the next event is handled.

The second two forms change the text and set the mark and the point to the end of it. The string is copied to the internal buffer. Passing NULL is the same as "". This returns non-zero if the new value is different than the current one. You can use the second version to directly set the length if you know it already or want to put nul's in the text.

30.46.3.33 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.

30.46.3.34 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.

The documentation for this class was generated from the following files:

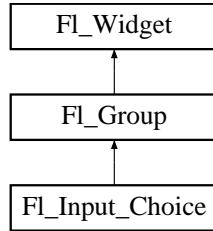
- Fl_Input_.H
- Fl_Input_.cxx

30.47 Fl_Input_Choice Class Reference

A combination of the input widget and a menu button.

```
#include <Fl_Input_Choice.H>
```

Inheritance diagram for Fl_Input_Choice::



Classes

- class **InputMenuButton**

Public Member Functions

- **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.
- void **add** (const char *s)
Adds an item to the menu.
- int **changed** () const
Check if the widget value changed since the last callback.
- void **clear_changed** ()
Mark the value of the widget as unchanged.
- void **set_changed** ()
Mark the value of the widget as changed.
- void **clear** ()
Removes all items from the menu.
- **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.
- 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.

- void [resize](#) (int X, int Y, int W, int H)
This resizes the [Fl_Group](#) widget and all of its children.
- [Fl_Color textcolor](#) () const
Gets the encapsulated input text color attributes.
- void [textcolor](#) ([Fl_Color](#) c)
Sets the encapsulated input text color attributes.
- [Fl_Font textfont](#) () const
Gets the encapsulated input text font attributes.
- void [textfont](#) ([Fl_Font](#) f)
Sets the encapsulated input text font attributes.
- [Fl_Fontsize textsize](#) () const
Gets the encapsulated input size attributes.
- void [textsize](#) ([Fl_Fontsize](#) s)
Sets the encapsulated input size attributes.
- const char * [value](#) () const
*See void [Fl_Input_Choice::value\(const char *s\)](#).*
- void [value](#) (const char *val)
Sets or returns the input widget's current contents.
- void [value](#) (int val)
*See void [Fl_Input_Choice::value\(const char *s\)](#).*
- [Fl_Menu_Button](#) * [menubutton](#) ()
Returns a reference to the internal [Fl_Menu_Button](#) widget.
- [Fl_Input](#) * [input](#) ()
Returns a reference to the internal [Fl_Input](#) widget.

30.47.1 Detailed Description

A combination of the input widget and a menu button.

The user can either type into the input area, or use the menu button chooser on the right, which loads the input area with predefined text. Normally it is drawn with an inset box and a white background.

The application can directly access both the input and menu widgets directly, using the [menubutton\(\)](#) and [input\(\)](#) accessor methods.

30.47.2 Constructor & Destructor Documentation

30.47.2.1 `Fl_Input_Choice::Fl_Input_Choice (int x, int y, int w, int h, const char *l = 0)` [inline]

Creates a new [Fl_Input_Choice](#) widget using the given position, size, and label string.

Inherited destructor Destroys the widget and any value associated with it.

30.47.3 Member Function Documentation

30.47.3.1 `void Fl_Input_Choice::add (const char *s)` [inline]

Adds an item to the menu.

30.47.3.2 `int Fl_Input_Choice::changed () const` [inline]

Check 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.

Return values:

0 if the value did not change

See also:

[set_changed\(\)](#), [clear_changed\(\)](#)*

Reimplemented from [Fl_Widget](#).

30.47.3.3 `void Fl_Input_Choice::clear ()` [inline]

Removes all items from the menu.

Reimplemented from [Fl_Group](#).

30.47.3.4 `void Fl_Input_Choice::clear_changed ()` [inline]

Mark the value of the widget as unchanged.

See also:

[changed\(\)](#), [set_changed\(\)](#)

Reimplemented from [Fl_Widget](#).

30.47.3.5 `Fl_Input* Fl_Input_Choice::input ()` [inline]

Returns a reference to the internal [Fl_Input](#) widget.

30.47.3.6 void Fl_Input_Choice::menu (const Fl_Menu_Item * *m*) [inline]

Sets the [Fl_Menu_Item](#) array used for the menu.

30.47.3.7 const Fl_Menu_Item* Fl_Input_Choice::menu () [inline]

Gets the [Fl_Menu_Item](#) array used for the menu.

30.47.3.8 Fl_Menu_Button* Fl_Input_Choice::menubutton () [inline]

Returns a reference to the internal [Fl_Menu_Button](#) widget.

30.47.3.9 void Fl_Input_Choice::resize (int *X*, int *Y*, int *W*, int *H*) [inline, virtual]

This 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](#).

30.47.3.10 void Fl_Input_Choice::set_changed () [inline]

Mark the value of the widget as changed.

See also:

[changed\(\)](#), [clear_changed\(\)](#)

Reimplemented from [Fl_Widget](#).

30.47.3.11 void Fl_Input_Choice::value (const char * *val*) [inline]

Sets or returns the input widget's current contents.

The second form sets the contents using the index into the menu which you can set as an integer. Setting the value effectively 'chooses' this menu item, and sets it as the new input text, deleting the previous text.

The documentation for this class was generated from the following file:

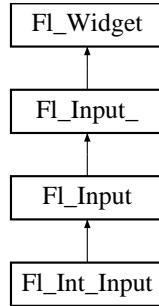
- [Fl_Input_Choice.H](#)

30.48 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 0xaef).

```
#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.

30.48.1 Detailed Description

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 0xaef).

30.48.2 Constructor & Destructor Documentation

30.48.2.1 [Fl_Int_Input::Fl_Int_Input](#) (int X, int Y, int W, int H, const char * l = 0) [inline]

Creates a new [Fl_Int_Input](#) widget using the given position, size, and label string.

The default boxtyle 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 file:

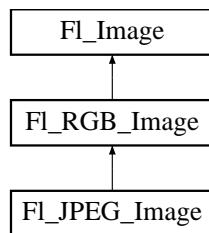
- [Fl_Int_Input.H](#)

30.49 Fl_JPEG_Image Class Reference

The [Fl_JPEG_Image](#) class supports loading, caching, and drawing of Joint Photographic Experts Group (JPEG) File Interchange Format (JFIF) images.

```
#include <Fl_JPEG_Image.h>
```

Inheritance diagram for Fl_JPEG_Image::



Public Member Functions

- [Fl_JPEG_Image](#) (const char *filename)

The constructor loads the JPEG image from the given jpeg filename.

30.49.1 Detailed Description

The [Fl_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.

30.49.2 Constructor & Destructor Documentation

30.49.2.1 Fl_JPEG_Image::Fl_JPEG_Image (const char *jpeg)

The constructor loads the JPEG image from the given jpeg filename.

The inherited destructor free all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

- Fl_JPEG_Image.H
- Fl_JPEG_Image.cxx

30.50 Fl_Label Struct Reference

This struct stores all information for a text or mixed graphics label.

```
#include <Fl_Widget.H>
```

Public Member Functions

- void `draw` (int, int, int, int, `Fl_Align`) const
draw the label aligned to the given box
- void `measure` (int &w, int &h) const
Measures the size of the label.

Public Attributes

- const char * `value`
label text
- `Fl_Image` * `image`
optional image for an active label
- `Fl_Image` * `deimage`
optional image for a deactivated label
- uchar `type`
type of label.
- `Fl_Font` `font`
label font used in text
- `Fl_Fontsize` `size`
size of label font
- unsigned `color`
text color

30.50.1 Detailed Description

This struct stores all information for a text or mixed graphics label.

Todo

For FLTK1.3, the `Fl_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.

30.50.2 Member Function Documentation

30.50.2.1 void Fl_Label::draw (int X, int Y, int W, int H, Fl_Align align) const

draw the label aligned to the given box

draw label with arbitrary alignment in arbitrary box

30.50.2.2 void Fl_Label::measure (int & W, int & H) const

Measures the size of the label.

Parameters:

→ W, H : this is the requested size for the label text plus image; on return, this will contain the size needed to fit the label

30.50.3 Member Data Documentation

30.50.3.1 uchar Fl_Label::type

type of label.

See also:

[Fl_Labeltype](#)

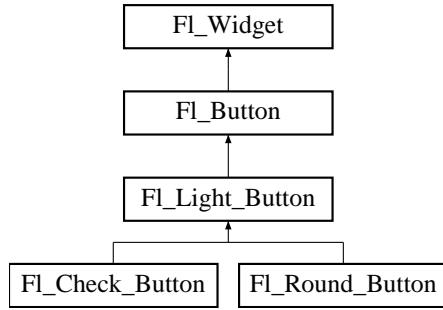
The documentation for this struct was generated from the following files:

- [Fl_Widget.H](#)
- [fl_labeltype.cxx](#)

30.51 Fl_Light_Button Class Reference

```
#include <Fl_Light_Button.H>
```

Inheritance diagram for Fl_Light_Button::



Public Member Functions

- virtual int [handle](#) (int)

Handles the specified event.

- [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.

Protected Member Functions

- virtual void [draw](#) ()

Draw the widget.

30.51.1 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\(\)](#).

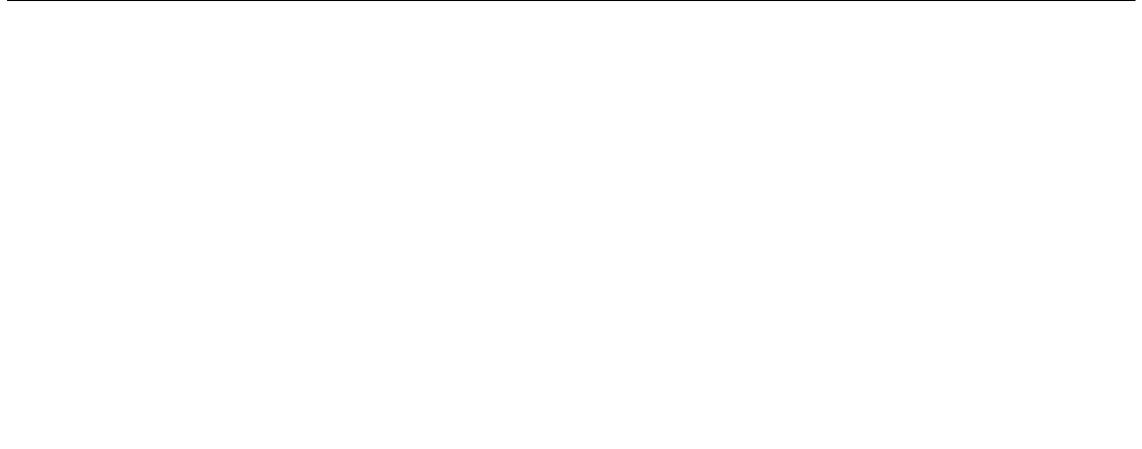


Figure 30.17: Fl_Light_Button

30.51.2 Constructor & Destructor Documentation

30.51.2.1 `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 destructor deletes the check button.

30.51.3 Member Function Documentation

30.51.3.1 `void Fl_Light_Button::draw () [protected, virtual]`

Draw 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.

Reimplemented from [Fl_Button](#).

30.51.3.2 `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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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:

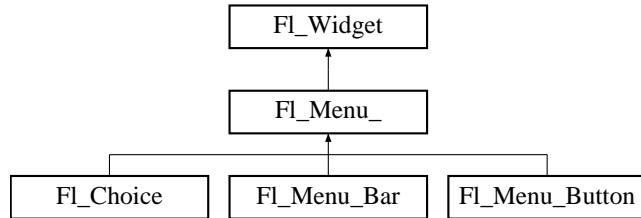
- Fl_Light_Button.H
- Fl_Light_Button.cxx

30.52 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

- **Fl_Menu_ (int, int, int, int, const char *=0)**
Creates a new `Fl_Menu_` widget using the given position, size, and label string.
- int **item.pathname (char *name, int namelen, const Fl_Menu_Item *finditem=0) const**
Set 'pathname' of specified menuitem If `finditem==NULL`, `mvalue()` is used (the most recently picked menuitem) Returns:
 - 0 : OK
 - -1 : item not found (`name=""`)
 - -2 : 'name' not large enough (`name=""`).
- const **Fl_Menu_Item * picked (const Fl_Menu_Item *)**
When user picks a menu item, call this.
- const **Fl_Menu_Item * find_item (const char *name)**
Find menu item index, given menu pathname eg.
- const **Fl_Menu_Item * test_shortcut ()**
Internal use only.
- void **global ()**
Make the shortcuts for this menu work no matter what window has the focus when you type it.
- const **Fl_Menu_Item * menu () const**
Returns a pointer to the array of `Fl_Menu_Items`.
- void **menu (const Fl_Menu_Item *m)**
Sets the menu array pointer directly.
- 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.
- int **add (const char *, int shortcut, Fl_Callback *, void *=0, int=0)**

Adds a new menu item, with a title string, shortcut int (or string), callback, argument to the callback, and flags.

- 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).

- 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 **size** () const

This returns the number of [Fl_Menu_Item](#) structures that make up the menu, correctly counting submenus.

- void **size** (int W, int H)

Change the size of the widget.

- void **clear** ()

Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.

- void **replace** (int, const char *)

Changes the text of item n.

- void **remove** (int)

Deletes item n from the menu.

- void **shortcut** (int i, int s)

Changes the shortcut of item i to n.

- void **mode** (int i, int fl)

Sets the flags of item i.

- int **mode** (int i) const

Gets the flags of item i.

- const [Fl_Menu_Item](#) * **mvalue** () const

Returns a pointer to the last menu item that was picked.

- int **value** () const

Returns the index into [menu\(\)](#) of the last item chosen by the user.

- int **value** (const [Fl_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.

- const char * **text** () const

Returns the title of the last item chosen, or of item i.

- const char * **text** (int i) const

Returns the title of the last item chosen, or of item i.

- **Fl_Font textfont () const**
Gets the current font of menu item labels.
- **void textfont (Fl_Font c)**
Sets the current font of menu item labels.
- **Fl_Fontsize textsize () const**
Gets the font size of menu item labels.
- **void textsize (Fl_Fontsize c)**
Sets the font size of menu item labels.
- **Fl_Color textcolor () const**
Get the current color of menu item labels.
- **void textcolor (unsigned c)**
Sets the current color of menu item labels.
- **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)**
See Fl_Boxtype [Fl_Menu_::down_box\(\)](#) const.
- **Fl_Color down_color () const**
For back compatibility, same as [selection_color\(\)](#).
- **void down_color (unsigned c)**
For back compatibility, same as [selection_color\(\)](#).

Protected Attributes

- **uchar alloc**
- **uchar down_box_**
- **Fl_Font textfont_**
- **Fl_Fontsize textsize_**
- **unsigned textcolor_**

30.52.1 Detailed Description

Base class of all widgets that have a menu in FLTK.

Currently FLTK provides you with [Fl_Menu_Button](#), [Fl_Menu_Bar](#), and [Fl_Choice](#).

The class contains a pointer to an array of structures of type [Fl_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 [Fl_Menu_](#).

30.52.2 Constructor & Destructor Documentation

30.52.2.1 `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.

30.52.3 Member Function Documentation

30.52.3.1 `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) 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.

30.52.3.2 `int Fl_Menu_::add (const char *t, int s, Fl_Callback *c, void *v = 0, int f = 0)`

Adds a new menu item, with a title string, shortcut int (or string), callback, argument to the callback, and flags.

If the menu array was directly set with `menu(x)` then `copy()` is done to make a private array.

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 "foo/bar/baz" will create a submenus called "foo" and "bar" with an entry called "baz". The "/" character is ignored if it appears as the first character of the label string, e.g. "/foo/bar/baz".

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 can be 0L, or either a modifier/key combination (for example `FL_CTRL+A`) or a string describing the shortcut in one of two ways:

```
[#+^]&lt;ascii_value&gt;;    eg. "97", "^97", "+97", "#97"
[#+^]&lt;ascii_char&gt;;    eg. "a", "^a", "+a", "#a"
```

..where `<ascii_value>` is a decimal value representing an ascii character (eg. 97 is the ascii for 'a'), and the optional prefixes enhance the value that follows. Multiple prefixes must appear in the above order.

```
# - Alt
+ - Shift
^ - Control
```

Text shortcuts are converted to integer shortcut by calling `int fl_old_shortcut(const char*)`.

The return value is the index into the array that the entry was put.

No items must be added to a menu during a callback to the same menu.

30.52.3.3 void Fl_Menu_::clear ()

Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.

Menus must no be cleared during a callback to the same menu.

30.52.3.4 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 ud is not NULL, then all user data pointers are changed in the menus as well. See void [Fl_Menu_::menu\(const Fl_Menu_Item* m\)](#).

30.52.3.5 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.

30.52.3.6 const Fl_Menu_Item * Fl_Menu_::find_item (const char * name)

Find menu item index, given menu pathname eg.

"Edit/Copy" Will also return submenus, eg. "Edit" Returns NULL if not found.

30.52.3.7 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!)

30.52.3.8 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 [delete\(\)](#)) a private copy is automatically done.

30.52.3.9 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.

30.52.3.10 int Fl_Menu_::mode (int i) const [inline]

Gets the flags of item i.

For a list of the flags, see [Fl_Menu_Item](#).

30.52.3.11 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](#).

30.52.3.12 const Fl_Menu_Item* Fl_Menu_::mvalue () const [inline]

Returns a pointer to the last menu item that was picked.

30.52.3.13 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. Unfortunatly this also casts away const for the checkboxes, but this was necessary so non-checkbox menus can really be declared const...

30.52.3.14 void Fl_Menu_::remove (int i)

Deletes item n 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.

30.52.3.15 void Fl_Menu_::replace (int i, const char * str)

Changes the text of item n.

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.

30.52.3.16 void Fl_Menu_::shortcut (int i, int s) [inline]

Changes the shortcut of item i to n.

30.52.3.17 void Fl_Menu_::size (int W, int H) [inline]

Change the size of the widget.

size(w,h) is a shortcut for [resize\(x\(\),y\(\),w,h\)](#).

Parameters:

← *W,H* new size

See also:

[position\(int, int\)](#), [resize\(int, int, int, int\)](#)

Reimplemented from [Fl_Widget](#).

30.52.3.18 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).

30.52.3.19 const Fl_Menu_Item* Fl_Menu_::test_shortcut () [inline]

Internal use only.

Reimplemented from [Fl_Widget](#).

30.52.3.20 const char* Fl_Menu_::text (int i) const [inline]

Returns the title of the last item chosen, or of item i.

30.52.3.21 const char* Fl_Menu_::text () const [inline]

Returns the title of the last item chosen, or of item i.

30.52.3.22 void Fl_Menu_::textcolor (unsigned c) [inline]

Sets the current color of menu item labels.

30.52.3.23 Fl_Color Fl_Menu_::textcolor () const [inline]

Get the current color of menu item labels.

30.52.3.24 void Fl_Menu_::textfont (Fl_Font c) [inline]

Sets the current font of menu item labels.

30.52.3.25 Fl_Font Fl_Menu_::textfont () const [inline]

Gets the current font of menu item labels.

30.52.3.26 void Fl_Menu_::textsize (Fl_Fontsize c) [inline]

Sets the font size of menu item labels.

30.52.3.27 Fl_Fontsize Fl_Menu_::textsize () const [inline]

Gets the font size of menu item labels.

30.52.3.28 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.

Reimplemented in [Fl_Choice](#).

30.52.3.29 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.

Reimplemented in [Fl_Choice](#).

30.52.3.30 int Fl_Menu_::value () const [inline]

Returns the index into [menu\(\)](#) of the last item chosen by the user.

It is zero initially.

Reimplemented in [Fl_Choice](#).

The documentation for this class was generated from the following files:

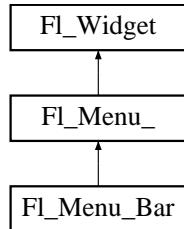
- [Fl_Menu_.H](#)
- [Fl_Menu_.cxx](#)
- [Fl_Menu_add.cxx](#)
- [Fl_Menu_global.cxx](#)

30.53 Fl_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

- int [handle](#) (int)
Handles the specified event.
- [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.

Protected Member Functions

- void [draw](#) ()
Draw the widget.

30.53.1 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 [Fl_Menu_Item](#) array. Because a [Fl_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.

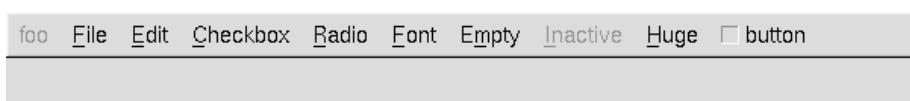


Figure 30.18: menubar

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 picks an item off the menu, the item's callback is done with the menubar as the `Fl_Widget*` argument. If the item does not have a callback the menubar's callback is done instead.

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.

30.53.2 Constructor & Destructor Documentation

30.53.2.1 `Fl_Menu_Bar::Fl_Menu_Bar (int X, int Y, int W, int H, const char * l = 0)` [inline]

Creates a new `Fl_Menu_Bar` widget using the given position, size, and label string.

The default boxtyle 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.

30.53.3 Member Function Documentation

30.53.3.1 `void Fl_Menu_Bar::draw () [protected, virtual]`

Draw 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.

Implements `Fl_Widget`.

30.53.3.2 `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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← `event` 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:

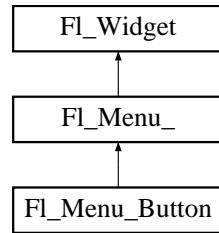
- [Fl_Menu_Bar.H](#)
- [Fl_Menu_Bar.cxx](#)

30.54 Fl_Menu_Button Class Reference

This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of [Fl_Menu_Item](#) objects.

```
#include <Fl_Menu_Button.H>
```

Inheritance diagram for Fl_Menu_Button::



Public Types

- enum {
 POPUP1 = 1, **POPUP2**, **POPUP12**, **POPUP3**,
 POPUP13, **POPUP23**, **POPUP123** }

Public Member Functions

- int [handle](#) (int)
Handles the specified event.
- const [Fl_Menu_Item](#) * [popup](#) ()
Act exactly as though the user clicked the button or typed the shortcut key.
- [Fl_Menu_Button](#) (int, int, int, int, const char *=0)
Creates a new [Fl_Menu_Button](#) widget using the given position, size, and label string.

Protected Member Functions

- void [draw](#) ()
Draw the widget.

30.54.1 Detailed Description

This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of [Fl_Menu_Item](#) objects.



Figure 30.19: 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 [Fl_Menu_Button](#) may also control a pop-up menu. This is done by setting the [type\(\)](#) , see below.

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 picks an item off the menu, the item's callback is done with the menu_button as the [Fl_Widget*](#) argument. If the item does not have a callback the menu_button's callback is done instead.

30.54.2 Constructor & Destructor Documentation

30.54.2.1 [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 boxtyle is [FL_UP_BOX](#).

The constructor sets [menu\(\)](#) to NULL. See [Fl_Menu_](#) for the methods to set or change the menu.

30.54.3 Member Function Documentation

30.54.3.1 [void Fl_Menu_Button::draw \(\) \[protected, virtual\]](#)

Draw 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.

Implements [Fl_Widget](#).

30.54.3.2 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.54.3.3 const Fl_Menu_Item * Fl_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.

The documentation for this class was generated from the following files:

- [Fl_Menu_Button.H](#)
- [Fl_Menu_Button.cxx](#)

30.55 Fl_Menu_Item Struct Reference

The [Fl_Menu_Item](#) structure defines a single menu item that is used by the [Fl_Menu_](#) class.

```
#include <Fl_Menu_Item.h>
```

Public Member Functions

- `const 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.
- `Fl_Menu_Item * next (int i=1)`
Advance a pointer by n items through a menu array, skipping the contents of submenus and invisible items.
- `const Fl_Menu_Item * first () const`
Returns the first menu item, same as next(0).
- `Fl_Menu_Item * first ()`
Returns the first menu item, same as next(0).
- `const char * label () const`
This is the title of the item.
- `void label (const char *a)`
See const char [Fl_Menu_Item::label\(\)](#) const.*
- `void label (Fl_Labeltype a, const char *b)`
See const char [Fl_Menu_Item::label\(\)](#) const.*
- `Fl_Labeltype labeltype () const`
A labeltype identifies a routine that draws the label of the widget.
- `void labeltype (Fl_Labeltype a)`
A labeltype identifies a routine that draws the label of the widget.
- `Fl_Color labelcolor () const`
This color is passed to the labeltype routine, and is typically the color of the label text.
- `void labelcolor (unsigned a)`
See Fl_Color [Fl_Menu_Item::labelcolor\(\)](#) const.
- `Fl_Font labelfont () const`
FONTS ARE IDENTIFIED BY SMALL 8-BIT INDEXES INTO A TABLE.
- `void labelfont (Fl_Font a)`
FONTS ARE IDENTIFIED BY SMALL 8-BIT INDEXES INTO A TABLE.
- `Fl_Fontsize labelsize () const`
GETS OR SETS THE LABEL FONT PIXEL SIZE/HEIGHT.

- void **labelsize** (Fl_Fontsize a)
Sets the label font pixel size/height.
- Fl_Callback_p **callback** () const
Each item has space for a callback function and an argument for that function.
- void **callback** (Fl_Callback *c, void *p)
See Fl_Callback_p Fl_MenuItem::callback() const.
- void **callback** (Fl_Callback *c)
See Fl_Callback_p Fl_MenuItem::callback() const.
- void **callback** (Fl_Callback0 *c)
See Fl_Callback_p Fl_MenuItem::callback() const.
- void **callback** (Fl_Callback1 *c, long p=0)
See Fl_Callback_p Fl_MenuItem::callback() const.
- void * **user_data** () const
Get or set the user_data argument that is sent to the callback function.
- void **user_data** (void *v)
Get or set the user_data argument that is sent to the callback function.
- long **argument** () const
For convenience you can also define the callback as taking a long argument.
- void **argument** (long v)
For convenience you can also define the callback as taking a long argument.
- 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.
- int **submenu** () const
Returns true if either FL_SUBMENU or FL_SUBMENU_POINTER is on in the flags.
- int **checkbox** () const
Returns true if a checkbox will be drawn next to this item.
- int **radio** () const
Returns true if this item is a radio item.
- int **value** () const
Returns the current value of the check or radio item.
- void **set** ()
Turns the check or radio item "on" for the menu item.

- void **clear** ()

Turns the check or radio item "off" for the menu item.
- void **setonly** ()

Turns the radio item "on" for the menu item and turns off adjacent radio items set.
- int **visible** () const

Gets the visibility of an item.
- void **show** ()

Makes an item visible in the menu.
- void **hide** ()

Hides an item in the menu.
- int **active** () const

Get whether or not the item can be picked.
- void **activate** ()

Allows a menu item to be picked.
- void **deactivate** ()

Prevents a menu item from being picked.
- int **activevisible** () const

Returns non 0 if FL_INACTIVE and FL_INVISIBLE are cleared, 0 otherwise.
- void **image** (Fl_Image *a)

compatibility api for FLUID, same as a->label(this)
- void **image** (Fl_Image &a)

compatibility api for FLUID, same as a.label(this)
- int **measure** (int *h, const Fl_Menu_ *) const

Measures width of label, including effect of & characters.
- void **draw** (int x, int y, int w, int h, const Fl_Menu_ *, int t=0) const

Draws the menu item in bounding box x,y,w,h, optionally selects the item.
- const Fl_Menu_Item * **popup** (int X, int Y, const char *title=0, const Fl_Menu_Item *picked=0, const Fl_Menu_ *=0) const

This method is called by widgets that want to display menus.
- const Fl_Menu_Item * **pulldown** (int X, int Y, int W, int H, const Fl_Menu_Item *picked=0, const Fl_Menu_ *=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.
- const Fl_Menu_Item * **test_shortcut** () const

This is designed to be called by a widgets handle() method in response to a FL_SHORTCUT event.

- const `Fl_Menu_Item` * `find_shortcut` (int *ip=0) const
Search only the top level menu for a shortcut.
- void `do_callback` (`Fl_Widget` *o) const
Call the `Fl_Menu_Item` item's callback, and provide the `Fl_Widget` argument (and optionally override the `user_data()` argument).
- void `do_callback` (`Fl_Widget` *o, void *arg) const
Call the `Fl_Menu_Item` item's callback, and provide the `Fl_Widget` argument (and optionally override the `user_data()` argument).
- void `do_callback` (`Fl_Widget` *o, long arg) const
Call the `Fl_Menu_Item` item's callback, and provide the `Fl_Widget` argument (and optionally override the `user_data()` argument).
- int `checked` () const
back compatibility only
- void `check` ()
back compatibility only
- void `uncheck` ()
back compatibility only
- int `add` (const char *, int shortcut, `Fl_Callback` *, void *=0, int=0)
Adds an item.
- int `add` (const char *a, const char *b, `Fl_Callback` *c, void *d=0, int e=0)
See int `add(const char, int shortcut, Fl_Callback*, void*, int)`.*
- int `size` () const
Size of the menu starting from this menu item.

Public Attributes

- const char * `text`
menu item text, returned by `label()`
- int `shortcut_`
menu item shortcut
- `Fl_Callback` * `callback_`
menu item callback
- void * `user_data_`
menu item user_data for 3rd party apps
- int `flags`

menu item flags like FL_MENU_TOGGLE,FL_MENU_RADIO

- **uchar labeltype_**
how the menu item text looks like
- **Fl_Font labelfont_**
which font for this menu item text
- **Fl_Fontsize labelsize_**
size of menu item text
- **unsigned labelcolor_**
menu item text color

30.55.1 Detailed Description

The [Fl_Menu_Item](#) structure defines a single menu item that is used by the [Fl_Menu_](#) class.

```
struct Fl_Menu_Item {
    const char*          text; // label()
    ulong                shortcut_;
    Fl_Callback*         callback_;
    void*                user_data_;
    int                  flags;
    uchar                labeltype_;
    uchar                labelfont_;
    uchar                labelsize_;
    uchar                labelcolor_;
};

enum { // values for flags:
    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
};
```

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:

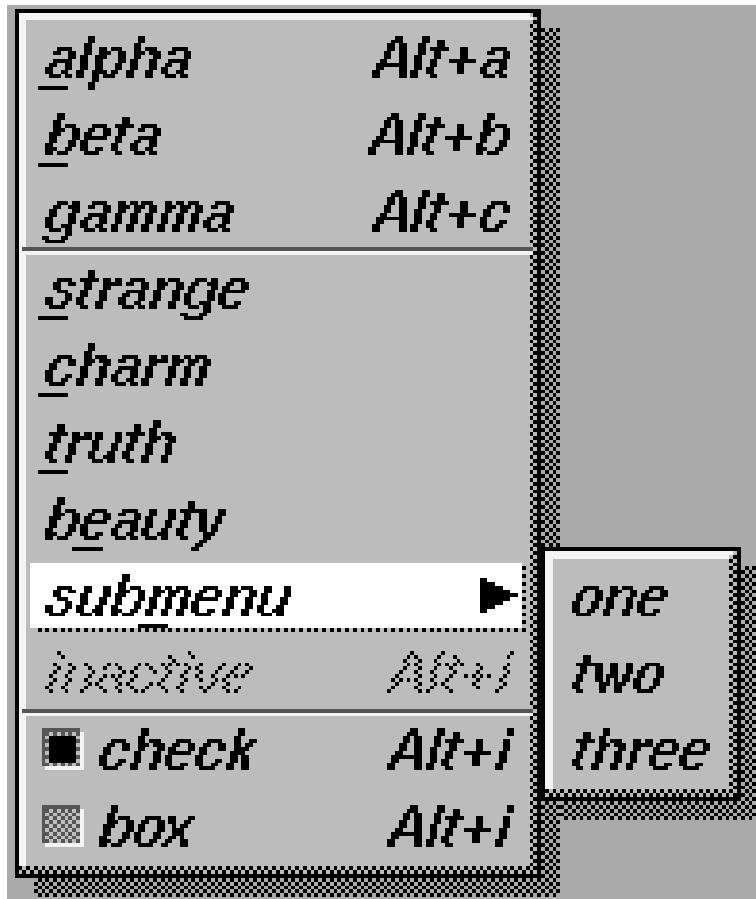


Figure 30.20: menu

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.

30.55.2 Member Function Documentation

30.55.2.1 `void Fl_Menu_Item::activate () [inline]`

Allows a menu item to be picked.

30.55.2.2 int Fl_Menu_Item::active () const [inline]

Get whether or not the item can be picked.

30.55.2.3 int Fl_Menu_Item::activevisible () const [inline]

Returns non 0 if FL_INACTIVE and FL_INVISIBLE are cleared, 0 otherwise.

30.55.2.4 int Fl_Menu_Item::add (const char * mytext, int sc, Fl_Callback * cb, void * data = 0, int myflags = 0)

Adds an 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 SUBMENU in the flags):

30.55.2.5 void Fl_Menu_Item::argument (long v) [inline]

For convenience you can also define the callback as taking a long argument.

This is implemented by casting this to a Fl_Callback and casting the long to a void* and may not be portable to some machines.

30.55.2.6 long Fl_Menu_Item::argument () const [inline]

For convenience you can also define the callback as taking a long argument.

This is implemented by casting this to a Fl_Callback and casting the long to a void* and may not be portable to some machines.

30.55.2.7 Fl_Callback_p Fl_Menu_Item::callback () const [inline]

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.

30.55.2.8 void Fl_Menu_Item::check () [inline]

back compatibility only

Deprecated**30.55.2.9 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.

30.55.2.10 int Fl_Menu_Item::checked () const [inline]

back compatibility only

Deprecated**30.55.2.11 void Fl_Menu_Item::clear () [inline]**

Turns the check or radio item "off" for the menu item.

30.55.2.12 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.

30.55.2.13 void Fl_Menu_Item::do_callback (Fl_Widget *o, long arg) const [inline]

Call the [Fl_Menu_Item](#) item's callback, and provide the [Fl_Widget](#) argument (and optionally override the [user_data\(\)](#) argument).

You must first check that [callback\(\)](#) is non-zero before calling this.

30.55.2.14 void Fl_Menu_Item::do_callback (Fl_Widget *o, void *arg) const [inline]

Call the [Fl_Menu_Item](#) item's callback, and provide the [Fl_Widget](#) argument (and optionally override the [user_data\(\)](#) argument).

You must first check that [callback\(\)](#) is non-zero before calling this.

30.55.2.15 void Fl_Menu_Item::do_callback (Fl_Widget *o) const [inline]

Call the [Fl_Menu_Item](#) item's callback, and provide the [Fl_Widget](#) argument (and optionally override the [user_data\(\)](#) argument).

You must first check that [callback\(\)](#) is non-zero before calling this.

30.55.2.16 void Fl_Menu_Item::draw (int x, int y, int w, int h, const Fl_Menu_ *m, int selected = 0) const

Draws the menu item in bounding box x,y,w,h, optionally selects the item.

30.55.2.17 const Fl_Menu_Item * Fl_Menu_Item::find_shortcut (int *ip = 0) const

Search only the top level menu for a shortcut.

Either &x in the label or the shortcut fields are used.

30.55.2.18 Fl_Menu_Item* Fl_Menu_Item::first () [inline]

Returns the first menu item, same as next(0).

30.55.2.19 const Fl_Menu_Item* Fl_Menu_Item::first () const [inline]

Returns the first menu item, same as next(0).

30.55.2.20 void Fl_Menu_Item::hide () [inline]

Hides an item in the menu.

30.55.2.21 const char* Fl_Menu_Item::label () const [inline]

This is the title of the 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.

30.55.2.22 Fl_Color Fl_Menu_Item::labelcolor () const [inline]

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.

30.55.2.23 void Fl_Menu_Item::labelfont (Fl_Font a) [inline]

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.

30.55.2.24 Fl_Font Fl_Menu_Item::labelfont () const [inline]

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.

30.55.2.25 void Fl_Menu_Item::labelsize (Fl_Fontsize a) [inline]

Sets the label font pixel size/height.

30.55.2.26 Fl_Fontsize Fl_Menu_Item::labelsize () const [inline]

Gets or sets the label font pixel size/height.

Gets the label font pixel size/height.

30.55.2.27 void Fl_Menu_Item::labeltype (Fl_Labeltype a) [inline]

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.

30.55.2.28 Fl_Labeltype Fl_Menu_Item::labeltype () const [inline]

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.

30.55.2.29 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.

30.55.2.30 Fl_Menu_Item* Fl_Menu_Item::next (int i = 1) [inline]

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.

30.55.2.31 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.

30.55.2.32 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_ * but = 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.*

X,Y is 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).

title is a character string title for the menu. If non-zero a small box appears above the menu with the title in it.

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.

button is a pointer to an `Fl_Menu_` from which the color and boxtypes for the menu are pulled. If NULL then defaults are used.

30.55.2.33 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 * t = 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 is centered over the rectangle (like [Fl_Choice](#) uses). If picked is zero 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.

30.55.2.34 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.

30.55.2.35 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 [set_only\(\)](#) does.

30.55.2.36 void Fl_Menu_Item::setonly ()

Turns the radio item "on" for the menu item and turns off adjacent radio items set.

30.55.2.37 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).

30.55.2.38 int Fl_Menu_Item::shortcut () const [inline]

Gets what key combination shortcut will trigger the menu item.

30.55.2.39 void Fl_Menu_Item::show () [inline]

Makes an item visible in the menu.

30.55.2.40 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.

30.55.2.41 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 preceded by ‘‘

30.55.2.42 void Fl_Menu_Item::uncheck () [inline]

back compatibility only

Deprecated

30.55.2.43 int Fl_Menu_Item::value () const [inline]

Returns the current value of the check or radio item.

30.55.2.44 int Fl_Menu_Item::visible () const [inline]

Gets the visibility of an item.

The documentation for this struct was generated from the following files:

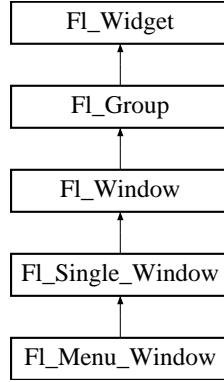
- Fl_Menu_Item.H
- Fl_Menu.cxx
- Fl_Menu_.cxx
- Fl_Menu_add.cxx

30.56 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

- void [show](#) ()

Put the window on the screen.

- void [erase](#) ()

Erases the window, does nothing if HAVE_OVERLAY is not defined config.h.

- void [flush](#) ()

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

- void [hide](#) ()

Remove the window from the screen.

- int [overlay](#) ()

Tells if hardware overlay mode is set.

- void [set_overlay](#) ()

Tells FLTK to use hardware overlay planes if they are available.

- void [clear_overlay](#) ()

Tells FLTK to use normal drawing planes instead of overlay planes.

- [~Fl_Menu_Window](#) ()

Destroys the window and all of its children.

- [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.

30.56.1 Detailed Description

The [Fl_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.

30.56.2 Constructor & Destructor Documentation

30.56.2.1 [Fl_Menu_Window::~Fl_Menu_Window \(\)](#)

Destroys the window and all of its children.

30.56.2.2 [Fl_Menu_Window::Fl_Menu_Window \(int W, int H, const char *l = 0\) \[inline\]](#)

Creates a new [Fl_Menu_Window](#) widget using the given size, and label string.

30.56.2.3 [Fl_Menu_Window::Fl_Menu_Window \(int X, int Y, int W, int H, const char *l = 0\) \[inline\]](#)

Creates a new [Fl_Menu_Window](#) widget using the given position, size, and label string.

30.56.3 Member Function Documentation

30.56.3.1 [void Fl_Menu_Window::clear_overlay \(\) \[inline\]](#)

Tells FLTK to use normal drawing planes instead of overlay planes.

This is usually necessary if your menu contains multi-color pixmaps.

30.56.3.2 [void Fl_Menu_Window::flush \(\) \[virtual\]](#)

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

Reimplemented from [Fl_Single_Window](#).

30.56.3.3 [void Fl_Menu_Window::hide \(\) \[virtual\]](#)

Remove 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_Window](#).

30.56.3.4 [void Fl_Menu_Window::set_overlay \(\) \[inline\]](#)

Tells FLTK to use hardware overlay planes if they are available.

30.56.3.5 void Fl_Menu_Window::show () [virtual]

Put the window on the screen.

Usually this has the side effect of opening the display. The second form is used for top-level windows and allow standard arguments to be parsed from the command-line.

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.

Reimplemented from [Fl_Single_Window](#).

The documentation for this class was generated from the following files:

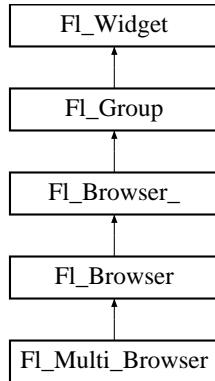
- [Fl_Menu_Window.H](#)
- [Fl_Menu_Window.cxx](#)

30.57 Fl_Multi_Browser Class Reference

The [Fl_Multi_Browser](#) class is a subclass of [Fl_Browser](#) which lets the user select any set of the lines.

```
#include <Fl_Multi_Browser.h>
```

Inheritance diagram for Fl_Multi_Browser::



Public Member Functions

- [Fl_Multi_Browser](#) (int X, int Y, int W, int H, const char *L=0)

Creates a new [Fl_Multi_Browser](#) widget using the given position, size, and label string.

30.57.1 Detailed Description

The [Fl_Multi_Browser](#) class is a subclass of [Fl_Browser](#) which lets the user select any set of the lines.

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 shift + click toggles the items. This is different then how forms did it. 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.

30.57.2 Constructor & Destructor Documentation

30.57.2.1 [Fl_Multi_Browser::Fl_Multi_Browser](#) (int X, int Y, int W, int H, const char * L = 0) [inline]

Creates a new [Fl_Multi_Browser](#) widget using the given position, size, and label string.

The default boxtyle is [FL_DOWN_BOX](#). The constructor specializes [Fl_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 file:

- [Fl_Multi_Browser.H](#)

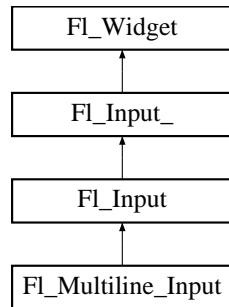
30.58 Fl_Multiline_Input Class Reference

This input field displays '

' 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.

30.58.1 Detailed Description

This input field displays '

' 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. I think FLTK can be used to write a powerful text editor, but it is not going to be a built-in feature. Powerful text editors in a toolkit are a big source of bloat.

30.58.2 Constructor & Destructor Documentation

30.58.2.1 [Fl_Multiline_Input::Fl_Multiline_Input](#) (int X, int Y, int W, int H, const char * l = 0) [inline]

Creates a new Fl_Multiline_Input widget using the given position, size, and label string.

The default boxtyle 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 file:

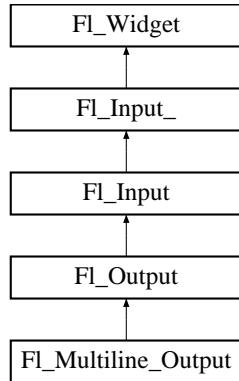
- [Fl_Multiline_Input.H](#)

30.59 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

- [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.

30.59.1 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.

30.59.2 Constructor & Destructor Documentation

30.59.2.1 [Fl_Multiline_Output::Fl_Multiline_Output](#) (int X, int Y, int W, int H, const char *l = 0) [inline]

Creates a new [Fl_Multiline_Output](#) widget using the given position, size, and label string.

The default boxtyle 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 file:

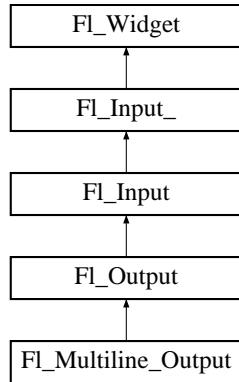
- [Fl_Multiline_Output.H](#)

30.60 Fl_Output Class Reference

This widget displays a piece of text.

```
#include <Fl_Output.h>
```

Inheritance diagram for Fl_Output::



Public Member Functions

- [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.

30.60.1 Detailed Description

This widget displays a piece of text.

When you set the [value\(\)](#) , [Fl_Output](#) does a strcpy() to it's 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 30.21: Fl_Output

There is a single subclass, [Fl_Multiline_Output](#), which allows you to display multiple lines of text.

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.

30.60.2 Constructor & Destructor Documentation

30.60.2.1 `Fl_Output::Fl_Output (int X, int Y, int W, int H, const char *l = 0) [inline]`

Creates a new [Fl_Output](#) widget using the given position, size, and label string.

The default boxtyle is FL_DOWN_BOX.

Inherited destrucor destroys the widget and any value associated with it.

The documentation for this class was generated from the following file:

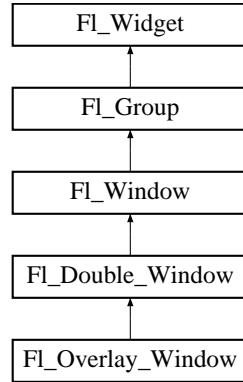
- [Fl_Output.H](#)

30.61 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

- void [show \(\)](#)
Put the window on the screen.
- void [flush \(\)](#)
Forces the window to be redrawn.
- void [hide \(\)](#)
Remove the window from the screen.
- void [resize \(int, int, int, int\)](#)
Changes the size and position of the window.
- [~Fl_Overlay_Window \(\)](#)
Destroys the window and all child widgets.
- int [can_do_overlay \(\)](#)
- void [redraw_overlay \(\)](#)
Call this to indicate that the overlay data has changed and needs to be redrawn.
- [Fl_Overlay_Window \(int W, int H, const char *l=0\)](#)
Creates a new [Fl_Overlay_Window](#) widget using the given position, size, and label (title) string.
- [Fl_Overlay_Window \(int X, int Y, int W, int H, const char *l=0\)](#)
*See [Fl_Overlay_Window::Fl_Overlay_Window\(int W, int H, const char *l=0\)](#).*
- void [show \(int a, char **b\)](#)
See virtual void [Fl_Window::show\(\)](#).

Friends

- class [_Fl_Overlay](#)

30.61.1 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.

30.61.2 Constructor & Destructor Documentation

30.61.2.1 [Fl_Overlay_Window::Fl_Overlay_Window](#) (int *W*, int *H*, const char * *l* = 0) [inline]

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.

30.61.3 Member Function Documentation

30.61.3.1 [void Fl_Overlay_Window::hide](#) () [virtual]

Remove 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_Double_Window](#).

30.61.3.2 [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\(\)](#).

30.61.3.3 [void Fl_Overlay_Window::resize](#) (int, int, int, int) [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_Double_Window](#).

30.61.3.4 void Fl_Overlay_Window::show () [virtual]

Put the window on the screen.

Usually this has the side effect of opening the display. The second form is used for top-level windows and allow standard arguments to be parsed from the command-line.

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.

Reimplemented from [Fl_Double_Window](#).

The documentation for this class was generated from the following files:

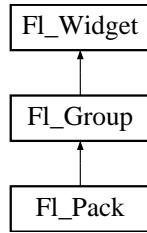
- [Fl_Overlay_Window.H](#)
- [Fl_Overlay_Window.cxx](#)

30.62 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

- void [draw\(\)](#)
Draw the widget.
- [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.
- 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.
- uchar [horizontal\(\) const](#)
Same as [Fl_Group::type\(\)](#).

30.62.1 Detailed Description

This widget was designed to add the functionality of compressing and aligning widgets.

If [type\(\)](#) is `Fl_Pack::HORIZONTAL` all the children are resized to the height of the [Fl_Pack](#), and are moved next to each other horizontally. If [type\(\)](#) is not `Fl_Pack::HORIZONTAL` then the children are resized to the width and are stacked below each other. Then the [Fl_Pack](#) resizes itself to surround the child widgets.

This widget is needed for the [Fl_Tabs](#). In addition you may want to put the [Fl_Pack](#) inside an [Fl_Scroll](#).

The resizable for [Fl_Pack](#) is set to NULL by default.

See also: [Fl_Group::resizable\(\)](#)

30.62.2 Constructor & Destructor Documentation

30.62.2.1 `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 boxtyle 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_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.

30.62.3 Member Function Documentation

30.62.3.1 `void Fl_Pack::draw () [virtual]`

Draw 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.

Reimplemented from `Fl_Group`.

The documentation for this class was generated from the following files:

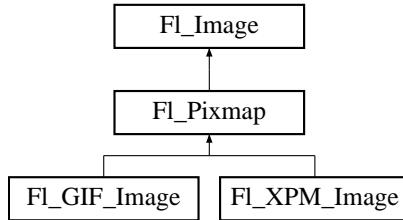
- `Fl_Pack.H`
- `Fl_Pack.cxx`

30.63 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

- [Fl_Pixmap \(char *const *D\)](#)

The constructors create a new pixmap from the specified XPM data.

- [Fl_Pixmap \(uchar *const *D\)](#)

The constructors create a new pixmap from the specified XPM data.

- [Fl_Pixmap \(const char *const *D\)](#)

The constructors create a new pixmap from the specified XPM data.

- [Fl_Pixmap \(const uchar *const *D\)](#)

The constructors create a new pixmap from the specified XPM data.

- virtual [~Fl_Pixmap \(\)](#)

The destructor free all memory and server resources that are used by the pixmap.

- virtual [Fl_Image * copy \(int W, int H\)](#)

The [copy\(\)](#) method creates a copy of the specified image.

- [Fl_Image * copy \(\)](#)

The [copy\(\)](#) method creates a copy of the specified image.

- virtual void [color_average \(Fl_Color c, float i\)](#)

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.

- virtual void [desaturate \(\)](#)

The [desaturate\(\)](#) method converts an image to grayscale.

- virtual void [draw \(int X, int Y, int W, int H, int cx=0, int cy=0\)](#)

The [draw\(\)](#) methods draw the image.

- void [draw \(int X, int Y\)](#)

The [draw\(\)](#) methods draw the image.

- virtual void **label (Fl_Widget *w)**

The **label()** methods are an obsolete way to set the image attribute of a widget or menu item.

- virtual void **label (Fl_Menu_Item *m)**

The **label()** methods are an obsolete way to set the image attribute of a widget or menu item.

- virtual void **uncache ()**

If the image has been cached for display, delete the cache data.

Public Attributes

- int **alloc_data**
- unsigned **id**
- unsigned **mask**

Protected Member Functions

- void **measure ()**

30.63.1 Detailed Description

The **Fl_Pixmap** class supports caching and drawing of colormap (pixmap) images, including transparency.

30.63.2 Constructor & Destructor Documentation

30.63.2.1 **Fl_Pixmap::Fl_Pixmap (char *const *D)** [inline, explicit]

The constructors create a new pixmap from the specified XPM data.

30.63.2.2 **Fl_Pixmap::Fl_Pixmap (uchar *const *D)** [inline, explicit]

The constructors create a new pixmap from the specified XPM data.

30.63.2.3 **Fl_Pixmap::Fl_Pixmap (const char *const *D)** [inline, explicit]

The constructors create a new pixmap from the specified XPM data.

30.63.2.4 **Fl_Pixmap::Fl_Pixmap (const uchar *const *D)** [inline, explicit]

The constructors create a new pixmap from the specified XPM data.

30.63.3 Member Function Documentation

30.63.3.1 void Fl_Pixmap::color_average (Fl_Color c, float i) [virtual]

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.

The i 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. *The original image data is not altered by this method.*

Reimplemented from [Fl_Image](#).

30.63.3.2 Fl_Image* Fl_Pixmap::copy () [inline]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.63.3.3 Fl_Image * Fl_Pixmap::copy (int W, int H) [virtual]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.63.3.4 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. *This method does not alter the original image data.*

Reimplemented from [Fl_Image](#).

30.63.3.5 void Fl_Pixmap::draw (int X, int Y) [inline]

The [draw\(\)](#) methods draw the image.

This form specifies the upper-lefthand corner of the image

Reimplemented from [Fl_Image](#).

30.63.3.6 void Fl_Pixmap::draw (int X, int Y, int W, int H, int cx = 0, int cy = 0) [virtual]

The [draw\(\)](#) methods draw the image.

This form specifies a bounding box for the image, with the origin (upper-lefthand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Image](#).

30.63.3.7 void Fl_Pixmap::label (Fl_Menu_Item * *m*) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

30.63.3.8 void Fl_Pixmap::label (Fl_Widget * *widget*) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

30.63.3.9 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:

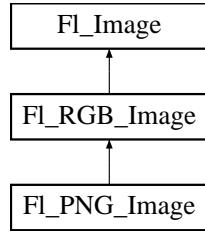
- [Fl_Pixmap.H](#)
- [Fl_Pixmap.cxx](#)

30.64 Fl_PNG_Image Class Reference

The [Fl_PNG_Image](#) class supports loading, caching, and drawing of Portable Network Graphics (PNG) image files.

```
#include <Fl_PNG_Image.h>
```

Inheritance diagram for Fl_PNG_Image::



Public Member Functions

- [Fl_PNG_Image](#) (const char *filename)

The constructor loads the named PNG image from the given png filename.

30.64.1 Detailed Description

The [Fl_PNG_Image](#) class supports loading, caching, and drawing of Portable Network Graphics (PNG) image files.

The class loads colormapped and full-color images and handles color- and alpha-based transparency.

30.64.2 Constructor & Destructor Documentation

30.64.2.1 Fl_PNG_Image::Fl_PNG_Image (const char * *png*)

The constructor loads the named PNG image from the given png filename.

The destructor free all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

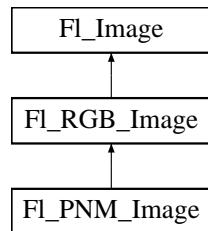
- Fl_PNG_Image.H
- Fl_PNG_Image.cxx

30.65 Fl_PNM_Image Class Reference

The [Fl_PNM_Image](#) class supports loading, caching, and drawing of Portable Anymap (PNM, PBM, PGM, PPM) image files.

```
#include <Fl_PNM_Image.h>
```

Inheritance diagram for Fl_PNM_Image::



Public Member Functions

- [Fl_PNM_Image](#) (const char *filename)

The constructor loads the named PNM image.

30.65.1 Detailed Description

The [Fl_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.

30.65.2 Constructor & Destructor Documentation

30.65.2.1 Fl_PNM_Image::Fl_PNM_Image (const char * *name*)

The constructor loads the named PNM image.

The inherited destructor free all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

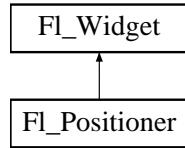
- [Fl_PNM_Image.H](#)
- [Fl_PNM_Image.cxx](#)

30.66 Fl_Positioner Class Reference

This class is provided for Forms compatibility.

```
#include <Fl_Positioner.H>
```

Inheritance diagram for Fl_Positioner::



Public Member Functions

- int **handle** (int)
Handles the specified event.
- **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.
- double **xvalue** () const
Gets the X axis coordinate.
- double **yvalue** () const
Gets the Y axis coordinate.
- int **xvalue** (double)
Sets the X axis coordinate.
- int **yvalue** (double)
Sets the Y axis coordinate.
- int **value** (double, double)
Returns the current position in x and y.
- void **xbounds** (double, double)
Sets the X axis bounds.
- double **xminimum** () const
Gets the X axis minimum.
- void **xminimum** (double a)
Same as xbounds(a, [xmaximum\(\)](#)).
- double **xmaximum** () const
Gets the X axis maximum.
- void **xmaximum** (double a)

Same as xbounds(xminimum(), a).

- void **ybounds** (double, double)
Sets the Y axis bounds.
- double **yminimum** () const
Gets the Y axis minimum.
- void **yminimum** (double a)
Same as ybounds(a, ymaximum()).
- double **ymaximum** () const
Gets the Y axis maximum.
- void **ymaximum** (double a)
Same as ybounds(ymininimum(), a).
- void **xstep** (double a)
Sets the stepping value for the X axis.
- void **ystep** (double a)
Sets the stepping value for the Y axis.

Protected Member Functions

- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int, int)
- void **draw** ()
Draw the widget.

30.66.1 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\(\)](#).

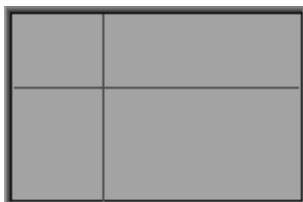


Figure 30.22: Fl_Positioner

30.66.2 Constructor & Destructor Documentation

30.66.2.1 `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.

Creates a new `FL_Positioner` widget using the given position, size, and label string.

The default boxtyle is `FL_NO_BOX`.

30.66.3 Member Function Documentation

30.66.3.1 `void FL_Positioner::draw () [protected, virtual]`

Draw 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.

Implements `FL_Widget`.

30.66.3.2 `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 new 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.

Parameters:

← *event* 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`.

30.66.3.3 `int FL_Positioner::value (double X, double Y)`

Returns the current position in x and y.

30.66.3.4 void Fl_Positioner::xbounds (double *a*, double *b*)

Sets the X axis bounds.

30.66.3.5 void Fl_Positioner::xstep (double *a*) [inline]

Sets the stepping value for the X axis.

30.66.3.6 int Fl_Positioner::xvalue (double *X*)

Sets the X axis coordinate.

30.66.3.7 double Fl_Positioner::xvalue () const [inline]

Gets the X axis coordinate.

30.66.3.8 void Fl_Positioner::ybounds (double *a*, double *b*)

Sets the Y axis bounds.

30.66.3.9 void Fl_Positioner::ystep (double *a*) [inline]

Sets the stepping value for the Y axis.

30.66.3.10 int Fl_Positioner::yvalue (double *Y*)

Sets the Y axis coordinate.

30.66.3.11 double Fl_Positioner::yvalue () const [inline]

Gets the Y axis coordinate.

The documentation for this class was generated from the following files:

- Fl_Positioner.H
- Fl_Positioner.cxx

30.67 Fl_Preferences Class Reference

[Fl_Preferences](#) provides methods to store user settings between application starts.

```
#include <Fl_Preferences.H>
```

Classes

- struct [Entry](#)

An entry associates a preference name to its corresponding value.

- 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

- enum [Root](#) { [SYSTEM](#) = 0, [USER](#) }

Define the scope of the preferences.

Public Member Functions

- [Fl_Preferences \(Root root, const char *vendor, const char *application\)](#)

The constructor creates a group that manages name/value pairs and child groups.

- [Fl_Preferences \(const char *path, const char *vendor, const char *application\)](#)

This constructor is used to create or read a preferences file at an arbitrary position in the file system.

- [Fl_Preferences \(Fl_Preferences &parent, const char *group\)](#)

This constructor generates a new group of preference entries inside the group or file parent.

- [Fl_Preferences \(Fl_Preferences *, const char *group\)](#)

create a Preferences node in relation to a parent node for reading and writing

- parent: base name for group

- group: group name (can contain '/' separated group names) example: [Fl_Preferences colors\(base, "setup/colors" \);](#)

- [~Fl_Preferences \(\)](#)

The destructor removes allocated resources.

- int [groups \(\)](#)

Returns the number of groups that are contained within a group.

- const char * [group \(int num_group\)](#)

Returns the name of the Nth group.

- char **groupExists** (const char *key)
Returns non-zero if a group with this name exists.
- char **deleteGroup** (const char *group)
Deletes a group.
- 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 **entryExists** (const char *key)
Returns non-zero if an entry with this name exists.
- char **deleteEntry** (const char *entry)
Removes a single entry (name/value pair).
- char **set** (const char *entry, int value)
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, 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, 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 **get** (const char *entry, int &value, int 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, double &value, double defaultValue)
Reads an entry from the group.
- 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, 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 maxSize)

Reads an entry from the group.

- int `size` (const char *entry)

Returns the size of the value part of an entry.

- char `getUserdataPath` (char *path, int pathlen)

Creates a path that is related to the preferences file and that is usable for application data beyond what is covered by `Fl_Preferences`.

- void `flush` ()

Write all preferences to disk.

Friends

- class `Node`
- class `RootNode`

30.67.1 Detailed Description

`Fl_Preferences` provides methods to store user settings between application starts.

It is similar to the Registry on WIN32 and Preferences on MacOS, and provides a simple configuration mechanism for UNIX.

`Fl_Preferences` uses a hierarchy to store data. It bundles similar data into groups and manages entries into those groups as name/value pairs.

Preferences are stored in text files that can be edited manually. The file format is easy to read and relatively forgiving. Preferences 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.

Entries can be of any length. However, the size of each preferences file should be kept under 100k for performance reasons. One application can have multiple preferences files. Extensive binary data however should be stored in separate files; see `getUserdataPath()`.

30.67.2 Member Enumeration Documentation

30.67.2.1 enum `Fl_Preferences::Root`

Define the scope of the preferences.

Enumerator:

SYSTEM Preferences are used system-wide.

USER Preferences apply only to the current user.

30.67.3 Constructor & Destructor Documentation

30.67.3.1 Fl_Preferences::Fl_Preferences (Root *root*, const char * *vendor*, const char * *application*)

The constructor creates a group that manages name/value pairs and child groups.

create the initial preferences base

- *root*: machine or user preferences
- *vendor*: unique identification of author or vendor of application Must be a valid directory name.

Groups are ready for reading and writing at any time. The root argument is either [Fl_Preferences::USER](#) or [Fl_Preferences::SYSTEM](#).

This constructor creates the *base* instance for all following entries and reads existing databases into memory. The vendor argument is a unique text string identifying the development team or vendor of an application. A domain name or an EMail address are great unique names, e.g. "researchATmatthiasm.com" or "fltk.org". The application argument can be the working title or final name of your application. Both vendor and application must be valid relative UNIX pathnames and may contain '/'s to create deeper file structures.

Parameters:

- ← *root* can be USER or SYSTEM for user specific or system wide preferences
- ← *vendor* unique text describing the company or author of this file
- ← *application* unique text describing the application
- *application*: vendor unique application name, i.e. "PreferencesTest" multiple preferences files can be created per application. Must be a valid file name. example: [Fl_Preferences](#) base([Fl_Preferences::USER](#), "fltk.org", "test01");

30.67.3.2 Fl_Preferences::Fl_Preferences (const char * *path*, const char * *vendor*, const char * *application*)

This constructor is used to create or read a preferences file at an arbitrary position in the file system.

create the initial preferences base

- *path*: an application-supplied path example: [Fl_Preferences](#) base("/usr/foo");

The file name is generated as *path/application.prefs*. If *application* is 0, *path* must contain the full file name.

Parameters:

- ← *path* path to the directory that contains the preferences file
- ← *vendor* unique text describing the company or author of this file
- ← *application* unique text describing the application

30.67.3.3 Fl_Preferences::Fl_Preferences (Fl_Preferences & parent, const char * group)

This constructor generates a new group of preference entries inside the group or file *parent*.
create a Preferences node in relation to a parent node for reading and writing

- parent: base name for group
- group: group name (can contain '/' separated group names) example: [Fl_Preferences colors\(base, "setup/colors" \);](#)

The group argument identifies a group of entries. It can contain '/'s to get quick access to individual elements inside the hierarchy.

Parameters:

- ← *parent* reference object for the new group
- ← *group* name of the group to access (may contain '/'s)

30.67.3.4 Fl_Preferences::Fl_Preferences (Fl_Preferences * parent, const char * group)

create a Preferences node in relation to a parent node for reading and writing

- parent: base name for group
- group: group name (can contain '/' separated group names) example: [Fl_Preferences colors\(base, "setup/colors" \);](#)

See also:

[Fl_Preferences\(Fl_Preferences&, const char *group \)](#)

30.67.3.5 Fl_Preferences::~Fl_Preferences ()

The destructor removes allocated resources.

destroy individual keys

- destroying the base preferences will flush changes to the prefs file
- after destroying the base, none of the depending preferences must be read or written

When used on the *base* preferences group, the destructor flushes all changes to the preferences file and deletes all internal databases.

30.67.4 Member Function Documentation

30.67.4.1 char Fl_Preferences::deleteEntry (const char * entry)

Removes a single entry (name/value pair).

remove a single entry (name/value pair) example: `buttonColor.deleteEntry("red");`

Parameters:

← *entry* name of entry to delete

Returns:

0 if deleting the entry failed

30.67.4.2 char Fl_Preferences::deleteGroup (const char * *group*)

Deletes a group.

delete a group example: setup.deleteGroup("colors/buttons");

Parameters:

← *group* name of the group to delete

Returns:

0 if call failed

30.67.4.3 int Fl_Preferences::entries ()

Returns the number of entries (name/value pairs) in a group.

return the number of entries (name/value) pairs for a group example: int n = buttonColor.entries();

Returns:

number of entries

30.67.4.4 const char * Fl_Preferences::entry (int *index*)

Returns the name of an entry.

return the name of an entry

- there is no guaranteed order of entry names
- the index must be within the range given by [entries\(\)](#) example: printf("Entry(%d)=%s\n", ix, buttonColor.entry(ix));

There is no guaranteed order of entry names. The index must be within the range given by [entries\(\)](#).

Parameters:

← *index* number indexing the requested entry

Returns:

pointer to value cstring

30.67.4.5 char Fl_Preferences::entryExists (const char *key)

Returns non-zero if an entry with this name exists.

return 1, if an entry with this name exists example: if (buttonColor.entryExists("red")).

Parameters:

← *key* name of entry that is searched for

Returns:

0 if entry was not found

..

30.67.4.6 void Fl_Preferences::flush ()

Write all preferences to disk.

write all preferences to disk

- this function works only with the base preference group
- this function is rarely used as deleting the base preferences flushes automatically

This function works only with the base preference group. This function is rarely used as deleting the base preferences flushes automatically.

30.67.4.7 char Fl_Preferences::get (const char *entry, void *value, const void *defaultValue, int defaultSize, int maxSize)

Reads an entry from the group.

read a binary entry from the group the data will be moved into the given destination buffer data will be clipped to the buffer size

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.

Parameters:

← *entry* name of entry
 → *value* returned from preferences or default value if none was set
 ← *defaultValue* default value to be used if no preference was set
 ← *defaultSize* size of default value array
 ← *maxSize* maximum length of value

Returns:

0 if the default value was used

Todo

maxSize should receive the number of bytes that were read.

30.67.4.8 char Fl_Preferences::get (const char * *entry*, void *& *value*, const void * *defaultValue*, int *defaultSize*)

Reads an entry from the group.

read a binary entry from the group 'data' will be changed to point to a new data buffer the data buffer must be deleted with 'free(data)' by the user.

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:

- ← *entry* name of entry
- *value* returned from preferences or default value if none was set
- ← *defaultValue* default value to be used if no preference was set
- ← *defaultSize* size of default value array

Returns:

0 if the default value was used

30.67.4.9 char Fl_Preferences::get (const char * *entry*, char * *value*, const char * *defaultValue*, int *maxSize*)

Reads an entry from the group.

read a text entry from the group the text will be moved into the given text buffer text will be clipped to the buffer size

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:

- ← *entry* name of entry
- *value* returned from preferences or default value if none was set
- ← *defaultValue* default value to be used if no preference was set
- ← *maxSize* maximum length of value plus one byte for a trailing zero

Returns:

0 if the default value was used

30.67.4.10 char Fl_Preferences::get (const char * *entry*, char *& *value*, const char * *defaultValue*)

Reads an entry from the group.

read a text entry from the group 'text' will be changed to point to a new text buffer the text buffer must be deleted with 'free(text)' by the user.

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:

- ← *entry* name of entry
- *value* returned from preferences or default value if none was set
- ← *defaultValue* default value to be used if no preference was set

Returns:

0 if the default value was used

30.67.4.11 char Fl_Preferences::get (const char * *entry*, 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:

- ← *entry* name of entry
- *value* returned from preferences or default value if none was set
- ← *defaultValue* default value to be used if no preference was set

Returns:

0 if the default value was used

30.67.4.12 char Fl_Preferences::get (const char * *entry*, 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:

- ← *entry* name of entry
- *value* returned from preferences or default value if none was set
- ← *defaultValue* default value to be used if no preference was set

Returns:

0 if the default value was used

30.67.4.13 char Fl_Preferences::get (const char * *entry*, 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:

- ← **entry** name of entry
- **value** returned from preferences or default value if none was set
- ← **defaultValue** default value to be used if no preference was set

Returns:

0 if the default value was used

30.67.4.14 char Fl_Preferences::getUserdataPath (char **path*, int *pathlen*)

Creates a path that is related to the preferences file and that is usable for application data beyond what is covered by [Fl_Preferences](#).

creates a path that is related to the preferences file and that is usable for application data beyond what is covered by [Fl_Preferences](#).

Parameters:

- **path** buffer for user data path
- ← **pathlen** size of path buffer

Returns:

0 if path was not created or pathname can't fit into buffer

- 'getUserdataPath' actually creates the directory
- 'path' must be large enough to receive a complete file path example: [Fl_Preferences](#) prefs(USER, "matthiasm.com", "test"); char path[FL_PATH_MAX]; prefs.getUserdataPath(path); sample returns: Win32: c:/Documents and Settings/matt/Application Data/matthiasm.com/test/ prefs: c:/Documents and Settings/matt/Application Data/matthiasm.com/test.prefs

30.67.4.15 const char * Fl_Preferences::group (int *num_group*)

Returns the name of the Nth group.

return the group name of the n'th group

- there is no guaranteed order of group names
- the index must be within the range given by [groups\(\)](#) example: printf("Group(%d)=%s'\n", ix, base.group(ix));

There is no guaranteed order of group names. The index must be within the range given by [groups\(\)](#).

Parameters:

- ← **num_group** number indexing the requested group

Returns:

cstring pointer to the group name

30.67.4.16 char Fl_Preferences::groupExists (const char * *key*)

Returns non-zero if a group with this name exists.

return 1, if a group with this name exists example: if (base.groupExists("setup/colors")).

Groupnames are relative to the 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:

← *key* name of group that is searched for

Returns:

0 if group was not found

..

30.67.4.17 int Fl_Preferences::groups ()

Returns the number of groups that are contained within a group.

return the number of groups that are contained within a group example: int n = base.groups();

Returns:

0 for no groups at all

30.67.4.18 char Fl_Preferences::set (const char * *entry*, const void * *value*, int *size*)

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 preferences file.

Parameters:

← *entry* name of entry

← *value* set this entry to *value*

← *size* of data array

Returns:

0 if setting the value failed

30.67.4.19 char Fl_Preferences::set (const char * *entry*, const char * *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 preferences file.

Parameters:

- ← **entry** name of entry
- ← **value** set this entry to *value*

Returns:

- 0 if setting the value failed

30.67.4.20 char Fl_Preferences::set (const char * *entry*, 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 preferences file.

Parameters:

- ← **entry** name of entry
- ← **value** set this entry to *value*
- ← **precision** number of decimal digits to represent value

Returns:

- 0 if setting the value failed

30.67.4.21 char Fl_Preferences::set (const char * *entry*, 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 preferences file.

Parameters:

- ← **entry** name of entry
- ← **value** set this entry to *value*

Returns:

- 0 if setting the value failed

30.67.4.22 char Fl_Preferences::set (const char * *entry*, 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 preferences file.

Parameters:

- ← **entry** name of entry

← **value** set this entry to *value*
← **precision** number of decimal digits to represent value

Returns:

0 if setting the value failed

30.67.4.23 char Fl_Preferences::set (const char * *entry*, 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 preferences file.

Parameters:

← **entry** name of entry
← **value** set this entry to *value*

Returns:

0 if setting the value failed

30.67.4.24 char Fl_Preferences::set (const char * *entry*, 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 preferences file.

Parameters:

← **entry** name of entry
← **value** set this entry to *value*

Returns:

0 if setting the value failed

30.67.4.25 int Fl_Preferences::size (const char * *entry*)

Returns the size of the value part of an entry.

return the size of the value part of an entry

Returns:

size of value

The documentation for this class was generated from the following files:

- Fl_Preferences.H
- Fl_Preferences.cxx

30.68 Fl_Preferences::Entry Struct Reference

An entry associates a preference name to its corresponding value.

```
#include <Fl_Preferences.H>
```

Public Attributes

- char * **name**
- char * **value**

30.68.1 Detailed Description

An entry associates a preference name to its corresponding value.

The documentation for this struct was generated from the following file:

- Fl_Preferences.H

30.69 Fl_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 \(unsigned int n\)](#)
Create a numerical name.
- [Name \(const char *format,...\)](#)
Create a name using 'printf' style formatting.
- [operator const char * \(\)](#)
Return the Name as a c-string.

30.69.1 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.

30.69.2 Constructor & Destructor Documentation

30.69.2.1 Fl_Preferences::Name (unsigned int n)

Create a numerical name.

create a group name or entry name on the fly

- this version creates a simple unsigned integer as an entry name example: `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], "");`

30.69.2.2 Fl_Preferences::Name (const char *format, ...)

Create a name using 'printf' style formatting.

create a group name or entry name on the fly

- this version creates entry names as in 'printf' example: `int n, i; Fl_Preferences prefs(USER, "matthias.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:

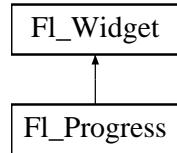
- Fl_Preferences.H
- Fl_Preferences.cxx

30.70 Fl_Progress Class Reference

Displays a progress bar for the user.

```
#include <Fl_Progress.h>
```

Inheritance diagram for Fl_Progress::



Public Member Functions

- [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.

- void [maximum](#) (float v)

Sets the maximum value in the progress widget.

- float [maximum](#) () const

Gets the maximum value in the progress widget.

- void [minimum](#) (float v)

Sets the minimum value in the progress widget.

- float [minimum](#) () const

Gets the minimum value in the progress widget.

- void [value](#) (float v)

Sets the current value in the progress widget.

- float [value](#) () const

Gets the current value in the progress widget.

Protected Member Functions

- virtual void [draw](#) ()

Draws the check button.

30.70.1 Detailed Description

Displays a progress bar for the user.

30.70.2 Constructor & Destructor Documentation

30.70.2.1 **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.

The inherited destructor removes the progress bar.

30.70.3 Member Function Documentation

30.70.3.1 **void Fl_Progress::draw (void) [protected, virtual]**

Draws the check button.

Implements [Fl_Widget](#).

30.70.3.2 **float Fl_Progress::maximum () const [inline]**

Gets the maximum value in the progress widget.

30.70.3.3 **void Fl_Progress::maximum (float v) [inline]**

Sets the maximum value in the progress widget.

30.70.3.4 **float Fl_Progress::minimum () const [inline]**

Gets the minimum value in the progress widget.

30.70.3.5 **void Fl_Progress::minimum (float v) [inline]**

Sets the minimum value in the progress widget.

30.70.3.6 **float Fl_Progress::value () const [inline]**

Gets the current value in the progress widget.

30.70.3.7 **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:

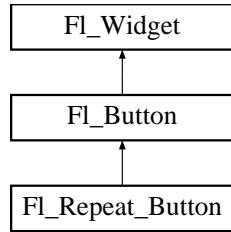
- [Fl_Progress.H](#)
- [Fl_Progress.cxx](#)

30.71 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

- int [handle](#) (int)
Handles the specified event.
- [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.
- void [deactivate](#) ()
Deactivate a widget.

30.71.1 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.

30.71.2 Constructor & Destructor Documentation

30.71.2.1 [Fl_Repeat_Button::Fl_Repeat_Button](#) (int X, int Y, int W, int H, const char * l = 0) [inline]

Creates a new [Fl_Repeat_Button](#) widget using the given position, size, and label string.

The default boxtyle is FL_UP_BOX. Deletes the button.

30.71.3 Member Function Documentation

30.71.3.1 void [Fl_Repeat_Button::deactivate](#) () [inline]

Deactivate a 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\(\)](#)

Reimplemented from [Fl_Widget](#).

30.71.3.2 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 new 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.

Parameters:

← *event* 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:

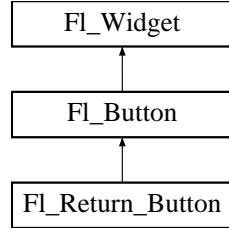
- [Fl_Repeat_Button.H](#)
- [Fl_Repeat_Button.cxx](#)

30.72 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

- int [handle](#) (int)

Handles the specified event.

- [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.

Protected Member Functions

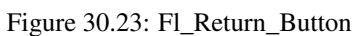
- void [draw](#) ()

Draw the widget.

30.72.1 Detailed Description

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.

A carriage-return symbol is drawn next to the button label.

Figure 30.23: Fl_Return_Button

30.72.2 Constructor & Destructor Documentation

30.72.2.1 `Fl_Return_Button::Fl_Return_Button (int X, int Y, int W, int H, const char *l = 0)` [inline]

Creates a new `Fl_Return_Button` widget using the given position, size, and label string.

The default boxtyle is `FL_UP_BOX`.

The inherited destructor deletes the button.

30.72.3 Member Function Documentation

30.72.3.1 `void Fl_Return_Button::draw ()` [protected, virtual]

Draw 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.

Reimplemented from `Fl_Button`.

30.72.3.2 `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 new 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.

Parameters:

← *event* 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:

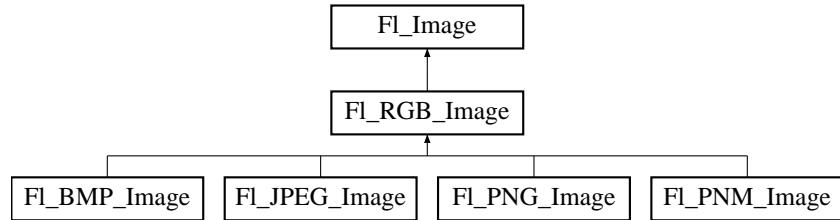
- [Fl_Return_Button.H](#)
- [Fl_Return_Button.cxx](#)

30.73 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

- [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.
- virtual [~Fl_RGB_Image](#) ()
The destructor free all memory and server resources that are used by the image.
- virtual [Fl_Image * copy](#) (int W, int H)
The [copy\(\)](#) method creates a copy of the specified image.
- [Fl_Image * copy](#) ()
The [copy\(\)](#) method creates a copy of the specified image.
- virtual void [color_average](#) (Fl_Color c, float i)
The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.
- virtual void [desaturate](#) ()
The [desaturate\(\)](#) method converts an image to grayscale.
- virtual void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0)
The [draw\(\)](#) methods draw the image.
- void [draw](#) (int X, int Y)
The [draw\(\)](#) methods draw the image.
- virtual void [label](#) (Fl_Widget *w)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [label](#) (Fl_Menu_Item *m)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [uncache](#) ()
If the image has been cached for display, delete the cache data.

Public Attributes

- const uchar * **array**
- int **alloc_array**
- unsigned **id**
- unsigned **mask**

30.73.1 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.

30.73.2 Constructor & Destructor Documentation

30.73.2.1 [Fl_RGB_Image::Fl_RGB_Image](#) (const uchar * *bits*, int *W*, int *H*, int *D* = 3, int *LD* = 0) [inline]

The constructor creates a new image from the specified data.

30.73.2.2 [Fl_RGB_Image::~Fl_RGB_Image](#) () [virtual]

The destructor free all memory and server resources that are used by the image.

30.73.3 Member Function Documentation

30.73.3.1 [void Fl_RGB_Image::color_average](#) ([Fl_Color](#) *c*, float *i*) [virtual]

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value *c*.

The *i* 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. *The original image data is not altered by this method.*

Reimplemented from [Fl_Image](#).

30.73.3.2 [Fl_Image* Fl_RGB_Image::copy](#) () [inline]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.73.3.3 Fl_Image * Fl_RGB_Image::copy (int W, int H) [virtual]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.73.3.4 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. *This method does not alter the original image data.*

Reimplemented from [Fl_Image](#).

30.73.3.5 void Fl_RGB_Image::draw (int X, int Y) [inline]

The [draw\(\)](#) methods draw the image.

This form specifies the upper-lefthand corner of the image

Reimplemented from [Fl_Image](#).

30.73.3.6 void Fl_RGB_Image::draw (int X, int Y, int W, int H, int cx = 0, int cy = 0) [virtual]

The [draw\(\)](#) methods draw the image.

This form specifies a bounding box for the image, with the origin (upper-lefthand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Image](#).

30.73.3.7 void Fl_RGB_Image::label (Fl_Menu_Item * m) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

30.73.3.8 void Fl_RGB_Image::label (Fl_Widget * widget) [virtual]

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

30.73.3.9 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](#).

The documentation for this class was generated from the following files:

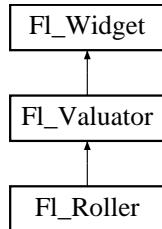
- [Fl_Image.H](#)
- [Fl_Image.cxx](#)

30.74 Fl_Roller Class Reference

The [Fl_Roller](#) widget is a "dolly" control commonly used to move 3D objects.

```
#include <Fl_Roller.h>
```

Inheritance diagram for Fl_Roller::



Public Member Functions

- `int handle (int)`
Handles the specified event.
- `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.

Protected Member Functions

- `void draw ()`
Draw the widget.

30.74.1 Detailed Description

The [Fl_Roller](#) widget is a "dolly" control commonly used to move 3D objects.

Figure 30.24: Fl_Roller

30.74.2 Constructor & Destructor Documentation

30.74.2.1 `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 boxtyle is `FL_NO_BOX`.

Inherited destructor destroys the valuator.

30.74.3 Member Function Documentation

30.74.3.1 `void Fl_Roller::draw () [protected, virtual]`

Draw 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.

Implements [Fl_Widget](#).

30.74.3.2 `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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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:

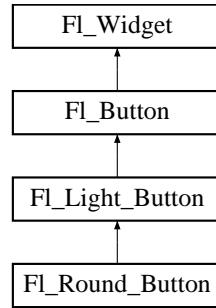
- `Fl_Roller.H`
- `Fl_Roller.cxx`

30.75 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.

30.75.1 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 30.25: Fl_Round_Button

The [Fl_Round_Button](#) subclass display 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_RED](#).

The documentation for this class was generated from the following files:

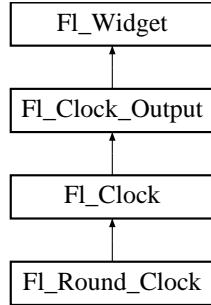
- Fl_Round_Button.H
- Fl_Round_Button.cxx

30.76 Fl_Round_Clock Class Reference

A clock widget of type FL_ROUND_CLOCK.

```
#include <Fl_Round_Clock.H>
```

Inheritance diagram for Fl_Round_Clock::



Public Member Functions

- [Fl_Round_Clock](#) (int x, int y, int w, int h, const char *l=0)
Creates the clock widget, setting his type and box.

30.76.1 Detailed Description

A clock widget of type FL_ROUND_CLOCK.

Has no box.

30.76.2 Constructor & Destructor Documentation

30.76.2.1 [Fl_Round_Clock::Fl_Round_Clock \(int x, int y, int w, int h, const char * l = 0\)](#) [inline]

Creates the clock widget, setting his type and box.

The documentation for this class was generated from the following file:

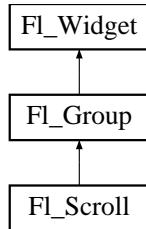
- Fl_Round_Clock.H

30.77 Fl_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 Fl_Scroll::



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 **resize** (int, int, int, int)
This resizes the [Fl_Group](#) widget and all of its children.
- int **handle** (int)
Handles the specified event.
- [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 **xposition** () const
Gets the current horizontal scrolling position.
- int **yposition** () const
Gets the current vertical scrolling position.
- void **scroll_to** (int, int)
Moves the contents of the scroll group to a new position.
- void **clear** ()
Clear all but the scrollbars.

Public Attributes

- [Fl_Scrollbar scrollbar](#)
- [Fl_Scrollbar hscrollbar](#)

Protected Member Functions

- void **bbox** (int &, int &, int &, int &)
- void **draw** ()

Draw the widget.

30.77.1 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:

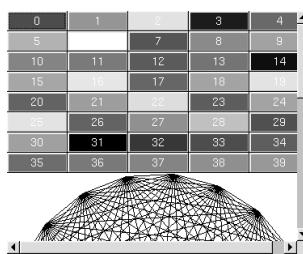


Figure 30.26: Fl_Scroll

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 [Fl_Double_Window](#).

By default you can scroll in both directions, and the scrollbars disappear if the data will fit in the area of the scroll.

Use [Fl_Scroll::type\(\)](#) to change this as follows :

- 0 - No scrollbars
- [Fl_Scroll::HORIZONTAL](#) - Only a horizontal scrollbar.
- [Fl_Scroll::VERTICAL](#) - Only a vertical scrollbar.
- [Fl_Scroll::BOTH](#) - The default is both scrollbars.
- [Fl_Scroll::HORIZONTAL_ALWAYS](#) - Horizontal scrollbar always on, vertical always off.
- [Fl_Scroll::VERTICAL_ALWAYS](#) - Vertical scrollbar always on, horizontal always off.
- [Fl_Scroll::BOTH_ALWAYS](#) - Both always on.

Use [scrollbar.align\(int\)](#) (see void [Fl_Widget::align\(Fl_Align\)](#)) : 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 h-scrollbar 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 it's drawing. To speed up drawing it should test [fl_push_clip\(\)](#).

Another very useful child is a single [Fl_Pack](#), which is itself a group that packs it's children together and changes size to surround them. Filling the [Fl_Pack](#) with [Fl_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 [Fl_Scroll](#) without scrolling. Be sure to leave space for the scrollbars, as Fluid won't show these either.

You cannot use [Fl_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.

30.77.2 Constructor & Destructor Documentation

30.77.2.1 [Fl_Scroll::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.

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 it's children can be automatic (local) variables, but you must declare the [Fl_Scroll](#) first, so that it is destroyed last.

30.77.3 Member Function Documentation

30.77.3.1 [void Fl_Scroll::clear \(\)](#)

Clear all but the scrollbars.

..

Reimplemented from [Fl_Group](#).

30.77.3.2 [void Fl_Scroll::draw \(\) \[protected, virtual\]](#)

Draw 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.

Reimplemented from [Fl_Group](#).

30.77.3.3 [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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.77.3.4 void Fl_Scroll::resize (int *X*, int *Y*, int *W*, int *H*) [virtual]

This 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](#).

30.77.3.5 void Fl_Scroll::scroll_to (int *X*, int *Y*)

Moves the contents of the scroll group to a new position.

30.77.3.6 int Fl_Scroll::xposition () const [inline]

Gets the current horizontal scrolling position.

30.77.3.7 int Fl_Scroll::yposition () const [inline]

Gets the current vertical scrolling position.

The documentation for this class was generated from the following files:

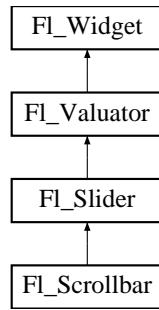
- [Fl_Scroll.H](#)
- [Fl_Scroll.cxx](#)

30.78 Fl_Scrollbar Class Reference

The [Fl_Scrollbar](#) widget displays a slider with arrow buttons at the ends of the scrollbar.

```
#include <Fl_Scrollbar.H>
```

Inheritance diagram for Fl_Scrollbar::



Public Member Functions

- [Fl_Scrollbar](#) (int x, int y, int w, int h, const char *l=0)

Creates a new [Fl_Scrollbar](#) widget using the given position, size, and label string.

- [~Fl_Scrollbar](#) ()

Destroys the Scrollbar.

- int [handle](#) (int)

Handles the specified event.

- int [value](#) ()

The first form returns the integer value of the scrollbar.

- int [value](#) (int p, int s, int top, int total)

See int [Fl_Scrollbar::value\(\)](#).

- int [linesize](#) () const

This number controls how big the steps are that the arrow keys do.

- void [linesize](#) (int i)

This number controls how big the steps are that the arrow keys do.

Protected Member Functions

- void [draw](#) ()

Draw the widget.

30.78.1 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 30.27: Fl_Scrollbar

30.78.2 Constructor & Destructor Documentation

30.78.2.1 [Fl_Scrollbar::Fl_Scrollbar \(int X, int Y, int W, int H, const char * L = 0\)](#)

Creates a new [Fl_Scrollbar](#) widget using the given position, size, and label string.

You need to do type(FL_HORIZONTAL) if you want a horizontal scrollbar.

30.78.2.2 [Fl_Scrollbar::~Fl_Scrollbar \(\)](#)

Destroys the Scrollbar.

30.78.3 Member Function Documentation

30.78.3.1 [void Fl_Scrollbar::draw \(\) \[protected, virtual\]](#)

Draw 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.

Reimplemented from [Fl_Slider](#).

30.78.3.2 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.78.3.3 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.

30.78.3.4 int Fl_Scrollbar::linesize () const [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.

30.78.3.5 int Fl_Scrollbar::value () [inline]

The first form returns the integer value of the scrollbar.

You can get the floating point value with [Fl_Slider::value\(\)](#). The second form sets [value\(\)](#), [range\(\)](#), and [slider_size\(\)](#) to make a variable-sized scrollbar. 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.

The documentation for this class was generated from the following files:

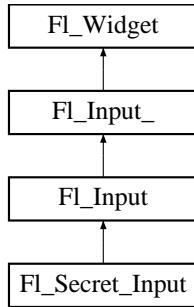
- [Fl_Scrollbar.H](#)
- [Fl_Scrollbar.cxx](#)

30.79 Fl_Secret_Input Class Reference

The [Fl_Secret_Input](#) class is a subclass of [Fl_Input](#) that displays its input as a string of asterisks.

```
#include <Fl_Secret_Input.H>
```

Inheritance diagram for Fl_Secret_Input::



Public Member Functions

- [Fl_Secret_Input](#) (int X, int Y, int W, int H, const char *l=0)

Creates a new [Fl_Secret_Input](#) widget using the given position, size, and label string.

30.79.1 Detailed Description

The [Fl_Secret_Input](#) class is a subclass of [Fl_Input](#) that displays its input as a string of asterisks.

This subclass is usually used to receive passwords and other "secret" information.

30.79.2 Constructor & Destructor Documentation

30.79.2.1 [Fl_Secret_Input::Fl_Secret_Input](#) (int X, int Y, int W, int H, const char * l = 0) [inline]

Creates a new [Fl_Secret_Input](#) widget using the given position, size, and label string.

The default boxtyle 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 file:

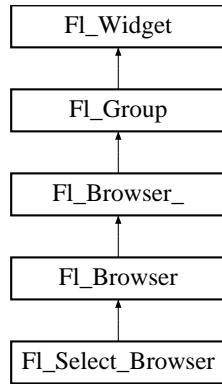
- [Fl_Secret_Input.H](#)

30.80 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.

30.80.1 Detailed Description

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.

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 [Fl_Browser](#) for methods to add and remove lines from the browser.

30.80.2 Constructor & Destructor Documentation

30.80.2.1 Fl_Select_Browser::Fl_Select_Browser (int X, int Y, int W, int H, const char * l = 0) [inline]

Creates a new [Fl_Select_Browser](#) widget using the given position, size, and label string.

The default boxtyle is FL_DOWN_BOX. The constructor specializes [Fl_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 file:

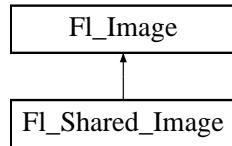
- Fl_Select_Browser.H

30.81 Fl_Shared_Image Class Reference

This class supports caching, loading, and drawing of image files.

```
#include <Fl_Shared_Image.H>
```

Inheritance diagram for Fl_Shared_Image::



Public Member Functions

- `const char * name ()`
Returns the filename of the shared image.
- `int refcount ()`
Returns the number of references of this shared image.
- `void release ()`
Releases and possibly destroys (if refcount <=0) a shared image.
- `void reload ()`
Reloads the shared image from disk.
- `virtual Fl_Image * copy (int W, int H)`
The `copy()` method creates a copy of the specified image.
- `Fl_Image * copy ()`
The `copy()` method creates a copy of the specified image.
- `virtual void color_average (Fl_Color c, float i)`
The `color_average()` method averages the colors in the image with the FLTK color value `c`.
- `virtual void desaturate ()`
The `desaturate()` method converts an image to grayscale.
- `virtual void draw (int X, int Y, int W, int H, int cx, int cy)`
The `draw()` methods draw the image.
- `void draw (int X, int Y)`
The `draw()` methods draw the image.
- `virtual void uncache ()`
If the image has been cached for display, delete the cache data.

Static Public Member Functions

- static [Fl_Shared_Image](#) * **find** (const char *n, int W=0, int H=0)
Finds a shared image from its named and size specifications.
- static [Fl_Shared_Image](#) * **get** (const char *n, int W=0, int H=0)
Gets a shared image, if it exists already ; it will return it.
- static [Fl_Shared_Image](#) ** **images** ()
Returns the Fl_Shared_Image array.*
- static int **num_images** ()
Returns the total number of shared images in the array.
- static void **add_handler** (Fl_Shared_Handler f)
Adds a shared image handler, which is basically a test function for adding new formats.
- static void **remove_handler** (Fl_Shared_Handler f)
Removes a shared image handler.

Protected Member Functions

- [Fl_Shared_Image](#) ()
Creates an empty shared image.
- [Fl_Shared_Image](#) (const char *n, [Fl_Image](#) *img=0)
Creates a shared image from its filename and its corresponding Fl_Image img.*
- virtual ~[Fl_Shared_Image](#) ()
The destructor free all memory and server resources that are used by the image.
- void **add** ()
- void **update** ()

Static Protected Member Functions

- static int **compare** ([Fl_Shared_Image](#) **i0, [Fl_Shared_Image](#) **i1)

Protected Attributes

- const char * **name_**
- int **original_**
- int **refcount_**
- [Fl_Image](#) * **image_**
- int **alloc_image_**

Static Protected Attributes

- static [Fl_Shared_Image](#) ** **images_** = 0
- static int **num_images_** = 0
- static int **alloc_images_** = 0
- static [Fl_Shared_Handler](#) * **handlers_** = 0
- static int **num_handlers_** = 0
- static int **alloc_handlers_** = 0

30.81.1 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, and PNG.

30.81.2 Constructor & Destructor Documentation

30.81.2.1 [Fl_Shared_Image::Fl_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.

30.81.2.2 [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.

30.81.2.3 [Fl_Shared_Image::~Fl_Shared_Image \(\)](#) [protected, virtual]

The destructor free 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.

30.81.3 Member Function Documentation

30.81.3.1 [void Fl_Shared_Image::color_average \(Fl_Color c, float i\)](#) [virtual]

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.

The i 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. *The original image data is not altered by this method.*

Reimplemented from [Fl_Image](#).

30.81.3.2 Fl_Image* Fl_Shared_Image::copy () [inline]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.81.3.3 Fl_Image * Fl_Shared_Image::copy (int W, int H) [virtual]

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.81.3.4 void Fl_Shared_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. *This method does not alter the original image data.*

Reimplemented from [Fl_Image](#).

30.81.3.5 void Fl_Shared_Image::draw (int X, int Y) [inline]

The [draw\(\)](#) methods draw the image.

This form specifies the upper-lefthand corner of the image

Reimplemented from [Fl_Image](#).

30.81.3.6 void Fl_Shared_Image::draw (int X, int Y, int W, int H, int cx, int cy) [virtual]

The [draw\(\)](#) methods draw the image.

This form specifies a bounding box for the image, with the origin (upper-lefthand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Image](#).

30.81.3.7 Fl_Shared_Image * Fl_Shared_Image::get (const char * n, int W = 0, int H = 0) [static]

Gets a shared image, if it exists already ; it will return it.

If it does not exist or if it exist but with other size, then the existing image is deleted and replaced by a new image from the n filename of the proper dimension. If n is not a valid image filename, then [get\(\)](#) will return NULL.

30.81.3.8 int Fl_Shared_Image::num_images () [static]

Returns the total number of shared images in the array.

30.81.3.9 int Fl_Shared_Image::refcount () [inline]

Returns the number of references of this shared image.

When reference is below 1, the image is deleted.

30.81.3.10 void Fl_Shared_Image::release ()

Releases and possibly destroys (if refcount <=0) a shared image.

In the latter case, it will reorganize the shared image array so that no hole will occur.

30.81.3.11 void Fl_Shared_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](#).

The documentation for this class was generated from the following files:

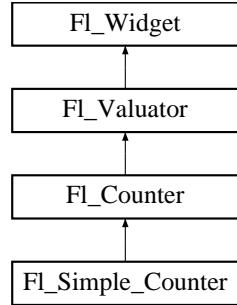
- [Fl_Shared_Image.H](#)
- [Fl_Shared_Image.cxx](#)

30.82 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)

30.82.1 Detailed Description

This widget creates a counter with only 2 arrow buttons.

Figure 30.28: Fl_Simple_Counter

The documentation for this class was generated from the following file:

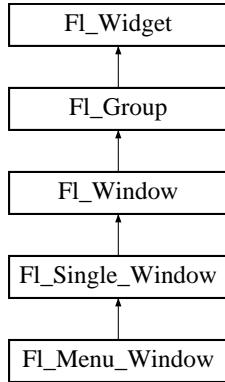
- [Fl_Simple_Counter.H](#)

30.83 Fl_Single_Window Class Reference

This is the same as [Fl_Window](#).

```
#include <Fl_Single_Window.H>
```

Inheritance diagram for Fl_Single_Window::



Public Member Functions

- void [show \(\)](#)

Put the window on the screen.

- void [show \(int a, char **b\)](#)

See virtual void [Fl_Window::show\(\)](#).

- void [flush \(\)](#)

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

- [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.

- int [make_current \(\)](#)

Sets things up so that the drawing functions in <[FL/fl_draw.H](#)> will go into this window.

30.83.1 Detailed Description

This is the same as [Fl_Window](#).

However, it is possible that some implementations will provide double-buffered windows by default. This subcan 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.

30.83.2 Member Function Documentation

30.83.2.1 void Fl_Single_Window::flush () [virtual]

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Menu_Window](#).

30.83.2.2 int Fl_Single_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.

Reimplemented from [Fl_Window](#).

30.83.2.3 void Fl_Single_Window::show () [virtual]

Put the window on the screen.

Usually this has the side effect of opening the display. The second form is used for top-level windows and allow standard arguments to be parsed from the command-line.

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.

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Menu_Window](#).

The documentation for this class was generated from the following files:

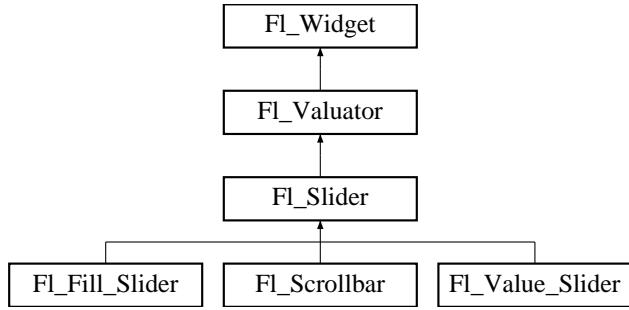
- [Fl_Single_Window.H](#)
- [Fl_Single_Window.cxx](#)

30.84 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 [draw\(\)](#)
Draw the widget.
- int [handle\(int\)](#)
Handles the specified event.
- [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 position, size, and label string.
- int [scrollvalue\(int windowtop, int windowsize, int first, int totalsize\)](#)
Returns [Fl_Scrollbar::value\(\)](#).
- void [bounds\(double a, double b\)](#)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- float [slider_size\(\) const](#)
Get or set the dimensions of the moving piece of slider.
- void [slider_size\(double v\)](#)
See float [slider_size\(\) const](#).
- [Fl_Boxtype slider\(\) const](#)
Gets the slider box type.
- void [slider\(Fl_Boxtype c\)](#)
Sets the slider box type.

Protected Member Functions

- void **draw** (int, int, int, int)
- int **handle** (int, int, int, int)

30.84.1 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 30.29: Fl_Slider

30.84.2 Constructor & Destructor Documentation

30.84.2.1 [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 boxtyle is [FL_DOWN_BOX](#).

30.84.2.2 [Fl_Slider::Fl_Slider \(uchar t, int X, int Y, int W, int H, const char * l\)](#)

Creates a new [Fl_Slider](#) widget using the given position, size, and label string.

The default boxtyle is [FL_DOWN_BOX](#).

30.84.3 Member Function Documentation

30.84.3.1 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.

Reimplemented from [Fl_Valuator](#).

30.84.3.2 void Fl_Slider::draw () [virtual]

Draw 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.

Implements [Fl_Widget](#).

Reimplemented in [Fl_Scrollbar](#), and [Fl_Value_Slider](#).

30.84.3.3 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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_Scrollbar](#), and [Fl_Value_Slider](#).

30.84.3.4 int Fl_Slider::scrollvalue (int *p*, int *W*, int *t*, int *l*)

Returns [Fl_Scrollbar::value\(\)](#).

30.84.3.5 void Fl_Slider::slider (Fl_Boxtype *c*) [inline]

Sets the slider box type.

30.84.3.6 Fl_Boxtype Fl_Slider::slider () const [inline]

Gets the slider box type.

30.84.3.7 void Fl_Slider::slider_size (double *v*)

See float [slider_size\(\) const](#).

See float [Fl_Slider::slider_size\(\) const](#).

30.84.3.8 float Fl_Slider::slider_size () const [inline]

Get or 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:

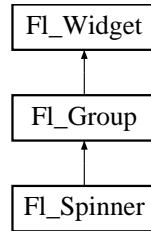
- [Fl_Slider.H](#)
- [Fl_Slider.cxx](#)

30.85 Fl_Spinner Class Reference

This widget is a combination of the input widget and repeat buttons.

```
#include <Fl_Spinner.h>
```

Inheritance diagram for Fl_Spinner::



Public Member Functions

- **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** ()

Sets or returns the format string for the value.

- void **format** (const char *f)

Sets or returns the format string for the value.

- int **handle** (int event)

Handles the specified event.

- double **maximum** () const

Speling mistakes retained for source compatibility.

- double **maximum** () const

Gets the maximum value of the widget.

- void **maximum** (double m)

Sets the maximum value of the widget.

- double **minimum** () const

Speling mistakes retained for source compatibility.

- 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)
This resizes the [Fl_Group](#) widget and all of its children.
- double **step** () const
Sets or returns the amount to change the value when the user clicks a button.
- void **step** (double s)
See double [Fl_Spinner::step\(\)](#) const.
- **Fl_Color** **textcolor** () const
Gets the color of the text in the input field.
- void **textcolor** (**Fl_Color** c)
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** f)
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.
- **uchar** **type** () const
Sets or Gets the numeric representation in the input field.
- void **type** (uchar v)
See uchar [Fl_Spinner::type\(\)](#) const.
- double **value** () const
Gets the current value of the widget.
- void **value** (double v)
Sets the current value of the widget.

30.85.1 Detailed Description

This widget is a combination of the input widget and repeat buttons.

The user can either type into the input area or use the buttons to change the value.

30.85.2 Constructor & Destructor Documentation

30.85.2.1 **Fl_Spinner::Fl_Spinner (int X, int Y, int W, int H, const char *L = 0)** [inline]

Creates a new [Fl_Spinner](#) widget using the given position, size, and label string.

Inherited destructor Destroys the widget and any value associated with it.

30.85.3 Member Function Documentation

30.85.3.1 **void Fl_Spinner::format (const char *f)** [inline]

Sets or returns the format string for the value.

30.85.3.2 **const char* Fl_Spinner::format ()** [inline]

Sets or returns the format string for the value.

30.85.3.3 **int Fl_Spinner::handle (int event)** [inline, 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 new 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.

Parameters:

← *event* 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](#).

30.85.3.4 **void Fl_Spinner::maximum (double m)** [inline]

Sets the maximum value of the widget.

30.85.3.5 **double Fl_Spinner::maximum () const** [inline]

Gets the maximum value of the widget.

30.85.3.6 double Fl_Spinner::maximum () const [inline]

Speling mistakes retained for source compatibility.

Deprecated**30.85.3.7 void Fl_Spinner::minimum (double *m*) [inline]**

Sets the minimum value of the widget.

30.85.3.8 double Fl_Spinner::minimum () const [inline]

Gets the minimum value of the widget.

30.85.3.9 double Fl_Spinner::mininum () const [inline]

Speling mistakes retained for source compatibility.

Deprecated**30.85.3.10 void Fl_Spinner::range (double *a*, double *b*) [inline]**

Sets the minimum and maximum values for the widget.

30.85.3.11 void Fl_Spinner::resize (int *X*, int *Y*, int *W*, int *H*) [inline, virtual]

This 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](#).

30.85.3.12 double Fl_Spinner::step () const [inline]

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.

30.85.3.13 void Fl_Spinner::textcolor (Fl_Color c) [inline]

Sets the color of the text in the input field.

30.85.3.14 Fl_Color Fl_Spinner::textcolor () const [inline]

Gets the color of the text in the input field.

30.85.3.15 void Fl_Spinner::textfont (Fl_Font f) [inline]

Sets the font of the text in the input field.

30.85.3.16 Fl_Font Fl_Spinner::textfont () const [inline]

Gets the font of the text in the input field.

30.85.3.17 void Fl_Spinner::textsize (Fl_Fontsize s) [inline]

Sets the size of the text in the input field.

30.85.3.18 Fl_Fontsize Fl_Spinner::textsize () const [inline]

Gets the size of the text in the input field.

30.85.3.19 uchar Fl_Spinner::type () const [inline]

Sets or Gets the numeric representation in the input field.

Valid values are FL_INT_INPUT and FL_FLOAT_INPUT. The first form also changes the [format\(\)](#) template. Setting a new spinner type via a superclass pointer will not work.

Note:

type is not a virtual function.

Reimplemented from [Fl_Widget](#).

30.85.3.20 void Fl_Spinner::value (double v) [inline]

Sets the current value of the widget.

Before setting value to a non-integer value, the spinner [type\(\)](#) should be changed to floating point.

30.85.3.21 double Fl_Spinner::value () const [inline]

Gets the current value of the widget.

The documentation for this class was generated from the following file:

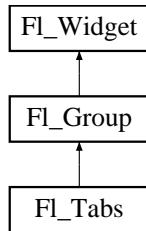
- [Fl_Spinner.H](#)

30.86 Fl_Tabs Class Reference

The [Fl_Tabs](#) widget is the "file card tabs" interface that allows you to put lots and lots of buttons and switches in a panel, as popularized by many toolkits.

```
#include <Fl_Tabs.h>
```

Inheritance diagram for Fl_Tabs::



Public Member Functions

- int [handle](#) (int)
Handles the specified event.
- [Fl_Widget](#) * [value](#) ()
Gets the currently visible widget/tab.
- int [value](#) ([Fl_Widget](#) *)
Sets the widget to become the current visible widget/tab.
- [Fl_Widget](#) * [push](#) () const
- int [push](#) ([Fl_Widget](#) *)
- [Fl_Tabs](#) (int, int, int, int, const char *=0)
Creates a new [Fl_Tabs](#) widget using the given position, size, and label string.
- [Fl_Widget](#) * [which](#) (int event_x, int event_y)

Protected Member Functions

- void [redraw_tabs](#) ()
- void [draw](#) ()
Draw the widget.

30.86.1 Detailed Description

The [Fl_Tabs](#) widget is the "file card tabs" interface that allows you to put lots and lots of buttons and switches in a panel, as popularized by many toolkits.



Figure 30.30: Fl_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 [Fl_Group](#) widgets containing several widgets themselves.

Each child makes a card, and it's [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.

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.

30.86.2 Constructor & Destructor Documentation

30.86.2.1 [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 boxtyle 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.

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.

30.86.3 Member Function Documentation

30.86.3.1 void Fl_Tabs::draw () [protected, virtual]

Draw 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.

Reimplemented from [Fl_Group](#).

30.86.3.2 int Fl_Tabs::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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.86.3.3 int Fl_Tabs::value (Fl_Widget * *newvalue*)

Sets the widget to become the current visible widget/tab.

Setting the value hides all other children, and makes this one visible, if it is really a child.

30.86.3.4 Fl_Widget * Fl_Tabs::value ()

Gets the currently visible widget/tab.

The [value\(\)](#) is the first visible child (or the last child if none are visible) and this also hides any other children. This allows the tabs to be deleted, moved to other groups, and [show\(\)/hide\(\)](#) called without it screwing up.

The documentation for this class was generated from the following files:

- Fl_Tabs.H
- Fl_Tabs.cxx

30.87 Fl_Text_Buffer Class Reference

The `Fl_Text_Buffer` class is used by the `Fl_Text_Display` and `Fl_Text_Editor` to manage complex text data and is based upon the excellent NEdit text editor engine - see <http://www.nedit.org/>.

```
#include <Fl_Text_Buffer.h>
```

Public Member Functions

- `Fl_Text_Buffer` (int requestedSize=0)
Create an empty text buffer of a pre-determined size (use this to avoid unnecessary re-allocation if you know exactly how much the buffer will need to hold.
- `~Fl_Text_Buffer` ()
Frees a text buffer.
- `int length ()`
Returns the number of characters in the buffer.
- `char * text ()`
Get the entire contents of a text buffer.
- `void text (const char *text)`
Replaces the entire contents of the text buffer.
- `char * text_range (int start, int end)`
Return a copy of the text between start and end character positions from text buffer buf.
- `char character (int pos)`
Returns the character at the specified position pos in the buffer.
- `char * text_in_rectangle (int start, int end, int rectStart, int rectEnd)`
Returns the text from the given rectangle.
- `void insert (int pos, const char *text)`
Inserts null-terminated string text at position pos.
- `void append (const char *t)`
Appends the text string to the end of the buffer.
- `void remove (int start, int end)`
Deletes a range of characters in the buffer.
- `void replace (int start, int end, const char *text)`
Deletes the characters between start and end, and inserts the null-terminated string text in their place in the buffer.
- `void copy (Fl_Text_Buffer *fromBuf, int fromStart, int fromEnd, int toPos)`
Copies text from one buffer to this one; fromBuf may be the same as this.

- int **undo** (int *cp=0)
Undo text modification according to the undo variables or insert text from the undo buffer.
- void **canUndo** (char flag=1)
Lets the undo system know if we can undo changes.
- int **insertfile** (const char *file, int pos, int buflen=128 *1024)
Inserts a file at the specified position.
- int **appendfile** (const char *file, int buflen=128 *1024)
Appends the named file to the end of the buffer.
- int **loadfile** (const char *file, int buflen=128 *1024)
Loads a text file into the buffer.
- int **outputfile** (const char *file, int start, int end, int buflen=128 *1024)
Writes the specified portions of the file to a file.
- int **savefile** (const char *file, int buflen=128 *1024)
Saves a text file from the current buffer.
- void **insert_column** (int column, int startPos, const char *text, int *charsInserted, int *charsDeleted)
Insert s columnwise into buffer starting at displayed character position column on the line beginning at startPos.
- void **replace_rectangular** (int start, int end, int rectStart, int rectEnd, const char *text)
Replaces a rectangular area in the buffer, given by start, end, rectStart, and rectEnd, with text.
- void **overlay_rectangular** (int startPos, int rectStart, int rectEnd, const char *text, int *charsInserted, int *charsDeleted)
Overlay text between displayed character positions rectStart and rectEnd on the line beginning at startPos.
- void **remove_rectangular** (int start, int end, int rectStart, int rectEnd)
Removes a rectangular swath of characters between character positions start and end and horizontal displayed-character offsets rectStart and rectEnd.
- void **clear_rectangular** (int start, int end, int rectStart, int rectEnd)
Clears text in the specified area.
- int **tab_distance** ()
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.
- void **select** (int start, int end)
Selects a range of characters in the buffer.

- int **selected** ()
Returns a non 0 value if text has been selected, 0 otherwise.
- void **unselect** ()
Cancels any previous selection on the primary text selection object.
- void **select_rectangular** (int start, int end, int rectStart, int rectEnd)
Achieves a rectangular selection on the primary text selection object.
- int **selection_position** (int *start, int *end)
Gets the selection position.
- int **selection_position** (int *start, int *end, int *isRect, int *rectStart, int *rectEnd)
Gets the selection position, and rectangular selection info.
- char * **selection_text** ()
Returns the currently selected text.
- void **remove_selection** ()
Removes the text in the primary selection.
- void **replace_selection** (const char *text)
Replaces the text in the primary selection.
- void **secondary_select** (int start, int end)
Selects a range of characters in the secondary selection.
- int **secondary_selected** ()
Returns a non 0 value if text has been selected in the secondary text selection, 0 otherwise.
- void **secondary_unselect** ()
Clears any selection in the secondary text selection object.
- void **secondary_select_rectangular** (int start, int end, int rectStart, int rectEnd)
Achieves a rectangular selection on the secondary text selection object.
- int **secondary_selection_position** (int *start, int *end)
Returns the current selection in the secondary text selection object.
- int **secondary_selection_position** (int *start, int *end, int *isRect, int *rectStart, int *rectEnd)
Returns the current selection in the secondary text selection object.
- char * **secondary_selection_text** ()
Returns the text in the secondary selection.
- void **remove_secondary_selection** ()
Removes the text from the buffer corresponding to the secondary text selection object.
- 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 [highlight](#) (int start, int end)
Highlights the specified text within the buffer.
- int [highlight](#) ()
Returns the highlighted text.
- void [unhighlight](#) ()
Unhighlights text in the buffer.
- void [highlight_rectangular](#) (int start, int end, int rectStart, int rectEnd)
Highlights a rectangular selection in the buffer.
- int [highlight_position](#) (int *start, int *end)
Highlights the specified text between start and end within the buffer.
- int [highlight_position](#) (int *start, int *end, int *isRect, int *rectStart, int *rectEnd)
Highlights the specified rectangle of text within the buffer.
- char * [highlight_text](#) ()
Returns the highlighted text.
- 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 [remove_modify_callback](#) (Fl_Text_Modify_Cb bufModifiedCB, void *cbArg)
Removes a modify callback.
- void [call_modify_callbacks](#) ()
Calls all modify callbacks that have been registered using the [add_modify_callback\(\)](#) method.
- void [add_predelete_callback](#) (Fl_Text_Predelete_Cb bufPredelCB, void *cbArg)
Adds a callback routine to be called before text is deleted from the buffer.
- void [remove_predelete_callback](#) (Fl_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 [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.
- char * [line_text](#) (int pos)
Returns the text from the entire line containing the specified character position.
- int [line_start](#) (int pos)
Returns the position of the start of the line containing position pos.

- int **line_end** (int pos)
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 **word_start** (int pos)
Returns the position corresponding to the start of the word.
- int **word_end** (int pos)
Returns the position corresponding to the end of the word.
- int **expand_character** (int pos, int indent, char *outStr)
Expands the given character to a displayable format.
- int **count_displayed_characters** (int lineStartPos, int targetPos)
Count the number of displayed characters between buffer position lineStartPos and targetPos.
- int **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).
- int **count_lines** (int startPos, int endPos)
Counts the number of newlines between startPos and endPos in buffer.
- 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 **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 **findchar_forward** (int startPos, char searchChar, int *foundPos)
Finds the next occurrence of the specified character.
- int **findchar_backward** (int startPos, char searchChar, int *foundPos)
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.
- int **findchars_forward** (int startPos, const char *searchChars, int *foundPos)
Finds the next occurrence of the specified characters.
- int **findchars_backward** (int startPos, const char *searchChars, int *foundPos)
Finds the previous occurrence of the specified characters.
- int **search_forward** (int startPos, const char *searchString, int *foundPos, int matchCase=0)
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.
- int **search_backward** (int startPos, const char *searchString, int *foundPos, int matchCase=0)
Search backwards in buffer for string searchString, starting with the character BEFORE startPos, returning the result in foundPos returns 1 if found, 0 if not.

- int [substitute_null_characters](#) (char *string, int length)

The primary routine for integrating new text into a text buffer with substitution of another character for ascii nuls.

- void [unsubstitute_null_characters](#) (char *string)

Converts strings obtained from buffers which contain null characters, which have been substituted for by a special substitution character, back to a null-containing string.

- char [null_substitution_character](#) ()

Returns the current nul substitution character.

- [Fl_Text_Selection * primary_selection](#) ()

Returns the primary selection.

- [Fl_Text_Selection * secondary_selection](#) ()

Returns the secondary selection.

- [Fl_Text_Selection * highlight_selection](#) ()

Returns the current highlight selection.

Static Public Member Functions

- static int [expand_character](#) (char c, int indent, char *outStr, int tabDist, char nullSubsChar)

Expand a single character c from the text buffer into its displayable screen representation (which may be several characters for a tab or a control code).

- static int [character_width](#) (char c, int indent, int tabDist, char nullSubsChar)

Return the length in displayed characters of character c expanded for display (as discussed above in [expand_character\(\)](#)).

Protected Member Functions

- void [call_modify_callbacks](#) (int pos, int nDeleted, int nInserted, int nRestyled, const char *deletedText)

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_preamble_callbacks](#) (int pos, int nDeleted)

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)

Internal (non-redisplaying) version of BufInsert.

- void [remove_](#) (int start, int end)

Internal (non-redisplaying) version of BufRemove.

- void [remove_rectangular_](#) (int start, int end, int rectStart, int rectEnd, int *replaceLen, int *endPos)

Deletes a rectangle of text without calling the modify callbacks.

- void [insert_column_](#) (int column, int startPos, const char *insText, int *nDeleted, int *nInserted, int *endPos)

Inserts a column of text without calling the modify callbacks.

- void [overlay_rectangular_](#) (int startPos, int rectStart, int rectEnd, const char *insText, int *nDeleted, int *nInserted, int *endPos)

Overlay a rectangular area of text without calling the modify callbacks.

- void [redisplay_selection](#) (Fl_Text_Selection *oldSelection, Fl_Text_Selection *newSelection)

Calls the stored redisplay procedure(s) for this buffer to update the screen for a change in a selection.

- void [move_gap](#) (int pos)

- 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.

- char * [selection_text_](#) (Fl_Text_Selection *sel)

- void [remove_selection_](#) (Fl_Text_Selection *sel)

Removes the text from the buffer corresponding to sel.

- void [replace_selection_](#) (Fl_Text_Selection *sel, const char *text)

Replaces the text in selection sel.

- void [rectangular_selection_boundaries](#) (int lineStartPos, int rectStart, int rectEnd, int *selStart, int *selEnd)

Finds the first and last character position in a line within a rectangular selection (for copying).

- 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

- [Fl_Text_Selection mPrimary](#)

highlighted areas

- [Fl_Text_Selection mSecondary](#)

highlighted areas

- [Fl_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)

- char * [mBuf](#)

allocated memory where the text is stored

- int **mGapStart**
points to the first character of the gap
- int **mGapEnd**
points to the first char after the gap
- int **mTabDist**
equiv.
- int **mUseTabs**
True if buffer routines are allowed to use tabs for padding in rectangular operations.
- int **mNModifyProcs**
number of modify-redisplay procs attached
- Fl_Text_Modify_Cb * **mNModifyProcs**
< procedures to call when buffer is
- void ** **mCbArgs**
caller arguments for modifyProcs above
- int **mNPredeleteProcs**
number of pre-delete procs attached
- Fl_Text_Predelete_Cb * **mPredeleteProcs**
< procedure to call before text is deleted
- void ** **mPredeleteCbArgs**
caller argument for pre-delete proc above
- int **mCursorPosHint**
hint for reasonable cursor position after a buffer modification operation
- char **mNullSubsChar**
NEdit is based on C null-terminated strings, so ascii-nul characters must be substituted with something else.
- char **mCanUndo**
if this buffer is used for attributes, it must not do any undo calls

30.87.1 Detailed Description

The **Fl_Text_Buffer** class is used by the **Fl_Text_Display** and **Fl_Text_Editor** to manage complex text data and is based upon the excellent NEdit text editor engine - see <http://www.nedit.org/>.

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30.87.2 Constructor & Destructor Documentation

30.87.2.1 `Fl_Text_Buffer::Fl_Text_Buffer (int requestedSize = 0)`

Create an empty text buffer of a pre-determined size (use this to avoid unnecessary re-allocation if you know exactly how much the buffer will need to hold).

Creates a new text buffer of the specified initial size.

30.87.3 Member Function Documentation

30.87.3.1 `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);
```

30.87.3.2 `void Fl_Text_Buffer::add_pdelete_callback (Fl_Text_Pdelete_Cb bufPreDeleteCB, void * cbArg)`

Adds a callback routine to be called before text is deleted from the buffer.

30.87.3.3 `void Fl_Text_Buffer::append (const char * t) [inline]`

Appends the text string to the end of the buffer.

30.87.3.4 `int Fl_Text_Buffer::appendfile (const char * file, int buflen = 128*1024) [inline]`

Appends the named file to the end of the buffer.

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).

30.87.3.5 `char Fl_Text_Buffer::character (int pos)`

Returns the character at the specified position *pos* in the buffer.

Positions start at 0

30.87.3.6 `int Fl_Text_Buffer::character_width (char c, int indent, int tabDist, char nullSubsChar) [static]`

Return the length in displayed characters of character *c* expanded for display (as discussed above in `expand_character()`).

If the buffer for which the character width is being measured is doing null substitution, *nullSubsChar* should be passed as that character (or nul to ignore).

30.87.3.7 void Fl_Text_Buffer::clear_rectangular (int *start*, int *end*, int *rectStart*, int *rectEnd*)

Clears text in the specified area.

It clears a rectangular "hole" out of the buffer between character positions start and end and horizontal displayed-character offsets rectStart and rectEnd.

30.87.3.8 int Fl_Text_Buffer::count_displayed_characters (int *lineStartPos*, int *targetPos*)

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)

30.87.3.9 int Fl_Text_Buffer::count_lines (int *startPos*, int *endPos*)

Counts the number of newlines between *startPos* and *endPos* in buffer.

The character at position *endPos* is not counted.

30.87.3.10 int Fl_Text_Buffer::expand_character (char *c*, int *indent*, char * *outStr*, int *tabDist*, char *nullSubsChar*) [static]

Expand a single character *c* from the text buffer into it's displayable screen representation (which may be several characters for a tab or a control code).

Returns the number of characters added to *outStr*. *indent* is the number of characters from the start of the line for figuring tabs of length *tabDist*. Output string is guaranteed to be shorter or equal in length to FL_TEXT_MAX_EXP_CHAR_LEN Tabs and other control characters are given special treatment. *nullSubsChar* represent the null character to be transformed in <nul>

30.87.3.11 int Fl_Text_Buffer::expand_character (int *pos*, int *indent*, char * *outStr*)

Expands the given character to a displayable format.

Tabs and other control characters are given special treatment. Get a character from the text buffer expanded into its screen representation (which may be several characters for a tab or a control code). Returns the number of characters written to *outStr*. *indent* is the number of characters from the start of the line for figuring tabs. Output string is guranteed to be shorter or equal in length to FL_TEXT_MAX_EXP_CHAR_LEN

30.87.3.12 int Fl_Text_Buffer::findchar_backward (int *startPos*, char *searchChar*, int * *foundPos*)

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 BufSearchBackward 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)

30.87.3.13 int Fl_Text_Buffer::findchar_forward (int *startPos*, char *searchChar*, int * *foundPos*)

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 BufSearchForward 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)

30.87.3.14 int Fl_Text_Buffer::findchars_backward (int *startPos*, const char * *searchChars*, int * *foundPos*)

Finds the previous occurrence of the specified characters.

Search backwards in buffer for characters in *searchChars*, starting with the character BEFORE *startPos*, returning the result in *foundPos* returns 1 if found, 0 if not.

30.87.3.15 int Fl_Text_Buffer::findchars_forward (int *startPos*, const char * *searchChars*, int * *foundPos*)

Finds the next occurrence of the specified characters.

Search forwards in buffer for characters in *searchChars*, starting with the character *startPos*, and returning the result in *foundPos* returns 1 if found, 0 if not.

30.87.3.16 int Fl_Text_Buffer::highlight () [inline]

Returns the highlighted text.

When you are done with the text, free it using the free() function.

30.87.3.17 void Fl_Text_Buffer::highlight (int *start*, int *end*)

Highlights the specified text within the buffer.

30.87.3.18 int Fl_Text_Buffer::highlight_position (int * *start*, int * *end*, int * *isRect*, int * *rectStart*, int * *rectEnd*)

Highlights the specified rectangle of text within the buffer.

30.87.3.19 int Fl_Text_Buffer::highlight_position (int * *start*, int * *end*)

Highlights the specified text between *start* and *end* within the buffer.

30.87.3.20 Fl_Text_Selection* Fl_Text_Buffer::highlight_selection () [inline]

Returns the current highlight selection.

30.87.3.21 char * Fl_Text_Buffer::highlight_text ()

Returns the highlighted text.

When you are done with the text, free it using the free() function.

30.87.3.22 void Fl_Text_Buffer::insert (int pos, const char * text)

Inserts null-terminated string *text* at position *pos*.

30.87.3.23 int Fl_Text_Buffer::insert_ (int pos, const char * text) [protected]

Internal (non-redisplaying) version of BufInsert.

Returns the length of text inserted (this is just `strlen(text)`, 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).

30.87.3.24 void Fl_Text_Buffer::insert_column (int column, int startPos, const char * text, int * charsInserted, int * charsDeleted)

Insert *s* columnwise into buffer starting at displayed character position *column* on the line beginning at *startPos*.

Opens a rectangular space the width and height of *s*, by moving all text to the right of *column* right. If *charsInserted* and *charsDeleted* are not NULL, the number of characters inserted and deleted in the operation (beginning at *startPos*) are returned in these arguments.

30.87.3.25 void Fl_Text_Buffer::insert_column_ (int column, int startPos, const char * insText, int * nDeleted, int * nInserted, int * endPos) [protected]

Inserts a column of text without calling the modify callbacks.

Note that in some pathological cases, inserting can actually decrease the size of the buffer because of spaces being coalesced into tabs. *nDeleted* and *nInserted* return the number of characters deleted and inserted beginning at the start of the line containing *startPos*. *endPos* returns buffer position of the lower left edge of the inserted column (as a hint for routines which need to set a cursor position).

30.87.3.26 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).

30.87.3.27 int Fl_Text_Buffer::length () [inline]

Returns the number of characters in the buffer.

30.87.3.28 int Fl_Text_Buffer::line_start (int pos)

Returns the position of the start of the line containing position *pos*.

30.87.3.29 char * Fl_Text_Buffer::line_text (int pos)

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.

30.87.3.30 char Fl_Text_Buffer::null_substitution_character () [inline]

Returns the current nul substitution character.

30.87.3.31 int Fl_Text_Buffer::outputfile (const char *file, int start, int end, int buflen = 128*1024)

Writes the specified portions of the file 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).

30.87.3.32 void Fl_Text_Buffer::overlay_rectangular (int startPos, int rectStart, int rectEnd, const char *text, int *charsInserted, int *charsDeleted)

Overlay *text* between displayed character positions *rectStart* and *rectEnd* on the line beginning at *startPos*.

If *charsInserted* and *charsDeleted* are not NULL, the number of characters inserted and deleted in the operation (beginning at *startPos*) are returned in these arguments.

30.87.3.33 void Fl_Text_Buffer::overlay_rectangular_ (int startPos, int rectStart, int rectEnd, const char *insText, int *nDeleted, int *nInserted, int *endPos) [protected]

Overlay a rectangular area of text without calling the modify callbacks.

nDeleted and *nInserted* return the number of characters deleted and inserted beginning at the start of the line containing *startPos*. *endPos* returns buffer position of the lower left edge of the inserted column (as a hint for routines which need to set a cursor position).

30.87.3.34 Fl_Text_Selection* Fl_Text_Buffer::primary_selection () [inline]

Returns the primary selection.

30.87.3.35 void Fl_Text_Buffer::rectangular_selection_boundaries (int lineStartPos, int rectStart, int rectEnd, int *selStart, int *selEnd) [protected]

Finds the first and last character position in a line within a rectangular selection (for copying).

Includes tabs which cross *rectStart*, but not control characters which do so. Leaves off tabs which cross *rectEnd*.

Technically, the calling routine should convert tab characters which cross the right boundary of the selection to spaces which line up with the edge of the selection. Unfortunately, the additional memory management required in the parent routine to allow for the changes in string size is not worth all the extra work just for a couple of shifted characters, so if a tab protrudes, just lop it off and hope that there are other characters in the selection to establish the right margin for subsequent columnar pastes of this data.

30.87.3.36 void Fl_Text_Buffer::remove (int start, int end)

Deletes a range of characters in the buffer.

30.87.3.37 void Fl_Text_Buffer::remove_ (int start, int end) [protected]

Internal (non-redisplaying) version of BufRemove.

Removes the contents of the buffer between start and end (and moves the gap to the site of the delete).

30.87.3.38 void Fl_Text_Buffer::remove_modify_callback (Fl_Text_Modify_Cb *bufModifiedCB*, void * *cbArg*)

Removes a modify callback.

30.87.3.39 void Fl_Text_Buffer::remove_pdelete_callback (Fl_Text_Pdelete_Cb *bufPreDeleteCB*, void * *cbArg*)

Removes a callback routine *bufPreDeleteCB* associated with argument *cbArg* to be called before text is deleted from the buffer.

30.87.3.40 void Fl_Text_Buffer::remove_rectangular_ (int start, int end, int rectStart, int rectEnd, int * replaceLen, int * endPos) [protected]

Deletes a rectangle of text without calling the modify callbacks.

Returns the number of characters replacing those between *start* and *end*. Note that in some pathological cases, deleting can actually increase the size of the buffer because of tab expansions. *endPos* returns the buffer position of the point in the last line where the text was removed (as a hint for routines which need to position the cursor after a delete operation)

30.87.3.41 void Fl_Text_Buffer::remove_secondary_selection ()

Removes the text from the buffer corresponding to the secondary text selection object.

30.87.3.42 void Fl_Text_Buffer::remove_selection ()

Removes the text in the primary selection.

30.87.3.43 void Fl_Text_Buffer::remove_selection_ (Fl_Text_Selection * *sel*) [protected]

Removes the text from the buffer corresponding to *sel*.

30.87.3.44 void Fl_Text_Buffer::replace_rectangular (int start, int end, int rectStart, int rectEnd, const char * *text*)

Replaces a rectangular area in the buffer, given by *start*, *end*, *rectStart*, and *rectEnd*, with *text*.

If *text* is vertically longer than the rectangle, add extra lines to make room for it.

30.87.3.45 void Fl_Text_Buffer::replace_secondary_selection (const char * *text*)

Replaces the text from the buffer corresponding to the secondary text selection object with the new string *text*.

30.87.3.46 void Fl_Text_Buffer::replace_selection (const char * *text*)

Replaces the text in the primary selection.

**30.87.3.47 void Fl_Text_Buffer::replace_selection_ (Fl_Text_Selection * *sel*, const char * *text*)
[protected]**

Replaces the *text* in selection *sel*.

30.87.3.48 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

30.87.3.49 void Fl_Text_Buffer::secondary_select (int *start*, int *end*)

Selects a range of characters in the secondary selection.

30.87.3.50 Fl_Text_Selection* Fl_Text_Buffer::secondary_selection () [inline]

Returns the secondary selection.

30.87.3.51 int Fl_Text_Buffer::secondary_selection_position (int * *start*, int * *end*, int * *isRect*, int * *rectStart*, int * *rectEnd*)

Returns the current selection in the secondary text selection object.

30.87.3.52 int Fl_Text_Buffer::secondary_selection_position (int * *start*, int * *end*)

Returns the current selection in the secondary text selection object.

30.87.3.53 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.

30.87.3.54 void Fl_Text_Buffer::secondary_unselect ()

Clears any selection in the secondary text selection object.

Cancels any previous selection on the primary text selection object.

30.87.3.55 void Fl_Text_Buffer::select (int *start*, int *end*)

Selects a range of characters in the buffer.

30.87.3.56 char * Fl_Text_Buffer::selection_text ()

Returns the currently selected text.

When you are done with the text, free it using the free() function.

30.87.3.57 int Fl_Text_Buffer::substitute_null_characters (char * *string*, int *len*)

The primary routine for integrating new text into a text buffer with substitution of another character for ascii nuls.

This substitutes null characters in the string in preparation for being copied or replaced into the buffer, and if necessary, adjusts the buffer as well, in the event that the string contains the character it is currently using for substitution. Returns 0, if substitution is no longer possible because all non-printable characters are already in use.

30.87.3.58 int Fl_Text_Buffer::tab_distance () [inline]

Gets the tab width.

30.87.3.59 char * Fl_Text_Buffer::text ()

Get the entire contents of a text buffer.

Memory is allocated to contain the returned string, which the caller must free.

30.87.3.60 char * Fl_Text_Buffer::text_in_rectangle (int *start*, int *end*, int *rectStart*, int *rectEnd*)

Returns the text from the given rectangle.

When you are done with the text, free it using the free() function.

30.87.3.61 char * Fl_Text_Buffer::text_range (int *start*, int *end*)

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.

30.87.3.62 void Fl_Text_Buffer::unhighlight ()

Unhighlights text in the buffer.

30.87.3.63 void Fl_Text_Buffer::unsubstitute_null_characters (char * *string*)

Converts strings obtained from buffers which contain null characters, which have been substituted for by a special substitution character, back to a null-containing string.

There is no time penalty for calling this routine if no substitution has been done.

30.87.3.64 int Fl_Text_Buffer::word_end (int pos)

Returns the position corresponding to the end of the word.

30.87.4 Member Data Documentation

30.87.4.1 Fl_Text_Modify_Cb* Fl_Text_Buffer::mModifyProcs [protected]

< procedures to call when buffer is modified to redisplay contents

30.87.4.2 char Fl_Text_Buffer::mNullSubsChar [protected]

NEdit is based on C null-terminated strings, so ascii-nul characters must be substituted with something else.

This is the else, but of course, things get quite messy when you use it

30.87.4.3 Fl_Text_Predelete_Cb* Fl_Text_Buffer::mPredeleteProcs [protected]

< procedure to call before text is deleted from the buffer; at most one is supported.

30.87.4.4 int Fl_Text_Buffer::mTabDist [protected]

equiv.

number of characters in a tab

The documentation for this class was generated from the following files:

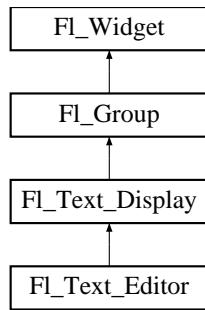
- Fl_Text_Buffer.H
- Fl_Text_Buffer.cxx

30.88 Fl_Text_Display Class Reference

This is the FLTK 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,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 }
text display cursor shapes enumeration
- enum { **CURSOR_POS, CHARACTER_POS** }
- enum { **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 { **ATTR_NONE = 0, ATTR_UNDERLINE = 1, ATTR_HIDDEN = 2** }
style attributes - currently not implemented!
- typedef void(* **Unfinished_Style_Cb**)(int, void *)

Public Member Functions

- [Fl_Text_Display](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new text display widget.
- [~Fl_Text_Display](#) ()
Free a text display and release its associated memory.

- virtual int **handle** (int e)
Handles the specified event.
- void **buffer** (Fl_Text_Buffer *buf)
Attach a text buffer to display, replacing the current buffer (if any).
- void **buffer** (Fl_Text_Buffer &buf)
Sets or gets the current text buffer associated with the text widget.
- Fl_Text_Buffer * **buffer** ()
Gets the current text buffer associated with the text widget.
- void **redisplay_range** (int start, int end)
Marks text from start to end as needing a redraw.
- void **scroll** (int topLineNum, int horizOffset)
Scrolls the current buffer to start at the specified line and column.
- void **insert** (const char *text)
Inserts "text" at the current cursor location.
- void **overstrike** (const char *text)
Replaces text at the current insert position.
- void **insert_position** (int newPos)
Sets the position of the text insertion cursor for text display.
- int **insert_position** ()
Gets the position of the text insertion cursor for text display.
- int **in_selection** (int x, int y)
Return 1 if position (X, Y) is inside of the primary Fl_Text_Selection.
- void **show_insert_position** ()
Scrolls the text buffer to show the current insert position.
- int **move_right** ()
Moves the current insert position right one character.
- int **move_left** ()
Moves the current insert position left one character.
- int **move_up** ()
Moves the current insert position up one line.
- int **move_down** ()
Moves the current insert position down one line.
- int **count_lines** (int start, int end, bool start_pos_is_line_start)
Same as BufCountLines, but takes in to account wrapping if wrapping is turned on.

- int **line_start** (int pos)

Same as BufStartOfLine, but returns the character after last wrap point rather than the last newline.

- int **line_end** (int pos, bool start_pos_is_line_start)

Same as BufEndOfLine, but takes in to account line breaks when wrapping is turned on.

- int **skip_lines** (int startPos, int nLines, bool startPosIsLineStart)

Same as BufCountForwardNLines, but takes in to account line breaks when wrapping is turned on.

- int **rewind_lines** (int startPos, int nLines)

Same as BufCountBackwardNLines, but takes in to account line breaks when wrapping is turned on.

- void **next_word** (void)

Moves the current insert position right one word.

- void **previous_word** (void)

Moves the current insert position left one word.

- void **show_cursor** (int b=1)

Shows the text cursor.

- void **hide_cursor** ()

Hides the text cursor.

- void **cursor_style** (int style)

Sets the text cursor style to one of the following::

- **Fl_Color cursor_color** () const

Sets or gets the text cursor color.

- void **cursor_color** (**Fl_Color** n)

Sets or gets the text cursor color.

- int **scrollbar_width** ()

Sets or gets the width/height of the scrollbars.

- void **scrollbar_width** (int W)

Sets or gets the width/height of the scrollbars.

- **Fl_Align scrollbar_align** ()

Gets the scrollbar alignment type.

- void **scrollbar_align** (**Fl_Align** a)

Sets the scrollbar alignment type.

- int **word_start** (int pos)

Moves the insert position to the beginning of the current word.

- int **word_end** (int pos)

Moves the insert position to the end of the current word.

- 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 **position_style** (int lineStartPos, int lineLen, int lineIndex, int dispIndex)

Determine the drawing method to use to draw a specific character from "buf".

- int **shortcut** () const

- void **shortcut** (int s)

- 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.

- Fl_Color **textcolor** () const

Gets the default color of text in the widget.

- void **textcolor** (unsigned n)

Sets the default color of text in the widget.

- int **wrapped_column** (int row, int column)

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.

- int **wrapped_row** (int row)

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.

- void **wrap_mode** (int wrap, int wrap_margin)

If mode is not zero, this call enables automatic word wrapping at column pos.

- virtual void **resize** (int X, int Y, int W, int H)

Change the size of the displayed text area.

Protected Member Functions

- virtual void **draw** ()

Draw the widget.

- void [draw_text](#) (int X, int Y, int W, int H)
Refresh a rectangle of the text display.
- void [draw_range](#) (int start, int end)
Refresh all of the text between buffer positions "start" and "end" not including the character at the position "end".
- void [draw_cursor](#) (int, int)
Draw a cursor with top center at X, y.
- void [draw_string](#) (int style, int x, int y, int toX, const char *string, int nChars)
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.
- void [draw_vline](#) (int visLineNum, int leftClip, int rightClip, int leftCharIndex, int rightCharIndex)
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").
- void [draw_line_numbers](#) (bool clearAll)
Refresh the line number area.
- void [clear_rect](#) (int style, int x, int y, int width, int height)
Clear a rectangle with the appropriate background color for "style".
- void [display_insert](#) ()
Scroll the display to bring insertion cursor into view.
- void [offset_line_starts](#) (int newTopLineNum)
Offset the line starts array, mTopLineNum, mFirstChar and lastChar, for a new vertical scroll position given by newTopLineNum.
- void [calc_line_starts](#) (int startLine, int endLine)
Scan through the text in the "textD"'s buffer and recalculate the line starts array values beginning at index "startLine" and continuing through (including) "endLine".
- void [update_line_starts](#) (int pos, int charsInserted, int charsDeleted, int linesInserted, int linesDeleted, int *scrolled)
Update the line starts array, mTopLineNum, mFirstChar and lastChar for text display "textD" after a modification to the text buffer, given by the position where the change began "pos", and the numbers of characters and lines inserted and deleted.
- void [calc_last_char](#) ()
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.
- int [position_to_line](#) (int pos, int *lineNum)
Find the line number of position "pos" relative to the first line of displayed text.
- int [string_width](#) (const char *string, int length, int style)
Find the width of a string in the font of a particular style.

- void **update_v_scrollbar** ()
Update the minimum, maximum, slider size, page increment, and value for vertical scroll bar.
- void **update_h_scrollbar** ()
Update the minimum, maximum, slider size, page increment, and value for the horizontal scroll bar.
- int **measure_vline** (int visLineNum)
Return the width in pixels of the displayed line pointed to by "visLineNum".
- int **longest_vline** ()
- int **empty_vlines** ()
Return true if there are lines visible with no corresponding buffer text.
- int **vline_length** (int visLineNum)
Return the length of a line (number of displayable characters) by examining entries in the line starts array rather than by scanning for newlines.
- int **xy_to_position** (int x, int y, int PosType=CHARACTER_POS)
Translate window coordinates to the nearest (insert cursor or character cell) text position.
- void **xy_to_rowcol** (int x, int y, int *row, int *column, int PosType=CHARACTER_POS)
Translate window coordinates to the nearest row and column number for positioning the cursor.
- int **position_to_xy** (int pos, int *x, int *y)
Translate a buffer text position to the XY location where the top left of the cursor would be positioned to point to that character.
- void **maintain_absolute_top_line_number** (int state)
In continuous wrap mode, internal line numbers are calculated after wrapping.
- int **get_absolute_top_line_number** ()
Returns the absolute (non-wrapped) line number of the first line displayed.
- void **absolute_top_line_number** (int oldFirstChar)
Re-calculate absolute top line number for a change in scroll position.
- int **maintaining_absolute_top_line_number** ()
Return true if a separate absolute top line number is being maintained (for displaying line numbers or showing in the statistics line).
- void **reset_absolute_top_line_number** ()
Count lines from the beginning of the buffer to reestablish the absolute (non-wrapped) top line number.
- int **position_to_linecol** (int pos, int *lineNum, int *column)
Find the line number of position "pos".
- void **scroll_** (int topLineNum, int horizOffset)
- void **extend_range_for_styles** (int *start, int *end)
*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).*

- void [find_wrap_range](#) (const char *deletedText, int pos, int nInserted, int nDeleted, int *modRangeStart, int *modRangeEnd, int *linesInserted, int *linesDeleted)

When continuous wrap is on, and the user inserts or deletes characters, wrapping can happen before and beyond the changed position.
- void [measure_deleted_lines](#) (int pos, int nDeleted)

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.
- void [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)

Count forward from startPos to either maxPos or maxLines (whichever is reached first), and return all relevant positions and line count.
- void [find_line_end](#) (int pos, bool start_pos_is_line_start, int *lineEnd, int *nextLineStart)

Finds both the end of the current line and the start of the next line.
- int [measure_proportional_character](#) (char c, int colNum, int pos)

Measure the width in pixels of a character "c" at a particular column "colNum" and buffer position "pos".
- int [wrap_uses_character](#) (int lineEndPos)

Line breaks in continuous wrap mode usually happen at newlines or whitespace.
- int [range_touches_selection](#) (Fl_Text_Selection *sel, int rangeStart, int rangeEnd)

Return true if the selection "sel" is rectangular, and touches a buffer position withing "rangeStart" to "rangeEnd".

Static Protected Member Functions

- static void [scroll_timer_cb](#) (void *)
- static void [buffer_predelete_cb](#) (int pos, int nDeleted, void *cbArg)

Callback attached to the text buffer to receive delete information before the modifications are actually made.
- static void [buffer_modified_cb](#) (int pos, int nInserted, int nDeleted, int nRestyled, const char *deletedText, void *cbArg)

Callback attached to the text buffer to receive modification information.
- static void [h_scrollbar_cb](#) (Fl_Scrollbar *w, Fl_Text_Display *d)
- static void [v_scrollbar_cb](#) (Fl_Scrollbar *w, Fl_Text_Display *d)

Callbacks for drag or valueChanged on scroll bars.

Friends

- void [fl_text_drag_me](#) (int pos, Fl_Text_Display *d)

30.88.1 Detailed Description

This is the FLTK text display widget.

It allows the user to view 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.

30.88.2 Constructor & Destructor Documentation

30.88.2.1 `Fl_Text_Display::Fl_Text_Display (int X, int Y, int W, int H, const char *l = 0)`

Creates a new text display widget.

30.88.2.2 `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.

30.88.3 Member Function Documentation

30.88.3.1 `Fl_Text_Buffer* Fl_Text_Display::buffer () [inline]`

Gets the current text buffer associated with the text widget.

Multiple text widgets can be associated with the same text buffer.

30.88.3.2 `void Fl_Text_Display::buffer (Fl_Text_Buffer & buf) [inline]`

Sets or gets the current text buffer associated with the text widget.

Multiple text widgets can be associated with the same text buffer.

30.88.3.3 `void Fl_Text_Display::calc_line_starts (int startLine, int endLine) [protected]`

Scan through the text in the "textD"'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.

30.88.3.4 `int Fl_Text_Display::count_lines (int startPos, int endPos, bool startPosIsLineStart)`

Same as BufCountLines, but takes in to 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.

30.88.3.5 void Fl_Text_Display::cursor_color (Fl_Color *n*) [inline]

Sets or gets the text cursor color.

30.88.3.6 Fl_Color Fl_Text_Display::cursor_color () const [inline]

Sets or gets the text cursor color.

30.88.3.7 void Fl_Text_Display::cursor_style (int *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.

30.88.3.8 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.

30.88.3.9 void Fl_Text_Display::draw () [protected, virtual]

Draw 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.

Reimplemented from [Fl_Group](#).

30.88.3.10 void Fl_Text_Display::draw_line_numbers (bool *clearAll*) [protected]

Refresh the line number area.

If clearAll is False, writes only over the character cell areas. Setting clearAll to True will clear out any stray marks outside of the character cell area, which might have been left from before a resize or font change.

30.88.3.11 void Fl_Text_Display::draw_range (int *startpos*, int *endpos*) [protected]

Refresh all of the text between buffer positions "start" and "end" not including the character at the position "end".

If end points beyond the end of the buffer, refresh the whole display after pos, including blank lines which are not technically part of any range of characters.

30.88.3.12 void Fl_Text_Display::draw_string (int *style*, int *X*, int *Y*, int *toX*, const char * *string*, int *nChars*) [protected]

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).

30.88.3.13 void Fl_Text_Display::draw_text (int *left*, int *top*, int *width*, int *height*) [protected]

Refresh a rectangle of the text display.

left and top are in coordinates of the text drawing window

30.88.3.14 void Fl_Text_Display::find_line_end (int *startPos*, bool *startPosIsLineStart*, int * *lineEnd*, int * *nextLineStart*) [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.

30.88.3.15 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]

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.

30.88.3.16 int Fl_Text_Display::get_absolute_top_line_number () [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.

30.88.3.17 int Fl_Text_Display::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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

Reimplemented in [Fl_Text_Editor](#).

30.88.3.18 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 "unfinishedStyle". Style buffer can trigger additional redisplay during a normal buffer modification if the buffer contains a primary [Fl_Text_Selection](#) (see extendRangeForStyleMods for more information on this protocol).

Style buffers, tables and their associated memory are managed by the caller.

30.88.3.19 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 BufInsert and then moving the insert position after the newly inserted text, except that it's optimized to do less redrawing.

30.88.3.20 int Fl_Text_Display::line_end (int *pos*, bool *startPosIsLineStart*)

Same as BufEndOfLine, but takes in to 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.

30.88.3.21 void Fl_Text_Display::maintain_absolute_top_line_number (int state) [protected]

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 TextDPosToLineAndCol). More specifically, this allows the line number reported in the statistics line to be calibrated in absolute lines, rather than post-wrapped lines.

30.88.3.22 void Fl_Text_Display::measure_deleted_lines (int pos, int nDeleted) [protected]

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).

30.88.3.23 int Fl_Text_Display::measure_proportional_character (char c, int colNum, int pos) [protected]

Measure the width in pixels of a character "c" 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.

30.88.3.24 int Fl_Text_Display::move_down ()

Moves the current insert position down one line.

30.88.3.25 int Fl_Text_Display::move_left ()

Moves the current insert position left one character.

30.88.3.26 int Fl_Text_Display::move_right ()

Moves the current insert position right one character.

30.88.3.27 int Fl_Text_Display::move_up ()

Moves the current insert position up one line.

30.88.3.28 void Fl_Text_Display::next_word (void)

Moves the current insert position right one word.

30.88.3.29 void Fl_Text_Display::offset_line_starts (int newTopLineNum) [protected]

Offset the line starts array, mTopLineNum, mFirstChar and lastChar, for a new vertical scroll position given by newTopLineNum.

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)

30.88.3.30 void Fl_Text_Display::overstrike (const char *text)

Replaces text at the current insert position.

30.88.3.31 int Fl_Text_Display::position_style (int lineStartPos, int lineLen, int lineIndex, int dispIndex)

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 "dispIndex", 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.

30.88.3.32 int Fl_Text_Display::position_to_line (int pos, int *lineNum) [protected]

Find the line number of position "pos" relative to the first line of displayed text.

Returns 0 if the line is not displayed.

30.88.3.33 int Fl_Text_Display::position_to_linecol (int pos, int *lineNum, int *column) [protected]

Find the line number of position "pos".

Note: 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).

30.88.3.34 int Fl_Text_Display::position_to_xy (int pos, int *X, int *Y) [protected]

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.

30.88.3.35 void Fl_Text_Display::previous_word (void)

Moves the current insert position left one word.

30.88.3.36 void Fl_Text_Display::redisplay_range (int startpos, int endpos)

Marks text from start to end as needing a redraw.

30.88.3.37 void Fl_Text_Display::reset_absolute_top_line_number () [protected]

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.

30.88.3.38 void Fl_Text_Display::scroll (int topLineNum, int horizOffset)

Scrolls the current buffer to start at the specified line and column.

30.88.3.39 void Fl_Text_Display::scrollbar_width (int W) [inline]

Sets or gets the width/height of the scrollbars.

30.88.3.40 int Fl_Text_Display::scrollbar_width () [inline]

Sets or gets the width/height of the scrollbars.

30.88.3.41 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!

30.88.3.42 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!

30.88.3.43 void Fl_Text_Display::show_insert_position ()

Scrolls the text buffer to show the current insert position.

30.88.3.44 int Fl_Text_Display::skip_lines (int startPos, int nLines, bool startPosIsLineStart)

Same as BufCountForwardNLines, but takes in to 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.

30.88.3.45 void Fl_Text_Display::textcolor (unsigned n) [inline]

Sets the default color of text in the widget.

30.88.3.46 Fl_Color Fl_Text_Display::textcolor () const [inline]

Gets the default color of text in the widget.

30.88.3.47 void Fl_Text_Display::textfont (Fl_Font s) [inline]

Sets the default font used when drawing text in the widget.

30.88.3.48 Fl_Font Fl_Text_Display::textfont () const [inline]

Gets the default font used when drawing text in the widget.

30.88.3.49 void Fl_Text_Display::textsize (Fl_Fontsize s) [inline]

Sets the default size of text in the widget.

30.88.3.50 Fl_Fontsize Fl_Text_Display::textsize () const [inline]

Gets the default size of text in the widget.

30.88.3.51 int Fl_Text_Display::word_end (int pos) [inline]

Moves the insert position to the end of the current word.

30.88.3.52 int Fl_Text_Display::word_start (int pos) [inline]

Moves the insert position to the beginning of the current word.

30.88.3.53 void Fl_Text_Display::wrap_mode (int wrap, int wrapMargin)

If *mode* is not zero, this call enables automatic word wrapping at column *pos*.

Word-wrapping does not change the text buffer itself, only the way that the text is displayed.

30.88.3.54 int Fl_Text_Display::wrap_uses_character (int *lineEndPos*) [protected]

Line breaks in continuous wrap mode usually happen at newlines 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 TextDEndOfLine or BufEndOfLine, 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.

30.88.3.55 int Fl_Text_Display::wrapped_column (int *row*, int *column*)

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.

30.88.3.56 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) [protected]

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.

Returned values:

retPos: Position where counting ended. When counting lines, the position returned is the start of the line "maxLines" lines beyond "startPos". *retLines*: Number of line breaks counted *retLineStart*: Start of the line where counting ended *retLineEnd*: End position of the last line traversed

30.88.3.57 int Fl_Text_Display::wrapped_row (int *row*)

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.

30.88.3.58 int Fl_Text_Display::xy_to_position (int *X*, int *Y*, int *posType* = CHARACTER_POS) [protected]

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).

30.88.3.59 void Fl_Text_Display::xy_to_rowcol (int X, int Y, int *row, int *column, int posType = CHARACTER_POS) [protected]

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.

The documentation for this class was generated from the following files:

- Fl_Text_Display.H
- Fl_Text_Display.cxx

30.89 Fl_Text_Display::Style_Table_Entry Struct Reference

This structure associates the color,font,size of a string to draw with an attribute mask matching attr.

```
#include <Fl_Text_Display.H>
```

Public Attributes

- [Fl_Color](#) **color**
- [Fl_Font](#) **font**
- int **size**
- unsigned **attr**

30.89.1 Detailed Description

This structure associates the color,font,size of a string to draw with an attribute mask matching attr.

The documentation for this struct was generated from the following file:

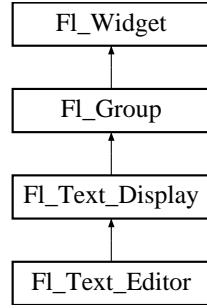
- Fl_Text_Display.H

30.90 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 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 Member Functions

- [Fl_Text_Editor \(int X, int Y, int W, int H, const char *l=0\)](#)
The constructor creates a new text editor widget.
- [virtual int handle \(int e\)](#)
Handles the specified event.
- [void insert_mode \(int b\)](#)
Sets the current insert mode; if non-zero, new text is inserted before the current cursor position.
- [int insert_mode \(\)](#)
Gets the current insert mode; if non-zero, new text is inserted before the current cursor position.
- [void add_key_binding \(int key, int state, Key_Func f, Key_Binding **list\)](#)
Adds a key of state "state" with the function "function".
- [void add_key_binding \(int key, int state, Key_Func f\)](#)
Adds a key of state "state" with the function "function".

- void `remove_key_binding` (int key, int state, `Key_Binding` **list)
Removes the key binding associated with the key "key" of state "state".
- void `remove_key_binding` (int key, int state)
Removes the key binding associated with the key "key" of state "state".
- void `remove_all_key_bindings` (`Key_Binding` **list)
Removes all of the key bindings associated with the text editor or list.
- void `remove_all_key_bindings` ()
Removes all of the key bindings associated with the text editor or list.
- void `add_default_key_bindings` (`Key_Binding` **list)
Adds all of the default editor key bindings to the specified key binding list.
- `Key_Func bound_key_function` (int key, int state, `Key_Binding` *list)
Returns the function associated with a key binding.
- `Key_Func bound_key_function` (int key, int state)
Returns the function associated with a key binding.
- void `default_key_function` (`Key_Func` f)
Sets the default key function for unassigned keys.

Static Public Member Functions

- static int `kf_default` (int c, `Fl_Text_Editor` *e)
Inserts the text associated with the key.
- static int `kf_ignore` (int c, `Fl_Text_Editor` *e)
Ignores the keypress.
- static int `kf_backspace` (int c, `Fl_Text_Editor` *e)
Does a backspace in the current buffer.
- static int `kf_enter` (int c, `Fl_Text_Editor` *e)
Inserts a newline at the current cursor position.
- static int `kf_move` (int c, `Fl_Text_Editor` *e)
Moves the text cursor in the direction indicated by key c.
- static int `kf_shift_move` (int c, `Fl_Text_Editor` *e)
Extends the current selection in the direction of key c.
- static int `kf_ctrl_move` (int c, `Fl_Text_Editor` *e)
Moves the current text cursor in the direction indicated by control key.

- static int [kf_c_s_move](#) (int c, [Fl_Text_Editor](#) *e)
Extends the current selection in the direction indicated by control key c.
- static int [kf_home](#) (int, [Fl_Text_Editor](#) *e)
Moves the text cursor to the beginning of the current line.
- static int [kf_end](#) (int c, [Fl_Text_Editor](#) *e)
Moves the text cursor to the end of the current line.
- static int [kf_left](#) (int c, [Fl_Text_Editor](#) *e)
Moves the text cursor one character to the left.
- static int [kf_up](#) (int c, [Fl_Text_Editor](#) *e)
Moves the text cursor one line up.
- static int [kf_right](#) (int c, [Fl_Text_Editor](#) *e)
Moves the text cursor one character to the right.
- static int [kf_down](#) (int c, [Fl_Text_Editor](#) *e)
Moves the text cursor one line down.
- static int [kf_page_up](#) (int c, [Fl_Text_Editor](#) *e)
Moves the text cursor up one page.
- static int [kf_page_down](#) (int c, [Fl_Text_Editor](#) *e)
Moves the text cursor down one page.
- static int [kf_insert](#) (int c, [Fl_Text_Editor](#) *e)
Toggles the insert mode in the text editor.
- static int [kf_delete](#) (int c, [Fl_Text_Editor](#) *e)
Does a delete of selected text or the current character in the current buffer.
- static int [kf_copy](#) (int c, [Fl_Text_Editor](#) *e)
Does a copy of selected text or the current character in the current buffer.
- static int [kf_cut](#) (int c, [Fl_Text_Editor](#) *e)
Does a cut of selected text in the current buffer.
- static int [kf_paste](#) (int c, [Fl_Text_Editor](#) *e)
Does a paste of selected text in the current buffer.
- static int [kf_select_all](#) (int c, [Fl_Text_Editor](#) *e)
Selects all text in the current buffer.
- static int [kf_undo](#) (int c, [Fl_Text_Editor](#) *e)
Undo last edit in the current buffer.

Protected Member Functions

- int [handle_key \(\)](#)
Handles a key press in the editor.
- void [maybe_do_callback \(\)](#)
does or does not a callback according to [changed\(\)](#) and [when\(\)](#) settings

30.90.1 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.

30.90.2 Constructor & Destructor Documentation

30.90.2.1 [Fl_Text_Editor::Fl_Text_Editor \(int X, int Y, int W, int H, const char *l = 0\)](#)

The constructor creates a new text editor widget.

30.90.3 Member Function Documentation

30.90.3.1 [void Fl_Text_Editor::add_default_key_bindings \(Key_Binding **list\)](#)

Adds all of the default editor key bindings to the specified key binding list.

30.90.3.2 [Key_Func Fl_Text_Editor::bound_key_function \(int key, int state\) \[inline\]](#)

Returns the function associated with a key binding.

30.90.3.3 [Fl_Text_Editor::Key_Func Fl_Text_Editor::bound_key_function \(int key, int state, Key_Binding *list\)](#)

Returns the function associated with a key binding.

30.90.3.4 [void Fl_Text_Editor::default_key_function \(Key_Func f\) \[inline\]](#)

Sets the default key function for unassigned keys.

30.90.3.5 [int Fl_Text_Editor::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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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_Text_Display](#).

30.90.3.6 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.

30.90.3.7 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.

30.90.3.8 int Fl_Text_Editor::kf_backspace (int *c*, Fl_Text_Editor * *e*) [static]

Does a backspace in the current buffer.

30.90.3.9 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*.

30.90.3.10 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.

30.90.3.11 int Fl_Text_Editor::kf_cut (int *c*, Fl_Text_Editor * *e*) [static]

Does a cut of selected text in the current buffer.

30.90.3.12 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.

30.90.3.13 int Fl_Text_Editor::kf_down (int *c*, Fl_Text_Editor * *e*) [static]

Moves the text cursor one line down.

30.90.3.14 int Fl_Text_Editor::kf_end (int *c*, Fl_Text_Editor * *e*) [static]

Moves the text cursor to the end of the current line.

30.90.3.15 int Fl_Text_Editor::kf_home (int, Fl_Text_Editor * *e*) [static]

Moves the text cursor to the beginning of the current line.

30.90.3.16 int Fl_Text_Editor::kf_insert (int *c*, Fl_Text_Editor * *e*) [static]

Toggles the insert mode in the text editor.

30.90.3.17 int Fl_Text_Editor::kf_left (int *c*, Fl_Text_Editor * *e*) [static]

Moves the text cursor one character to the left.

30.90.3.18 int Fl_Text_Editor::kf_move (int *c*, Fl_Text_Editor * *e*) [static]

Moves the text cursor in the direction indicated by key *c*.

30.90.3.19 int Fl_Text_Editor::kf_page_down (int *c*, Fl_Text_Editor * *e*) [static]

Moves the text cursor down one page.

30.90.3.20 int Fl_Text_Editor::kf_page_up (int *c*, Fl_Text_Editor * *e*) [static]

Moves the text cursor up one page.

30.90.3.21 int Fl_Text_Editor::kf_paste (int *c*, Fl_Text_Editor * *e*) [static]

Does a paste of selected text in the current buffer.

30.90.3.22 int Fl_Text_Editor::kf_right (int *c*, Fl_Text_Editor * *e*) [static]

Moves the text cursor one character to the right.

30.90.3.23 int Fl_Text_Editor::kf_select_all (int *c*, Fl_Text_Editor * *e*) [static]

Selects all text in the current buffer.

30.90.3.24 int Fl_Text_Editor::kf_shift_move (int c, Fl_Text_Editor * e) [static]

Extends the current selection in the direction of key c.

30.90.3.25 int Fl_Text_Editor::kf_undo (int c, Fl_Text_Editor * e) [static]

Undo last edit in the current buffer.

Also deselect previous selection.

30.90.3.26 int Fl_Text_Editor::kf_up (int c, Fl_Text_Editor * e) [static]

Moves the text cursor one line up.

30.90.3.27 void Fl_Text_Editor::remove_all_key_bindings () [inline]

Removes all of the key bindings associated with the text editor or list.

30.90.3.28 void Fl_Text_Editor::remove_all_key_bindings (Key_Binding ** list)

Removes all of the key bindings associated with the text editor or list.

30.90.3.29 void Fl_Text_Editor::remove_key_binding (int key, int state) [inline]

Removes the key binding associated with the key "key" of state "state".

The documentation for this class was generated from the following files:

- Fl_Text_Editor.H
- Fl_Text_Editor.cxx

30.91 Fl_Text_Editor::Key_Binding Struct Reference

Simple linked list associating a key/state to a function.

```
#include <Fl_Text_Editor.H>
```

Public Attributes

- int **key**
the key pressed
- int **state**
the state of key modifiers
- **Key_Func** function
associated function
- **Key_Binding** * **next**
next key binding in the list

30.91.1 Detailed Description

Simple linked list associating a key/state to a function.

The documentation for this struct was generated from the following file:

- Fl_Text_Editor.H

30.92 Fl_Text_Selection Class Reference

This is an internal class for [Fl_Text_Buffer](#) to manage text selections.

```
#include <Fl_Text_Buffer.H>
```

Public Member Functions

- void **set** (int start, int end)
- void **set_rectangular** (int start, int end, int rectStart, int rectEnd)
- void **update** (int pos, int nDeleted, int nInserted)

Updates an individual selection for changes in the corresponding text.

- char **rectangular** ()
- int **start** ()
- int **end** ()
- int **rect_start** ()
- int **rect_end** ()
- char **selected** ()

Returns a non-zero number if any text has been selected, or 0 if no text is selected.

- void **selected** (char b)
- int **includes** (int pos, int lineStartPos, int dispIndex)

Return true if position pos with indentation dispIndex is in the [Fl_Text_Selection](#).

- int **position** (int *start, int *end)
- int **position** (int *start, int *end, int *isRect, int *rectStart, int *rectEnd)

Protected Attributes

- char **mSelected**
- char **mRectangular**
- int **mStart**
- int **mEnd**
- int **mRectStart**
- int **mRectEnd**

Friends

- class [Fl_Text_Buffer](#)

30.92.1 Detailed Description

This is an internal class for [Fl_Text_Buffer](#) to manage text selections.

Todo

members must be documented

The documentation for this class was generated from the following files:

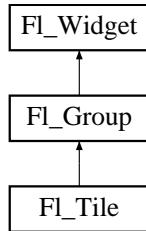
- Fl_Text_Buffer.H
- Fl_Text_Buffer.cxx

30.93 Fl_Tile Class Reference

The [Fl_Tile](#) class lets you resize the children by dragging the border between them:.

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

Inheritance diagram for [Fl_Tile](#):



Public Member Functions

- int [handle](#) (int)
Handles the specified event.
- [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.
- void [resize](#) (int, int, int, int)
This resizes the [Fl_Group](#) widget and all of its children.
- void [position](#) (int, int, int, int)
Drag the intersection at `from_x,from_y` to `to_x,to_y`.

30.93.1 Detailed Description

The [Fl_Tile](#) class lets you resize the children by dragging the border between them:.

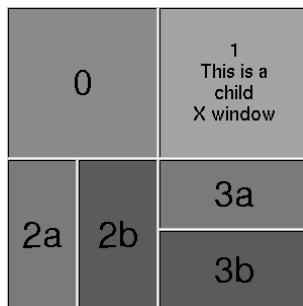


Figure 30.31: [Fl_Tile](#)

For the tiling to work correctly, the children of an [Fl_Tile](#) must cover the entire area of the widget, but not overlap. This means that all children must touch each other at their edges, and no gaps can't 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.

`FL_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.

Even though objects can be resized to zero sizes, they must initially have non-zero sizes so the `FL_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(FL_Widget &w)` : The "resizable" child widget (which should be invisible) limits where the border can be dragged to. If you don't set it, it will be possible to drag the borders right to the edge, and thus resize objects on the edge to zero width or height. The `resizable()` widget is not resized by dragging any borders. See also void `FL_Group::resizable(FL_Widget &w)`

30.93.2 Constructor & Destructor Documentation

30.93.2.1 `FL_Tile::FL_Tile (int X, int Y, int W, int H, const char *l = 0)` [inline]

Creates a new `FL_Tile` widget using the given position, size, and label string.

The default boxtyle 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_Tile` and all of it's children can be automatic (local) variables, but you must declare the `FL_Tile` first, so that it is destroyed last.

30.93.3 Member Function Documentation

30.93.3.1 `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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.93.3.2 void Fl_Tile::position (int *oix*, int *oiy*, int *newx*, int *newy*)

Drag the intersection at from_x,from_y to to_x,to_y.

This redraws all the necessary children.

30.93.3.3 void Fl_Tile::resize (int *X*, int *Y*, int *W*, int *H*) [virtual]

This 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](#).

The documentation for this class was generated from the following files:

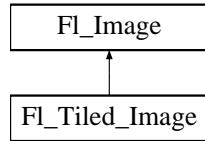
- [Fl_Tile.H](#)
- [Fl_Tile.cxx](#)

30.94 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

- [Fl_Tiled_Image \(Fl_Image *i, int W=0, int H=0\)](#)
The constructors create a new tiled image containing the specified image.
- virtual [~Fl_Tiled_Image \(\)](#)
The destructor frees all memory and server resources that are used by the tiled image.
- virtual [Fl_Image * copy \(int W, int H\)](#)
The [copy\(\)](#) method creates a copy of the specified image.
- [Fl_Image * copy \(\)](#)
The [copy\(\)](#) method creates a copy of the specified image.
- virtual void [color_average \(Fl_Color c, float i\)](#)
*The [color_average\(\)](#) method averages the colors in the image with the FLTK color value *c*.*
- virtual void [desaturate \(\)](#)
The [desaturate\(\)](#) method converts an image to grayscale.
- virtual void [draw \(int X, int Y, int W, int H, int cx, int cy\)](#)
The [draw\(\)](#) methods draw the image.
- void [draw \(int X, int Y\)](#)
The [draw\(\)](#) methods draw the image.
- [Fl_Image * image \(\)](#)
Gets The image that is shared.

Protected Attributes

- [Fl_Image * image_](#)
- int [alloc_image_](#)

30.94.1 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.

30.94.2 Constructor & Destructor Documentation

30.94.2.1 [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.

30.94.3 Member Function Documentation

30.94.3.1 [void Fl_Tiled_Image::color_average \(Fl_Color c, float i\) \[virtual\]](#)

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.

The i 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. *The original image data is not altered by this method.*

Reimplemented from [Fl_Image](#).

30.94.3.2 [Fl_Image* Fl_Tiled_Image::copy \(\) \[inline\]](#)

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.94.3.3 [Fl_Image * Fl_Tiled_Image::copy \(int W, int H\) \[virtual\]](#)

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

30.94.3.4 [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. *This method does not alter the original image data.*

Reimplemented from [Fl_Image](#).

30.94.3.5 void Fl_Tiled_Image::draw (int X, int Y) [inline]

The [draw\(\)](#) methods draw the image.

This form specifies the upper-lefthand corner of the image

Reimplemented from [Fl_Image](#).

30.94.3.6 void Fl_Tiled_Image::draw (int X, int Y, int W, int H, int cx, int cy) [virtual]

The [draw\(\)](#) methods draw the image.

This form specifies a bounding box for the image, with the origin (upper-lefthand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Image](#).

The documentation for this class was generated from the following files:

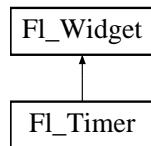
- [Fl_Tiled_Image.H](#)
- [Fl_Tiled_Image.cxx](#)

30.95 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

- int [handle](#) (int)
Handles the specified event.
- [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.
- [~Fl_Timer](#) ()
Destroys the timer and removes the timeout.
- void [value](#) (double)
Sets the current timer value.
- double [value](#) () const
See void [Fl_Timer::value\(double\)](#).
- char [direction](#) () const
Gets or sets the direction of the timer.
- void [direction](#) (char d)
Gets or sets the direction of the timer.
- char [suspended](#) () const
Gets or sets whether the timer is suspended.
- void [suspended](#) (char d)
Gets or sets whether the timer is suspended.

Protected Member Functions

- void [draw](#) ()
Draw the widget.

30.95.1 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 [Fl::add_timeout\(\)](#) instead.

30.95.2 Constructor & Destructor Documentation

30.95.2.1 `Fl_Timer::Fl_Timer (uchar t, int X, int Y, int W, int H, const char *I)`

Creates a new [Fl_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.

30.95.3 Member Function Documentation

30.95.3.1 `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\(\)](#).

30.95.3.2 `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\(\)](#).

30.95.3.3 `void Fl_Timer::draw () [protected, virtual]`

Draw 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.

Implements [Fl_Widget](#).

30.95.3.4 `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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.95.3.5 void Fl_Timer::suspended (char *d*)

Gets or sets whether the timer is suspended.

30.95.3.6 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:

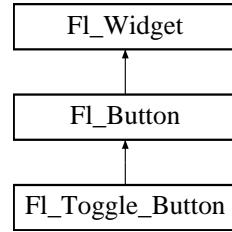
- [Fl_Timer.H](#)
- [forms_timer.cxx](#)

30.96 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.

30.96.1 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 [Fl_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\(\)](#).

30.96.2 Constructor & Destructor Documentation

30.96.2.1 [Fl_Toggle_Button::Fl_Toggle_Button \(int X, int Y, int W, int H, const char * l = 0\) \[inline\]](#)

Creates a new [Fl_Toggle_Button](#) widget using the given position, size, and label string.

The inherited destructor deletes the toggle button.

The documentation for this class was generated from the following file:

- [Fl_Toggle_Button.H](#)

30.97 Fl_Tooltip Class Reference

The [Fl_Tooltip](#) class provides tooltip support for all FLTK widgets.

```
#include <Fl_Tooltip.H>
```

Static Public Member Functions

- static float [delay](#) ()
Gets the tooltip delay.
- static void [delay](#) (float f)
Sets the tooltip delay.
- 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 [enabled](#) ()
Returns non-zero if tooltips are enabled.
- static void [enable](#) (int b=1)
Enables tooltips on all widgets (or disables if b is false).
- static void [disable](#) ()
Same as enable(0), disables tooltips on all widgets.
- 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_Widget * [current](#) ()
Gets the current widget target.
- static void [current](#) (Fl_Widget *)
Sets the current widget target.
- 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 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 color \(\)](#)
Gets the background color for tooltips.
- static void [color \(unsigned c\)](#)
Sets the background color for tooltips.
- static [Fl_Color textcolor \(\)](#)
Gets the color of the text in the tooltip.
- static void [textcolor \(unsigned c\)](#)
Sets the color of the text in the tooltip.

Static Public Attributes

- static void(* [enter](#))([Fl_Widget](#) *w) = nothing
- static void(* [exit](#))([Fl_Widget](#) *w) = nothing

Friends

- void [Fl_Widget::tooltip \(const char *\)](#)

30.97.1 Detailed Description

The [Fl_Tooltip](#) class provides tooltip support for all FLTK widgets.

It contains only static methods.

30.97.2 Member Function Documentation

30.97.2.1 static void [Fl_Tooltip::color \(unsigned c\)](#) [inline, static]

Sets the background color for tooltips.

The default background color is a pale yellow.

30.97.2.2 static [Fl_Color Fl_Tooltip::color \(\)](#) [inline, static]

Gets the background color for tooltips.

The default background color is a pale yellow.

30.97.2.3 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.

30.97.2.4 static void Fl_Tooltip::delay (float *f*) [inline, static]

Sets the tooltip delay.

The default delay is 1.0 seconds.

30.97.2.5 static float Fl_Tooltip::delay () [inline, static]

Gets the tooltip delay.

The default delay is 1.0 seconds.

30.97.2.6 static void Fl_Tooltip::disable () [inline, static]

Same as enable(0), disables tooltips on all widgets.

30.97.2.7 static void Fl_Tooltip::enable (int *b* = 1) [inline, static]

Enables tooltips on all widgets (or disables if *b* is false).

30.97.2.8 static int Fl_Tooltip::enabled () [inline, static]

Returns non-zero if tooltips are enabled.

30.97.2.9 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).

30.97.2.10 static void Fl_Tooltip::font (Fl_Font *i*) [inline, static]

Sets the typeface for the tooltip text.

30.97.2.11 static Fl_Font Fl_Tooltip::font () [inline, static]

Gets the typeface for the tooltip text.

30.97.2.12 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.

30.97.2.13 static float Fl_Tooltip::hoverdelay () [inline, static]

Gets the tooltip hover delay, the delay between tooltips.

The default delay is 0.2 seconds.

30.97.2.14 static void Fl_Tooltip::size (Fl_Fontsize s) [inline, static]

Sets the size of the tooltip text.

30.97.2.15 static Fl_Fontsize Fl_Tooltip::size () [inline, static]

Gets the size of the tooltip text.

30.97.2.16 static void Fl_Tooltip::textcolor (unsigned c) [inline, static]

Sets the color of the text in the tooltip.

The default is black.

30.97.2.17 static Fl_Color Fl_Tooltip::textcolor () [inline, static]

Gets the color of the text in the tooltip.

The default is black.

The documentation for this class was generated from the following files:

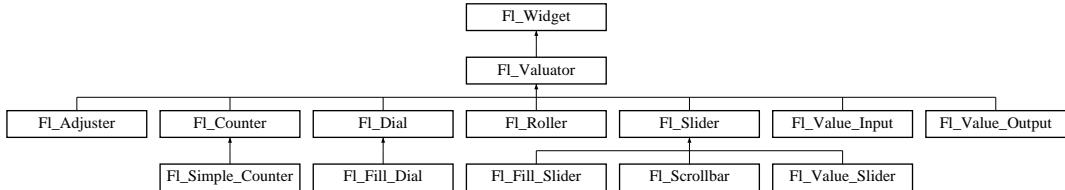
- Fl_Tooltip.H
- Fl.cxx
- Fl_Tooltip.cxx

30.98 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 [minimum](#) () const
Gets the minimum value for the valuator.
- void [minimum](#) (double a)
Sets the minimum value for the valuator.
- double [maximum](#) () const
Gets the maximum value for the valuator.
- void [maximum](#) (double a)
Sets the maximum value for the valuator.
- void [range](#) (double a, double b)
Sets the minimum and maximum values for the valuator.
- void [step](#) (int a)
See double [Fl_Valuator::step\(\)](#) const.
- void [step](#) (double a, int b)
See double [Fl_Valuator::step\(\)](#) const.
- void [step](#) (double s)
See double [Fl_Valuator::step\(\)](#) const.
- double [step](#) () const
Gets or sets the step value.
- void [precision](#) (int)
Sets the step value to $1/10^{digits}$.

- **double value () const**
Gets the floating point(double) value.
- **int value (double)**
Sets the current value.
- **virtual int format (char *)**
Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.
- **double round (double)**
Round the passed value to the nearest step increment.
- **double clamp (double)**
Clamps the passed value to the valuator range.
- **double increment (double, int)**
Adds n times the step value to the passed value.

Protected Member Functions

- **int horizontal () const**
Tells if the valuator is an FL_HORIZONTAL one.
- **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.
- **double previous_value () const**
Gets the previous floating point value before an event changed it.
- **void handle_push ()**
Stores the current value in the previous value.
- **double softclamp (double)**
Clamps the value, but accepts v if the previous value is not already out of range.
- **void handle_drag (double newvalue)**
Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.
- **void handle_release ()**
Called after an FL_WHEN_RELEASE event is received and before the callback.
- **virtual void value_damage ()**
Asks for partial redraw.
- **void set_value (double v)**
Sets the current floating point value.

30.98.1 Detailed Description

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.

There are probably more of these classes in FLTK than any others:

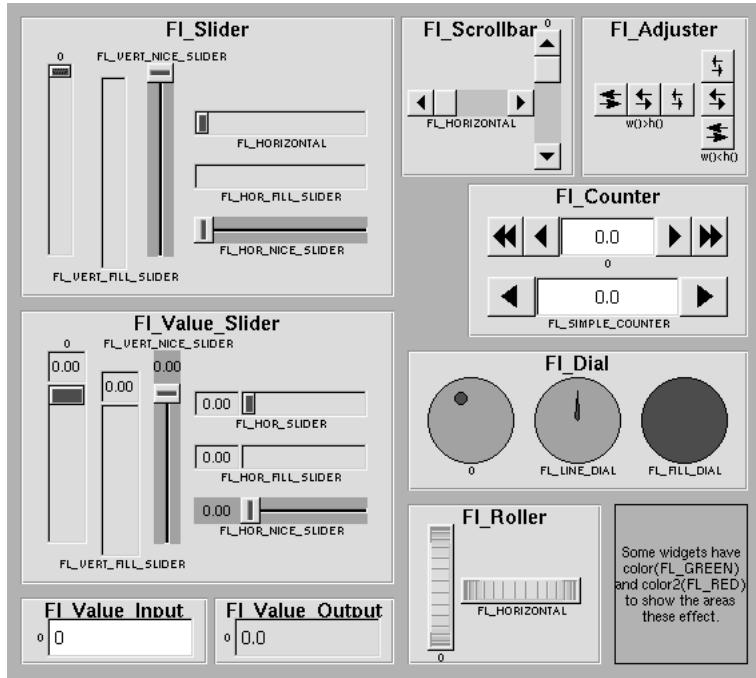


Figure 30.32: Valuators derived from [Fl_Valuator](#)

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.

30.98.2 Constructor & Destructor Documentation

30.98.2.1 [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 boxtyle is `FL_NO_BOX`.

30.98.3 Member Function Documentation

30.98.3.1 [void Fl_Valuator::bounds \(double a, double b\)](#) [inline]

Sets the minimum (a) and maximum (b) values for the valuator widget.

Reimplemented in [Fl_Slider](#).

30.98.3.2 double Fl_Valuator::clamp (double v)

Clamps the passed value to the valuator range.

30.98.3.3 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 %.*n*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_Value_... 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 in *buffer*. *buffer* should have space for at least 128 bytes.

You may override this function to create your own text formatting.

30.98.3.4 void Fl_Valuator::handle_drag (double v) [protected]

Called during a drag operation, after an FL_WHEN_CHANGED event is received and before the callback.

30.98.3.5 void Fl_Valuator::handle_release () [protected]

Called after an FL_WHEN_RELEASE event is received and before the callback.

30.98.3.6 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 fabs([maximum\(\)](#) - [minimum\(\)](#)) / 100.

30.98.3.7 void Fl_Valuator::maximum (double a) [inline]

Sets the maximum value for the valuator.

30.98.3.8 double Fl_Valuator::maximum () const [inline]

Gets the maximum value for the valuator.

30.98.3.9 void Fl_Valuator::minimum (double a) [inline]

Sets the minimum value for the valuator.

30.98.3.10 double Fl_Valuator::minimum () const [inline]

Gets the minimum value for the valuator.

30.98.3.11 void Fl_Valuator::precision (int *p*)

Sets the step value to $1/10^{\text{digits}}$.

30.98.3.12 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.

30.98.3.13 double Fl_Valuator::round (double *v*)

Round the passed value to the nearest step increment.

Does nothing if step is zero.

30.98.3.14 void Fl_Valuator::set_value (double *v*) [inline, protected]

Sets the current floating point value.

30.98.3.15 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 two integers, A/B. You can set these integers directly. Currently setting a floating point value sets the nearest A/1 or 1/B value possible.

30.98.3.16 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).

30.98.3.17 double Fl_Valuator::value () const [inline]

Gets the floating point(double) value.

See int [value\(double\)](#)

The documentation for this class was generated from the following files:

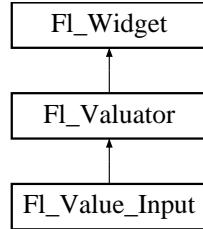
- Fl_Valuator.H
- Fl_Valuator.cxx

30.99 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

- int [handle](#) (int)
Handles the specified event.
- void [draw](#) ()
Draw the widget.
- void [resize](#) (int x, int y, int w, int h, const char *l=0)
Change the size or position of the widget.
- [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.
- void [soft](#) (char s)
See void [Fl_Value_Input::soft\(char s\)](#).
- char [soft](#) () const
If "soft" is turned on, the user is allowed to drag the value outside the range.
- int [shortcut](#) () const
The first form returns the current shortcut key for the Input.
- void [shortcut](#) (int s)
See int [Fl_Value_Input::shortcut\(\) const](#).
- [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.

- `Fl_Color textcolor () const`

Gets the color of the text in the value box.

- void `textcolor (unsigned n)`

Sets the color of the text in the value box.

- `Fl_Color cursor_color () const`

Gets the color of the text cursor.

- void `cursor_color (unsigned n)`

Sets the color of the text cursor.

Public Attributes

- `Fl_Input input`

30.99.1 Detailed Description

The `Fl_Value_Input` widget displays a numeric value.

The user can click in the text field and edit it - there is in fact a hidden `Fl_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 `Fl_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 30.33: Fl_Value_Input

30.99.2 Constructor & Destructor Documentation

30.99.2.1 `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 boxtyle is `FL_DOWN_BOX`.

30.99.3 Member Function Documentation

30.99.3.1 `void Fl_Value_Input::cursor_color (unsigned n) [inline]`

Sets the color of the text cursor.

The text cursor is black by default.

30.99.3.2 `Fl_Color Fl_Value_Input::cursor_color () const [inline]`

Gets the color of the text cursor.

The text cursor is black by default.

30.99.3.3 void Fl_Value_Input::draw () [virtual]

Draw 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.

Implements [Fl_Widget](#).

30.99.3.4 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 new 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.

Parameters:

← *event* 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](#).

30.99.3.5 void Fl_Value_Input::resize (int *x*, int *y*, int *w*, int *h*) [virtual]

Change 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:

← *x,y* new position relative to the parent window
← *w,h* new size

See also:

[position\(int, int\)](#), [size\(int, int\)](#)

Reimplemented from [Fl_Widget](#).

30.99.3.6 int Fl_Value_Input::shortcut () const [inline]

The first form returns the current shortcut key for the Input.

The second form sets the shortcut key to key. 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).

30.99.3.7 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.

30.99.3.8 void Fl_Value_Input::textcolor (unsigned n) [inline]

Sets the color of the text in the value box.

30.99.3.9 Fl_Color Fl_Value_Input::textcolor () const [inline]

Gets the color of the text in the value box.

30.99.3.10 void Fl_Value_Input::textfont (Fl_Font s) [inline]

Sets the typeface of the text in the value box.

30.99.3.11 Fl_Font Fl_Value_Input::textfont () const [inline]

Gets the typeface of the text in the value box.

30.99.3.12 void Fl_Value_Input::textsize (Fl_Fontsize s) [inline]

Sets the size of the text in the value box.

30.99.3.13 Fl_Fontsize Fl_Value_Input::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_Input.H](#)

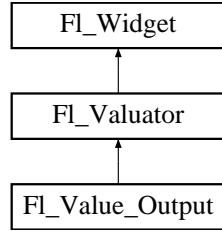
- Fl_Value_Input.cxx

30.100 Fl_Value_Output Class Reference

The [Fl_Value_Output](#) widget displays a floating point value.

```
#include <Fl_Value_Output.H>
```

Inheritance diagram for Fl_Value_Output::



Public Member Functions

- **int handle (int)**
Handles the specified event.
- **void draw ()**
Draw the widget.
- **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.
- **void soft (uchar s)**
If "soft" is turned on, the user is allowed to drag the value outside the range.
- **uchar soft () const**
If "soft" is turned on, the user is allowed to drag the value outside the range.
- **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)**
- **Fl_Color textcolor () const**
Sets the color of the text in the value box.
- **void textcolor (unsigned s)**
Gets the color of the text in the value box.

30.100.1 Detailed Description

The [Fl_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 $10 * \text{step}()$, and the right button by $100 * \text{step}()$.

This is much lighter-weight than [Fl_Value_Input](#) because it contains no text editing code or character buffer.

Figure 30.34: Fl_Value_Output

30.100.2 Constructor & Destructor Documentation

30.100.2.1 `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 boxtyle is `FL_NO_BOX`.

Inherited destructor destroys the Valuator.

30.100.3 Member Function Documentation

30.100.3.1 `void Fl_Value_Output::draw () [virtual]`

Draw 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.

Implements [Fl_Widget](#).

30.100.3.2 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 new 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.

Parameters:

← *event* 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](#).

30.100.3.3 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.

30.100.3.4 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.

30.100.3.5 void Fl_Value_Output::textcolor (unsigned *s*) [inline]

Gets the color of the text in the value box.

30.100.3.6 Fl_Color Fl_Value_Output::textcolor () const [inline]

Sets the color of the text in the value box.

30.100.3.7 void Fl_Value_Output::textfont (Fl_Font s) [inline]

Sets the typeface of the text in the value box.

30.100.3.8 Fl_Font Fl_Value_Output::textfont () const [inline]

Gets the typeface of the text in the value box.

30.100.3.9 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:

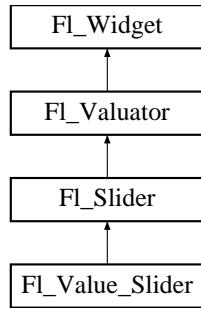
- [Fl_Value_Output.H](#)
- [Fl_Value_Output.cxx](#)

30.101 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

- void [draw \(\)](#)

Draw the widget.

- int [handle \(int\)](#)

Handles the specified event.

- [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.

- [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.

- [Fl_Color textcolor \(\) const](#)

Gets the color of the text in the value box.

- void [textcolor \(unsigned s\)](#)

Sets the color of the text in the value box.

30.101.1 Detailed Description

The [Fl_Value_Slider](#) widget is a [Fl_Slider](#) widget with a box displaying the current value.

Figure 30.35: Fl_Value_Slider

30.101.2 Constructor & Destructor Documentation

30.101.2.1 [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 boxtyle is FL_DOWN_BOX.

30.101.3 Member Function Documentation

30.101.3.1 [void Fl_Value_Slider::draw \(\) \[virtual\]](#)

Draw 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.

Reimplemented from [Fl_Slider](#).

30.101.3.2 [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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

30.101.3.3 void Fl_Value_Slider::textcolor (unsigned s) [inline]

Sets the color of the text in the value box.

30.101.3.4 Fl_Color Fl_Value_Slider::textcolor () const [inline]

Gets the color of the text in the value box.

30.101.3.5 void Fl_Value_Slider::textfont (Fl_Font s) [inline]

Sets the typeface of the text in the value box.

30.101.3.6 Fl_Font Fl_Value_Slider::textfont () const [inline]

Gets the typeface of the text in the value box.

30.101.3.7 void Fl_Value_Slider::textsize (Fl_Fontsize s) [inline]

Sets the size of the text in the value box.

30.101.3.8 Fl_Fontsize Fl_Value_Slider::textsize () const [inline]

Gets the size of the text in the value box.

The documentation for this class was generated from the following files:

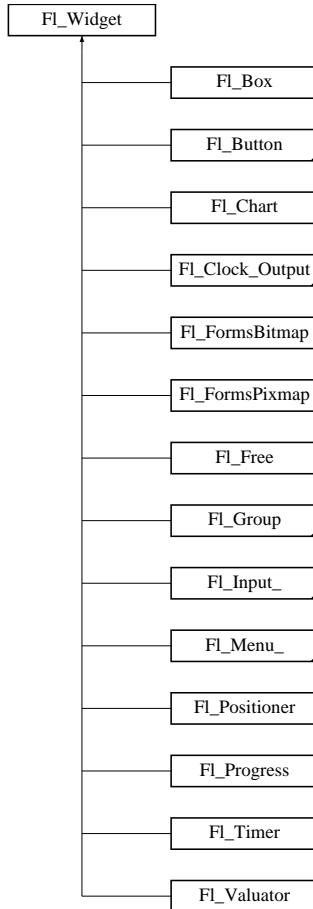
- [Fl_Value_Slider.H](#)
- [Fl_Value_Slider.cxx](#)

30.102 Fl_Widget Class Reference

[Fl_Widget](#) is the base class for all widgets in FLTK.

```
#include <Fl_Widget.h>
```

Inheritance diagram for Fl_Widget::



Public Member Functions

- virtual [~Fl_Widget \(\)](#)
Destroys the widget.
- virtual void [draw \(\)=0](#)
Draw the widget.
- virtual int [handle \(int event\)](#)
Handles the specified event.
- [Fl_Group * parent \(\) const](#)
Returns a pointer to the parent widget.

- void **parent** (Fl_Group *p)
Internal use only.
- uchar **type** () const
Gets the widget type.
- void **type** (uchar t)
Sets the widget type.
- int **x** () const
Gets the widget position in its window.
- int **y** () const
Gets the widget position in its window.
- int **w** () const
Gets the widget width.
- int **h** () const
Gets the widget height.
- virtual void **resize** (int x, int y, int w, int h)
Change the size or position of the widget.
- int **damage_resize** (int, int, int, int)
Internal use only.
- void **position** (int X, int Y)
Reposition the window or widget.
- void **size** (int W, int H)
Change the size of the widget.
- Fl_Align **align** () const
Gets the label alignment.
- void **align** (Fl_Align alignment)
Sets the label alignment.
- Fl_Boxtype **box** () const
Gets the box type for the widget.
- void **box** (Fl_Boxtype new_box)
Sets the box type for the widget.
- Fl_Color **color** () const
Gets the background color of the widget.
- void **color** (unsigned bg)
Sets the background color of the widget.

- **Fl_Color selection_color () const**
Gets the selection color.
- **void selection_color (unsigned a)**
Gets or sets the selection color.
- **void color (unsigned bg, unsigned sel)**
Sets the background and selection color of the widget.
- **const char * label () const**
Get the current label text.
- **void label (const char *text)**
Get or set the current label pointer.
- **void copy_label (Fl_CString new_label)**
Sets the current label.
- **void label (Fl_Labeltype a, const char *b)**
Shortcut to set the label text and type in one call.
- **Fl_Labeltype labeltype () const**
Gets the label type.
- **void labeltype (Fl_Labeltype a)**
Sets the label type.
- **Fl_Color labelcolor () const**
Gets the label color.
- **void labelcolor (unsigned 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)**
Gets or sets the font size in pixels.
- **Fl_Image * image ()**
Gets or sets the image to use as part of the widget label.
- **void image (Fl_Image *img)**

Gets or sets the image to use as part of the widget label.

- void **image** (Fl_Image &img)

Gets or sets the image to use as part of the widget label.

- Fl_Image * **deimage** ()

Gets the image to use as part of the widget label.

- void **deimage** (Fl_Image *img)

Sets the image to use as part of the widget label.

- void **deimage** (Fl_Image &img)

Sets the image to use as part of the widget label.

- const char * **tooltip** () const

Gets the current tooltip text.

- void **tooltip** (const char *t)

Sets the current tooltip text.

- Fl_Callback_p **callback** () const

Gets the current callback function for the widget.

- void **callback** (Fl_Callback *cb, void *p)

Sets the current callback function for the widget.

- void **callback** (Fl_Callback *cb)

Sets the current callback function 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.

- void * **user_data** () const

Gets the user data for this widget.

- void **user_data** (void *v)

Sets the user data for this widget.

- 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.

- Fl_When **when** () const

Controls when callbacks are done.

- void **when** (uchar i)
Flags used to decide when a callback is called.

- int **visible** () const
Returns whether a widget is visible.
- int **visible_r** () const
Returns whether a widget and all its parents are visible.

- void **show** ()
Makes a widget visible.
- void **hide** ()
Makes a widget invisible.

- void **set_visible** ()
Makes the widget visible.
- void **clear_visible** ()
Hides the widget.
- int **active** () const
Returns whether the widget is active.
- int **active_r** () const
active_r() returns whether the widget and all of its parents are active.

- void **activate** ()
Activate a widget.
- void **deactivate** ()
Deactivate a widget.

- int **output** () const
Return if a widget is used for output only.

- void **set_output** ()
Set a widget to output only.

- void **clear_output** ()
Set a widget to accept input.

- int **takesevents** () const
Returns if the widget is able to take events.

- int **changed** () const
Check if the widget value changed since the last callback.

- void **set_changed** ()
Mark the value of the widget as changed.

- void **clear_changed** ()
Mark the value of the widget as unchanged.
- int **take_focus** ()
Give the widget the keyboard focus.
- void **set_visible_focus** ()
Enables keyboard focus navigation with this widget.
- void **clear_visible_focus** ()
Disables keyboard focus navigation with this widget.
- void **visible_focus** (int v)
Modifies keyboard focus navigation.
- int **visible_focus** ()
Check whether this widget has a visible focus.
- void **do_callback** ()
Call the widget callback.
- void **do_callback** (Fl_Widget *o, void *arg=0)
Call the widget callback.
- void **do_callback** (Fl_Widget *o, long arg)
Call the widget callback.
- int **test_shortcut** ()
Internal use only.
- int **contains** (const Fl_Widget *w) const
Checks if w is a child of this widget.
- int **inside** (const Fl_Widget *w) const
Check if this widget is a child of w.
- void **redraw** ()
Schedule the drawing of the widget.
- void **redraw_label** ()
Schedule the drawing of the label.
- uchar **damage** () const
*Returns non-zero if **draw()** needs to be called.*
- void **clear_damage** (uchar c=0)
Clear damage flags.
- void **damage** (uchar c)

Set the damage bits for the widget.

- void **damage** (uchar c, int x, int y, int w, int h)

Set the damage bits for an area inside the widget.

- void **draw_label** (int, int, int, int, **Fl_Align**) const

Anybody can call this to force the label to draw anywhere.

- void **measure_label** (int &ww, int &hh)

Sets width ww, height hh accordingly with the labeltype size, label with images will return w() h() of the image.

- **Fl_Window** * **window** () const

*Returns a pointer to the primary **Fl_Window** widget.*

- **Fl_Color** **color2** () const

For back compatibility only.

- void **color2** (unsigned a)

For back compatibility only.

Static Public Member Functions

- static void **default_callback** (**Fl_Widget** *cb, void *d)

Sets the default callback for all widgets.

- static char **label_shortcut** (const char *t)

Internal use only.

- static int **test_shortcut** (const char *)

Internal use only.

Protected Types

- enum {

INACTIVE = 1, **INVISIBLE** = 2, **OUTPUT** = 4, **SHORTCUT_LABEL** = 64,

CHANGED = 128, **VISIBLE_FOCUS** = 512, **COPIED_LABEL** = 1024 }

flags possible values enumeration.

Protected Member Functions

- **Fl_Widget** (int x, int y, int w, int h, **Fl_CString** label=0L)

Creates a widget at the given position and size.

- void **x** (int v)

Internal use only.

- void [y](#) (int v)

Internal use only.

- void [w](#) (int v)

Internal use only.

- void [h](#) (int v)

Internal use only.

- int [flags](#) () const

Gets the widget flags mask.

- void [set_flag](#) (int c)

Sets a flag in the flags mask.

- void [clear_flag](#) (int c)

Clears a flag in the flags mask.

- void [draw_box](#) () const

Draws the widget box according its box style.

- void [draw_box](#) ([Fl_Boxtype](#), [Fl_Color](#)) const

Draws a box of type b, of color c at the widget position and size.

- void [draw_box](#) ([Fl_Boxtype](#), int, int, int, int, [Fl_Color](#)) const

Draws a box of type b, of color c at the widget position X,Y and size W,H.

- void [draw_focus](#) ()

draws a focus rectangle around the widget

- void [draw_focus](#) ([Fl_Boxtype](#), int, int, int, int) const

Draws a focus box for the widget at position X,Y and SIZE W,H .

- void [draw_label](#) () const

The normal call for a [draw\(\)](#) method.

- void [draw_label](#) (int, int, int, int) const

[draw\(\)](#) can use this instead to change the bounding box

Friends

- class [Fl_Group](#)

30.102.1 Detailed Description

[Fl_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.

30.102.2 Member Enumeration Documentation

30.102.2.1 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

INVISIABLE the widget is not drawn but can receive events

OUTPUT for output only

SHORTCUT_LABEL the label contains a shortcut we need to draw

CHANGED the widget value changed

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

30.102.3 Constructor & Destructor Documentation

30.102.3.1 Fl_Widget::Fl_Widget (int x, int y, int w, int h, Fl_CString 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:

← *x,y* the position of the widget relative to the enclosing window

← *w,h* size of the widget in pixels

← *label* optional text for the widget label

30.102.3.2 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, and it is your responsibility to either remove() them from any enclosing group or destroy that group *immediately* after destroying the children. You almost always want to destroy the parent group instead which will destroy all of the child widgets and groups in that group.

Destruction does not remove from any parent group! And groups when destroyed destroy all their children. This is convenient and fast. However, it is only legal to destroy a "root" such as an [Fl_Window](#), and automatic destructors may be called.

30.102.4 Member Function Documentation

30.102.4.1 void Fl_Widget::activate ()

Activate a widget.

Changing this value will send FL_ACTIVATE to the widget if [active_r\(\)](#) is true.

See also:

[active\(\)](#), [active_r\(\)](#), [deactivate\(\)](#)

30.102.4.2 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\(\)](#)

30.102.4.3 int Fl_Widget::active_r () const

[active_r\(\)](#) 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\(\)](#)

30.102.4.4 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:

← *alignment* new label alignment

See also:

[align\(\)](#), [Fl_Align](#)

30.102.4.5 Fl_Align Fl_Widget::align () const [inline]

Gets the label alignment.

Returns:

label alignment

See also:

[label\(\)](#), [align\(Fl_Align\)](#), [Fl_Align](#)

Todo

This function should not take uchar as an argument. Apart from the fact that uchar is too short with only 8 bits, it does not provide type safety (in which case we don't need to declare Fl_Type an enum to begin with).

30.102.4.6 void Fl_Widget::argument (long *v*) [inline]

Sets the current user data (long) argument that is passed to the callback function.

Todo

The user data value must be implemented using a *union* to avoid 64 bit machine incompatibilities.

30.102.4.7 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:

← *new_box* the new box type

See also:

[box\(\)](#), [Fl_Boxtype](#)

30.102.4.8 Fl_Boxtype Fl_Widget::box () const [inline]

Gets the box type for the widget.

Returns:

the current box type

See also:

[box\(Fl_Boxtype\)](#), [Fl_Boxtype](#)

30.102.4.9 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:

← *cb* new callback

← *p* user data

30.102.4.10 void Fl_Widget::callback (Fl_Callback0 * cb) [inline]

Sets the current callback function for the widget.

Each widget has a single callback.

Parameters:

← *cb* new callback

30.102.4.11 void Fl_Widget::callback (Fl_Callback * cb) [inline]

Sets the current callback function for the widget.

Each widget has a single callback.

Parameters:

← *cb* new callback

30.102.4.12 void Fl_Widget::callback (Fl_Callback * cb, void * p) [inline]

Sets the current callback function for the widget.

Each widget has a single callback.

Parameters:

← *cb* new callback

← *p* user data

30.102.4.13 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

30.102.4.14 int Fl_Widget::changed () const [inline]

Check 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.

Return values:

0 if the value did not change

See also:

[set_changed\(\)](#), [clear_changed\(\)](#)

Reimplemented in [Fl_Input_Choice](#).

30.102.4.15 void Fl_Widget::clear_changed () [inline]

Mark the value of the widget as unchanged.

See also:

[changed\(\)](#), [set_changed\(\)](#)

Reimplemented in [Fl_Input_Choice](#).

30.102.4.16 void Fl_Widget::clear_damage (uchar *c* = 0) [inline]

Clear damage flags.

Damage flags are cleared when parts of the widget drawing is repaired.

Parameters:

← *c* bitmask of flags to clear

See also:

[damage\(uchar\)](#), [damage\(\)](#)

30.102.4.17 void Fl_Widget::clear_output () [inline]

Set a widget to accept input.

See also:

[set_output\(\)](#), [output\(\)](#)

30.102.4.18 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.

30.102.4.19 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\(int\)](#)

30.102.4.20 void Fl_Widget::color (unsigned *bg*, unsigned *sel*) [inline]

Sets the background and selection color of the widget.

The two color form sets both the background and selection colors.

Parameters:

← *bg* background color

← *sel* selection color

See also:

[color\(unsigned\)](#), [selection_color\(unsigned\)](#)

30.102.4.21 void Fl_Widget::color (unsigned *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:

← *bg* background color

See also:

[color\(\)](#), [color\(unsigned, unsigned\)](#), [selection_color\(unsigned\)](#)

30.102.4.22 Fl_Color Fl_Widget::color () const [inline]

Gets the background color of the widget.

Returns:

current background color

See also:

[color\(unsigned\)](#), [color\(unsigned, unsigned\)](#)

30.102.4.23 void Fl_Widget::color2 (unsigned *a*) [inline]

For back compatibility only.

30.102.4.24 Fl_Color Fl_Widget::color2 () const [inline]

For back compatibility only.

30.102.4.25 int Fl_Widget::contains (const Fl_Widget * *w*) const

Checks if *w* is a child of this widget.

Parameters:

← *w* 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.

30.102.4.26 void Fl_Widget::copy_label (Fl_CString *new_label*)

Sets the current label.

Unlike [label\(\)](#), this method allocates a copy of the label string instead of using the original string pointer.

Parameters:

← *new_label* the new label text

See also:

[label\(\)](#)

Reimplemented in [Fl_Window](#).

30.102.4.27 void Fl_Widget::damage (uchar *c*, int *x*, int *y*, int *w*, int *h*)

Set the damage bits for an area inside the widget.

Setting damage bits will schedule the widget for the next redraw.

Parameters:

← *c* bitmask of flags to set

← *x,y,w,h* size of damaged area

See also:

[damage\(\)](#), [clear_damage\(uchar\)](#)

30.102.4.28 void Fl_Widget::damage (uchar *c*)

Set the damage bits for the widget.

Setting damage bits will schedule the widget for the next redraw.

Parameters:

← *c* bitmask of flags to set

See also:

[damage\(\)](#), [clear_damage\(uchar\)](#)

30.102.4.29 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\(uchar\)](#)

30.102.4.30 int Fl_Widget::damage_resize (int *X*, int *Y*, int *W*, int *H*)

Internal use only.

30.102.4.31 void Fl_Widget::deactivate ()

Deactivate a 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\(\)](#)

Reimplemented in [Fl_Repeat_Button](#).

30.102.4.32 void Fl_Widget::default_callback (Fl_Widget * *cb*, void * *d*) [static]

Sets the default callback for all widgets.

Sets the default callback, which puts a pointer to the widget on the queue returned by [Fl::readqueue\(\)](#). You may want to call this from your own callback.

Parameters:

← *cb* the new callback

← *d* user data associated with that callback

See also:

[callback\(\)](#), [do_callback\(\)](#), [Fl::readqueue\(\)](#)

30.102.4.33 void Fl_Widget::deimage (Fl_Image & *img*) [inline]

Sets the image to use as part of the widget label.

This image is used when drawing the widget in the inactive state.

Parameters:

← *img* the new image for the deactivated widget

30.102.4.34 void Fl_Widget::deimage (Fl_Image * *img*) [inline]

Sets the image to use as part of the widget label.

This image is used when drawing the widget in the inactive state.

Parameters:

← *img* the new image for the deactivated widget

30.102.4.35 Fl_Image* Fl_Widget::deimage () [inline]

Gets the image to use as part of the widget label.

This image is used when drawing the widget in the inactive state.

Returns:

the current deactivated image for this widget

30.102.4.36 void Fl_Widget::do_callback (Fl_Widget **o*, long *arg*) [inline]

Call the widget callback.

Causes a widget to invoke its callback function, optionally with arbitrary arguments.

Parameters:

← *o* call the callback with *o* as the widget argument

← *arg* call the callback with *arg* as the user data argument

See also:

[callback\(\)](#)

30.102.4.37 void Fl_Widget::do_callback (Fl_Widget **o*, void **arg* = 0) [inline]

Call the widget callback.

Causes a widget to invoke its callback function, optionally with arbitrary arguments.

Parameters:

← *o* call the callback with *o* as the widget argument

← *arg* call the callback with *arg* as the user data argument

See also:

[callback\(\)](#)

30.102.4.38 void Fl_Widget::do_callback () [inline]

Call the widget callback.

Causes a widget to invoke its callback function, optionally with arbitrary arguments.

See also:

[callback\(\)](#)

30.102.4.39 virtual void Fl_Widget::draw () [pure virtual]

Draw 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.

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_FormsBitmap](#), [Fl_FormsPixmap](#), [Fl_Free](#), [Fl_Gl_Window](#), [Fl_Group](#), [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_Slider](#), [Fl_Tabs](#), [Fl_Text_Display](#), [Fl_Timer](#), [Fl_Value_Input](#), [Fl_Value_Output](#), [Fl_Value_Slider](#), [Fl_Window](#), and [Fl_Glut_Window](#).

30.102.4.40 void Fl_Widget::draw_box (Fl_Boxtype b, int X, int Y, int W, int H, Fl_Color c) const [protected]

Draws a box of type b, of color c at the widget position X,Y and size W,H.

30.102.4.41 void Fl_Widget::draw_box (Fl_Boxtype b, Fl_Color c) const [protected]

Draws a box of type b, of color c at the widget position and size.

30.102.4.42 void Fl_Widget::draw_focus (Fl_Boxtype B, int X, int Y, int W, int H) const [protected]

Draws a focus box for the widget at position X,Y and SIZE W,H .

30.102.4.43 int Fl_Widget::h () const [inline]

Gets the widget height.

Returns:

the height of the widget in pixels.

30.102.4.44 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.

30.102.4.45 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 new 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.

Parameters:

← *event* 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_Adjuster](#), [Fl_Box](#), [Fl_Browser_](#), [Fl_Button](#), [Fl_Check_Browser](#), [Fl_Choice](#), [Fl_Clock](#), [Fl_Counter](#), [Fl_Dial](#), [Fl_File_Input](#), [Fl_Free](#), [Fl_Group](#), [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_Slider](#), [Fl_Spinner](#), [Fl_Tabs](#), [Fl_Text_Display](#), [Fl_Text_Editor](#), [Fl_Tile](#), [Fl_Timer](#), [Fl_Value_Input](#), [Fl_Value_Output](#), [Fl_Value_Slider](#), [Fl_Window](#), and [Fl_Glut_Window](#).

30.102.4.46 void Fl_Widget::hide ()

Makes a widget invisible.

See also:

[show\(\)](#), [visible\(\)](#), [visible_r\(\)](#)

Reimplemented in [Fl_Browser](#), [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Menu_Window](#), [Fl_Overlay_Window](#), and [Fl_Window](#).

30.102.4.47 void Fl_Widget::image (Fl_Image & *img*) [inline]

Gets or sets the image to use as part of the widget label.

This image is used when drawing the widget in the active state.

Parameters:

← *img* the new image for the label

30.102.4.48 void Fl_Widget::image (Fl_Image * *img*) [inline]

Gets or sets the image to use as part of the widget label.

This image is used when drawing the widget in the active state.

Parameters:

← *img* the new image for the label

30.102.4.49 Fl_Image* Fl_Widget::image () [inline]

Gets or sets the image to use as part of the widget label.

This image is used when drawing the widget in the active state.

Returns:

the current image

30.102.4.50 int Fl_Widget::inside (const Fl_Widget * w) const [inline]

Check if this widget is a child of w.

Returns 1 if this widget is a child of w, or is equal to w. Returns 0 if w is NULL.

Parameters:

← w the possible parent widget.

See also:

[contains\(\)](#)

30.102.4.51 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\(Fl_CString\)](#), [labeltype\(Fl_Labeltype\)](#)

30.102.4.52 void Fl_Widget::label (const char * text)

Get or set the current label pointer.

The label is shown somewhere on or next to the widget. 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:

← text pointer to new label text

See also:

[copy_label\(\)](#)

Reimplemented in [Fl_Window](#).

30.102.4.53 const char* Fl_Widget::label () const [inline]

Get the current label text.

Returns:

a pointer to the current label text

See also:

[label\(Fl_CString\)](#), [copy_label\(Fl_CString\)](#)

Reimplemented in [Fl_Window](#).

30.102.4.54 char Fl_Widget::label_shortcut (const char **t*) [static]

Internal use only.

30.102.4.55 void Fl_Widget::labelcolor (unsigned *c*) [inline]

Sets the label color.

The default color is FL_FOREGROUND_COLOR.

Parameters:

← *c* the new label color

30.102.4.56 Fl_Color Fl_Widget::labelcolor () const [inline]

Gets the label color.

The default color is FL_FOREGROUND_COLOR.

Returns:

the current label color

30.102.4.57 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:

← *f* the new font for the label

See also:

[Fl_Font](#)

30.102.4.58 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](#)

30.102.4.59 void Fl_Widget::labelsize (Fl_Fontsize *pix*) [inline]

Gets or sets the font size in pixels.

The default size is 14 pixels.

Parameters:

← *pix* the new font size

30.102.4.60 Fl_Fontsize Fl_Widget::labelsize () const [inline]

Gets the font size in pixels.

The default size is 14 pixels.

Returns:

the current font size

30.102.4.61 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:

← *a* new label type

See also:

[Fl_Labeltype](#)

30.102.4.62 Fl_Labeltype Fl_Widget::labeltype () const [inline]

Gets the label type.

Returns:

the current label type.

See also:

[Fl_Labeltype](#)

30.102.4.63 void Fl_Widget::measure_label (int & *ww*, int & *hh*) [inline]

Sets width *ww*, height *hh* accordingly with the labeltype size, label with images will return [w\(\)](#) [h\(\)](#) of the image.

30.102.4.64 int Fl_Widget::output () const [inline]

Return 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:

0 if the widget is used for input and output

See also:

[set_output\(\)](#), [clear_output\(\)](#)

30.102.4.65 void Fl_Widget::parent (Fl_Group * *p*) [inline]

Internal use only.

Use [Fl_Group::add\(Fl_Widget*\)](#) instead.

30.102.4.66 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:

NULL if the widget has no parent

See also:

[Fl_Group::add\(Fl_Widget*\)](#)

30.102.4.67 void Fl_Widget::position (int *X*, int *Y*) [inline]

Reposition the window or widget.

[position\(X,Y\)](#) is a shortcut for [resize\(X,Y,w\(\),h\(\)\)](#).

Parameters:

$\leftarrow X, Y$ new position relative to the parent window

See also:

[resize\(int, int, int, int\)](#), [size\(int, int\)](#)

Reimplemented in [Fl_Input_](#).

30.102.4.68 void Fl_Widget::redraw ()

Schedule the drawing of the widget.

Marks the widget as needing its [draw\(\)](#) routine called.

30.102.4.69 void Fl_Widget::redraw_label ()

Schedule the drawing of the label.

Marks the widget or the parent as needing a redraw for the label area of a widget.

30.102.4.70 void Fl_Widget::resize (int *x*, int *y*, int *w*, int *h*) [virtual]

Change 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:

← *x,y* new position relative to the parent window

← *w,h* new size

See also:

[position\(int, int\)](#), [size\(int, int\)](#)

Reimplemented in [Fl_Browser_](#), [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Group](#), [Fl_Help_View](#), [Fl_Input_](#), [Fl_Input_Choice](#), [Fl_Overlay_Window](#), [Fl_Scroll](#), [Fl_Spinner](#), [Fl_Text_Display](#), [Fl_Tile](#), [Fl_Value_Input](#), and [Fl_Window](#).

30.102.4.71 void Fl_Widget::selection_color (unsigned *a*) [inline]

Gets or 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\(int, int\)](#).

Parameters:

← *a* the new selection color

See also:

[selection_color\(\)](#), [color\(unsigned, unsigned\)](#)

30.102.4.72 Fl_Color Fl_Widget::selection_color () const [inline]

Gets the selection color.

Returns:

the current selection color

See also:

[selection_color\(unsigned\)](#), [color\(unsigned, unsigned\)](#)

30.102.4.73 void Fl_Widget::set_changed () [inline]

Mark the value of the widget as changed.

See also:

[changed\(\)](#), [clear_changed\(\)](#)

Reimplemented in [Fl_Input_Choice](#).

30.102.4.74 void Fl_Widget::set_output () [inline]

Set a widget to output only.

See also:

[output\(\)](#), [clear_output\(\)](#)

30.102.4.75 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.

30.102.4.76 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\(int\)](#)

30.102.4.77 void Fl_Widget::show ()

Makes a widget visible.

An invisible widget never gets redrawn and does not get events. 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_Menu_Window](#), [Fl_Overlay_Window](#), [Fl_Single_Window](#), and [Fl_Window](#).

30.102.4.78 void Fl_Widget::size (int *W*, int *H*) [inline]

Change the size of the widget.

`size(w,h)` is a shortcut for `resize(x(),y(),w,h)`.

Parameters:

← *W,H* new size

See also:

[position\(int, int\)](#), [resize\(int, int, int, int\)](#)

Reimplemented in [Fl_Browser](#), [Fl_Chart](#), [Fl_Help_View](#), [Fl_Input_](#), and [Fl_Menu_](#).

30.102.4.79 int Fl_Widget::take_focus ()

Give 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.

30.102.4.80 int Fl_Widget::takesevents () 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

30.102.4.81 int Fl_Widget::test_shortcut (const char * *t*) [static]

Internal use only.

30.102.4.82 int Fl_Widget::test_shortcut ()

Internal use only.

Reimplemented in [Fl_Menu_](#).

30.102.4.83 void Fl_Widget::tooltip (const char * *t*)

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 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:

← *t* new tooltip

30.102.4.84 const char* Fl_Widget::tooltip () const [inline]

Gets the current tooltip text.

Returns:

a pointer to the tooltip text or NULL

30.102.4.85 void Fl_Widget::type (uchar *t*) [inline]

Sets the widget type.

This is used for Forms compatibility.

Reimplemented in [Fl_Spinner](#).

30.102.4.86 uchar Fl_Widget::type () const [inline]

Gets the widget type.

Returns the widget type value, which is used for Forms compatibility and to simulate RTTI.

Reimplemented in [Fl_Spinner](#).

30.102.4.87 void Fl_Widget::user_data (void * *v*) [inline]

Sets the user data for this widget.

Sets the new user data (void *) argument that is passed to the callback function.

Parameters:

← *v* new user data

30.102.4.88 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

30.102.4.89 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\(\)](#)

30.102.4.90 int Fl_Widget::visible_focus () [inline]

Check 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\(\)](#)

30.102.4.91 void Fl_Widget::visible_focus (int *v*) [inline]

Modifies keyboard focus navigation.

Parameters:

← *v* set or clear visible focus

See also:

[set_visible_focus\(\)](#), [clear_visible_focus\(\)](#), [visible_focus\(\)](#)

30.102.4.92 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\(\)](#)

30.102.4.93 int Fl_Widget::w () const [inline]

Gets the widget width.

Returns:

the width of the widget in pixels.

30.102.4.94 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.

30.102.4.95 void Fl_Widget::when (uchar i) [inline]

Flags used to decide when a callback is called.

[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:

← *i* set of flags

30.102.4.96 Fl_When Fl_Widget::when () const [inline]

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.

Return the conditions under which the callback is called.

Returns:

set of flags

30.102.4.97 Fl_Window * Fl_Widget::window () const

Returns a pointer to the primary [Fl_Window](#) widget.

Returns:

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.

30.102.4.98 int Fl_Widget::x () const [inline]

Gets the widget position in its window.

Returns:

the x position relative to the window

30.102.4.99 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.

30.102.4.100 int Fl_Widget::y () const [inline]

Gets the widget position in its window.

Returns:

the y position relative to the window

30.102.4.101 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:

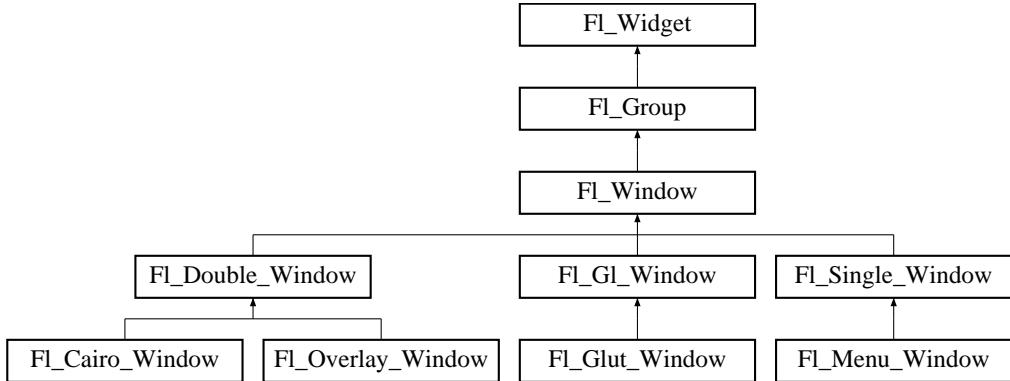
- [Fl_Widget.H](#)
- [Fl.cxx](#)
- [fl_boxtype.cxx](#)
- [fl_labeltype.cxx](#)
- [fl_shortcut.cxx](#)
- [Fl_Tooltip.cxx](#)
- [Fl_Widget.cxx](#)
- [Fl_Window.cxx](#)

30.103 Fl_Window Class Reference

This widget produces an actual window.

```
#include <Fl_Window.h>
```

Inheritance diagram for Fl_Window::



Public Member Functions

- [Fl_Window \(int w, int h, const char *title=0\)](#)
Creates a window from the given size and title.
- [Fl_Window \(int x, int y, int w, int h, const char *title=0\)](#)
Creates a window from the given position, size and title.
- virtual [~Fl_Window \(\)](#)
The destructor also deletes all the children.
- virtual int [handle \(int\)](#)
Handles the specified event.
- virtual void [resize \(int, int, int, int\)](#)
Changes the size and position of the window.
- void [border \(int b\)](#)
Gets or sets whether or not the window manager border is around the window.
- void [clear_border \(\)](#)
Fast inline function to turn the border off.
- int [border \(\) const](#)
See int [Fl_Window::border\(int\)](#).
- void [set_override \(\)](#)
Activate the flags [FL_NOBORDER|FL_OVERRIDE](#).
- int [override \(\) const](#)

Returns non zero if FL_OVERRIDE flag is set, 0 otherwise.

- **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).

- **int modal () const**

Returns true if this window is modal.

- **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.

- **int non_modal () const**

Returns true if this window is modal or non-modal.

- **void hotspot (int x, int y, int offscreen=0)**

Position 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.

- **void hotspot (const Fl_Widget *, int offscreen=0)**

See void [Fl_Window::hotspot\(int x, int y, int offscreen = 0\)](#).

- **void hotspot (const Fl_Widget &p, int offscreen=0)**

See void [Fl_Window::hotspot\(int x, int y, int offscreen = 0\)](#).

- **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 size_range (int a, int b, int c=0, int d=0, int e=0, int f=0, int g=0)**

Set the allowable range the user can resize this window to.

- **const char * label () const**

See void [Fl_Window::label\(const char\)](#).*

- **const char * iconlabel () const**

See void [Fl_Window::iconlabel\(const char\)](#).*

- **void label (const char *)**

Sets the window title bar label.

- **void iconlabel (const char *)**

Sets the icon label.

- **void label (const char *label, const char *iconlabel)**

Gets or sets the icon label.

- **void copy_label (const char *a)**

Sets the current label.

- const char * **xclass** () const

See void [Fl_Window::xclass\(const char\)](#).*

- void **xclass** (const char *c)

A string used to tell the system what type of window this is.

- const void * **icon** () const

Gets the current icon window target dependent data.

- void **icon** (const void *ic)

Sets the current icon window target dependent data.

- int **shown** ()

Returns non-zero if [show\(\)](#) has been called (but not [hide\(\)](#)).

- virtual void **show** ()

Put the window on the screen.

- virtual void **hide** ()

Remove the window from the screen.

- void **show** (int, char **)

See virtual void [Fl_Window::show\(\)](#).

- void **fullscreen** ()

Makes the window completely fill the screen, without any window manager border visible.

- void **fullscreen_off** (int, int, int, int)

Turns off any side effects of [fullscreen\(\)](#) and does resize(x,y,w,h).

- void **iconize** ()

Iconifies the window.

- int **x_root** () const

Gets the x position of the window on the screen.

- int **y_root** () const

Gets the y position of the window on the screen.

- void **make_current** ()

Sets things up so that the drawing functions in <[FL/fl_draw.H](#)> will go into this window.

- void **cursor** (Fl_Cursor, Fl_Color=FL_BLACK, Fl_Color=FL_WHITE)

Changes the cursor for this window.

- void **default_cursor** (Fl_Cursor, Fl_Color=FL_BLACK, Fl_Color=FL_WHITE)

Sets the default Window cursor as well as its color.

Static Public Member Functions

- static [Fl_Window * current\(\)](#)
Returns the last window that was made current.
- static void [default_callback \(Fl_Window *, void *\)](#)
Back compatibility: Sets the default callback v for win to call on close event.

Protected Member Functions

- virtual void [draw\(\)](#)
Draw the widget.
- virtual void [flush\(\)](#)
Forces the window to be drawn, this window is also made current and calls draw().

Static Protected Attributes

- static [Fl_Window * current_](#)
Stores the last window that was made current.

Friends

- class [Fl_X](#)

30.103.1 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\(\)](#).

30.103.2 Constructor & Destructor Documentation

30.103.2.1 [Fl_Window::Fl_Window \(int w, int h, const char * title = 0\)](#)

Creates a window from the given size and title.

If [Fl_Group::current\(\)](#) is not NULL, the window is created as a subwindow of the parent window.

The first form of the constructor creates a top-level window and asks the window manager to position the window. The second 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.

30.103.2.2 Fl_Window::Fl_Window (int x, int y, int w, int h, const char * title = 0)

Creates a window from the given position, size and title.

See `Fl_Window::Fl_Window(int w, int h, const char *title = 0)`

30.103.2.3 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 it's children can be automatic (local) variables, but you must declare the `Fl_Window` *first* so that it is destroyed last.

30.103.3 Member Function Documentation

30.103.3.1 void Fl_Window::border (int b)

Gets or sets whether or not the window manager border is around the window.

The default value is true. `border(n)` can be used to turn the border on and off, and returns non-zero if the value has been changed. *Under most X window managers this does not work after `show()` has been called, although SGI's 4DWM does work.*

30.103.3.2 void Fl_Window::clear_border () [inline]

Fast inline function to turn the border off.

It only works before `show()` is called.

30.103.3.3 void Fl_Window::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.

Parameters:

← `new_label` the new label text

See also:

[label\(\)](#)

Reimplemented from [Fl_Widget](#).

30.103.3.4 **Fl_Window * Fl_Window::current () [static]**

Returns the last window that was made current.

See also:

[Fl_Window::make_current\(\)](#)

Reimplemented from [Fl_Group](#).

30.103.3.5 **void Fl_Window::cursor (Fl_Cursor c, Fl_Color fg = FL_BLACK, Fl_Color bg = FL_WHITE)**

Changes the cursor for this window.

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 [<Enumerations.H>](#). (Under X you can get any XC_cursor value by passing `Fl_Cursor((XC_foo/2)+1)`). The colors only work on X, they are not implemented on WIN32.

For back compatibility only.

30.103.3.6 **void Fl_Window::default_cursor (Fl_Cursor c, Fl_Color fg = FL_BLACK, Fl_Color bg = FL_WHITE)**

Sets the default Window cursor as well as its color.

For back compatibility only.

30.103.3.7 **void Fl_Window::draw () [protected, virtual]**

Draw 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.

Reimplemented from [Fl_Group](#).

Reimplemented in [Fl_Cairo_Window](#), [Fl_Gl_Window](#), and [Fl_Glut_Window](#).

30.103.3.8 **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](#), [Fl_Menu_Window](#), [Fl_Overlay_Window](#), and [Fl_Single_Window](#).

30.103.3.9 void Fl_Window::fullscreen ()

Makes the window completely fill the screen, without any window manager border visible.

You must use [fullscreen_off\(\)](#) to undo this. This may not work with all window managers.

30.103.3.10 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 new 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 overriden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters:

← *event* 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](#).

Reimplemented in [Fl_Glut_Window](#).

30.103.3.11 void Fl_Window::hide () [virtual]

Remove 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](#).

Reimplemented in [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Menu_Window](#), and [Fl_Overlay_Window](#).

30.103.3.12 void Fl_Window::hotspot (int *x*, int *y*, int *offscreen* = 0)

Position 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\(\)](#)

30.103.3.13 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.

30.103.3.14 void Fl_Window::iconlabel (const char * *iname*)

Sets the icon label.

30.103.3.15 void Fl_Window::label (const char * *label*, const char * *iconlabel*)

Gets or sets the icon label.

30.103.3.16 void Fl_Window::label (const char * *name*)

Sets the window title bar label.

Reimplemented from [Fl_Widget](#).

30.103.3.17 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.

Reimplemented in [Fl_Gl_Window](#), [Fl_Single_Window](#), and [Fl_Glut_Window](#).

30.103.3.18 int Fl_Window::modal () const [inline]

Returns true if this window is modal.

30.103.3.19 int Fl_Window::non_modal () const [inline]

Returns true if this window is modal or non-modal.

30.103.3.20 int Fl_Window::override () const [inline]

Returns non zero if FL_OVERRIDE flag is set, 0 otherwise.

30.103.3.21 virtual void Fl_Window::resize (int, int, int, int) [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](#).

Reimplemented in [Fl_Double_Window](#), [Fl_Gl_Window](#), and [Fl_Overlay_Window](#).

30.103.3.22 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\(\)](#).

30.103.3.23 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.

30.103.3.24 virtual void Fl_Window::show () [virtual]

Put the window on the screen.

Usually this has the side effect of opening the display. The second form is used for top-level windows and allow standard arguments to be parsed from the command-line.

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.

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Double_Window](#), [Fl_Gl_Window](#), [Fl_Menu_Window](#), [Fl_Overlay_Window](#), and [Fl_Single_Window](#).

30.103.3.25 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()`).

30.103.3.26 void Fl_Window::size_range (int *a*, int *b*, int *c* = 0, int *d* = 0, int *e* = 0, int *f* = 0, int *g* = 0) [inline]

Set the allowable range the user can resize this window to.

This only works for top-level windows.

- minw and minh are the smallest the window can be. Either value must be greater than 0.
- maxw and maxh are 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.
- dw and dh are size increments. The window will be constrained to widths of minw + N * dw, where N is any non-negative integer. If these are less or equal to 1 they are ignored. (this is ignored on WIN32)
- aspect is a flag that indicates that the window should preserve it's aspect ratio. This only works if both the maximum and minimum have the same aspect ratio. (ignored on WIN32 and by many X window managers)

If this function is not called, FLTK tries to figure out the range from the setting of [resizable\(\)](#):

- 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.
- If either dimension of [resizable\(\)](#) is less than 100, then that is considered the minimum size. Otherwise the [resizable\(\)](#) has a minimum size of 100.
- If either dimension of [resizable\(\)](#) is zero, then that is also the maximum size (so the window cannot resize in that direction).

It is undefined what happens if the current size does not fit in the constraints passed to [size_range\(\)](#).

30.103.3.27 void Fl_Window::xclass (const char * *c*) [inline]

A string used to tell the system what type of window this is.

Mostly this identifies the picture to draw in the icon. *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". This only works if called *before* calling [show\(\)](#).

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. The passed pointer is stored unchanged. The string is not copied.

30.103.4 Member Data Documentation

30.103.4.1 Fl_Window* Fl_Window::current_ [static, protected]

Stores the last window that was made current.

See [current\(\)](#) const

Reimplemented from [Fl_Group](#).

The documentation for this class was generated from the following files:

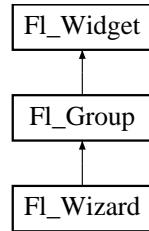
- Fl_Window.H
- Fl.cxx
- Fl_arg.cxx
- fl_cursor.cxx
- Fl_Window.cxx
- Fl_Window_fullscreen.cxx
- Fl_Window_hotspot.cxx
- Fl_Window_iconize.cxx

30.104 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.

30.104.1 Detailed Description

This widget is based off the [Fl_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 [Fl_Tabs](#), wizard panes are composed of child (usually [Fl_Group](#)) widgets. Navigation buttons must be added separately.

30.104.2 Constructor & Destructor Documentation

30.104.2.1 [Fl_Wizard::Fl_Wizard](#) (int *xx*, int *yy*, int *ww*, int *hh*, const char * *l* = 0)

The constructor creates the [Fl_Wizard](#) widget at the specified position and size.

The inherited destructor destroys the widget and its children.

30.104.3 Member Function Documentation

30.104.3.1 void Fl_Wizard::next ()

This method shows the next child of the wizard.

If the last child is already visible, this function does nothing.

30.104.3.2 void Fl_Wizard::prev ()

Shows the previous child.

30.104.3.3 void Fl_Wizard::value (Fl_Widget * *kid*)

Sets the child widget that is visible.

30.104.3.4 Fl_Widget * Fl_Wizard::value ()

Gets the current visible child widget.

The documentation for this class was generated from the following files:

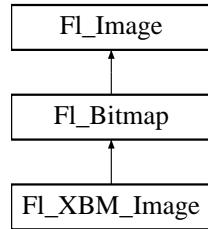
- Fl_Wizard.H
- Fl_Wizard.cxx

30.105 Fl_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.

30.105.1 Detailed Description

The [Fl_XBM_Image](#) class supports loading, caching, and drawing of X Bitmap (XBM) bitmap files.

30.105.2 Constructor & Destructor Documentation

30.105.2.1 Fl_XBM_Image::Fl_XBM_Image (const char * *name*)

The constructor loads the named XBM file from the given name filename.

The destructor free all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

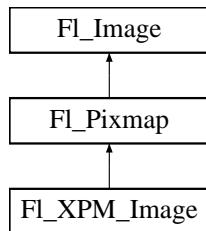
- Fl_XBM_Image.H
- Fl_XBM_Image.cxx

30.106 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.

30.106.1 Detailed Description

The [Fl_XPM_Image](#) class supports loading, caching, and drawing of X Pixmap (XPM) images, including transparency.

30.106.2 Constructor & Destructor Documentation

30.106.2.1 Fl_XPM_Image::Fl_XPM_Image (const char * *name*)

The constructor loads the XPM image from the name filename.

The destructor free all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

- Fl_XPM_Image.H
- Fl_XPM_Image.cxx

Chapter 31

File Documentation

31.1 Enumerations.H File Reference

This file contains type definitions and general enumerations.

```
#include "Fl_Export.h"  
#include "fl_types.h"
```

Defines

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_MAJOR_VERSION** 1
The major release version of this FLTK library.
- #define **FL_MINOR_VERSION** 3
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.

Mouse and Keyboard Events

*This and the following constants define the non-ASCII keys on the keyboard for **FL_KEYBOARD** and **FL_SHORTCUT** events.*

Todo

***FL_Button** and **FL_key...** constants could be structured better (use an enum or some doxygen grouping ?)*

See also:

[Fl::event_key\(\)](#) and [Fl::get_key\(int\)](#) (use ascii letters for all other keys):

- #define **FL_Button** 0xfee8
*A mouse button; use **FL_Button** + n for mouse button n.*
- #define **FL_Backspace** 0xff08
The backspace key.
- #define **FL_Tab** 0xff09
The tab key.
- #define **FL_Enter** 0xff0d
The enter key.
- #define **FL_Pause** 0xff13
The pause key.
- #define **FL_Scroll_Lock** 0xff14
The scroll lock key.
- #define **FL_Escape** 0xff1b
The escape key.
- #define **FL_Home** 0xff50
The home key.
- #define **FL_Left** 0xff51
The left arrow key.
- #define **FL_Up** 0xff52
The up arrow key.
- #define **FL_Right** 0xff53
The right arrow key.
- #define **FL_Down** 0xff54
The down arrow key.
- #define **FL_Page_Up** 0xff55
The page-up key.
- #define **FL_Page_Down** 0xff56
The page-down key.
- #define **FL_End** 0xff57
The end key.
- #define **FL_Print** 0xff61
The print (or print-screen) key.
- #define **FL_Insert** 0xff63
The insert key.

- #define **FL_Menu** 0xff67
The menu key.
- #define **FL_Help** 0xff68
The 'help' key on Mac keyboards.
- #define **FL_Num_Lock** 0xff7f
The num lock key.
- #define **FL_KP** 0xff80
*One of the keypad numbers; use **FL_KP** + *n* for number *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_F** 0xffbd
*One of the function keys; use **FL_F** + *n* for function key *n*.*
- #define **FL_F_Last** 0xffe0
The last function key; use to range-check function keys.
- #define **FL_Shift_L** 0xffe1
The lefthand shift key.
- #define **FL_Shift_R** 0xffe2
The righthand shift key.
- #define **FL_Control_L** 0xffe3
The lefthand control key.
- #define **FL_Control_R** 0xffe4
The righthand control key.
- #define **FL_Caps_Lock** 0xffe5
The caps lock key.
- #define **FL_Meta_L** 0xffe7
The left meta/Windows key.
- #define **FL_Meta_R** 0xffe8
The right meta/Windows key.
- #define **FL_Alt_L** 0xffe9
The left alt key.
- #define **FL_Alt_R** 0xffea
The right alt key.
- #define **FL_Delete** 0xffff

The delete key.

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_SHIFT 0x00010000`
One of the shift keys is down.
- `#define FL_CAPS_LOCK 0x00020000`
The caps lock is on.
- `#define FL_CTRL 0x00040000`
One of the ctrl keys is down.
- `#define FL_ALT 0x00080000`
One of the alt keys is down.
- `#define FL_NUM_LOCK 0x00100000`
The num lock is on.
- `#define FL_META 0x00400000`
One of the meta/Windows keys is down.
- `#define FL_SCROLL_LOCK 0x00800000`
The scroll lock is on.
- `#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_BUTTON**(n) (0x00800000<<(n))
Mouse button n (n > 0) is pushed.
- #define **FL_COMMAND** FL_CTRL
An alias for FL_CTRL on WIN32 and X11, or FL_META on MacOS X.

Typedefs

- typedef int **FL_Fontsize**
Size of a font in pixels.

Enumerations

- 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 }
```

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_EMBOSSSED_LABEL, _FL_MULTI_LABEL, _FL_ICON_LABEL, _FL_IMAGE_LABEL,
FL_FREE_LABELTYPE }
```

The labeltype() method sets the type of the label.

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 }
```

These constants determine when a callback is performed.

Variables

- **FL_EXPORT FL_Fontsize FL_NORMAL_SIZE**
normal font size

31.1.1 Detailed Description

This file contains type definitions and general enumerations.

31.1.2 Define Documentation

31.1.2.1 #define FL_MAJOR_VERSION 1

The major release version of this FLTK library.

See also:

[FL_VERSION](#)

31.1.2.2 #define FL_MINOR_VERSION 3

The minor release version for this library.

FLTK remains mostly source-code compatible between minor version changes.

31.1.2.3 #define FL_PATCH_VERSION 0

The patch version for this library.

FLTK remains binary compatible between patches.

31.1.2.4 #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*.

This is changed slightly from the beta versions because the old "const double" definition would not allow for conditional compilation...

FL_VERSION is a double that describes the major and minor version numbers. Version 1.1 is actually stored as 1.01 to allow for more than 9 minor 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.

31.1.3 Typedef Documentation

31.1.3.1 `typedef unsigned Fl_Align`

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 for most widgets, which centers the label inside the widget.

Flags can be or'd to achieve a combination of alignments.

See also:

[FL_ALIGN_CENTER](#), etc.

31.1.3.2 `typedef int Fl_Font`

A font number is an index into the internal font table.

The following constants define the standard FLTK fonts:

31.1.3.3 `typedef int Fl_Fontsize`

Size of a font in pixels.

This is the approximate height of a font in pixels.

31.1.4 Enumeration Type Documentation

31.1.4.1 `enum Fl_Boxtype`

Enumerator:

FL_NO_BOX nothing is drawn at all, this box is invisible

FL_FLAT_BOX a flat box

FL_UP_BOX see figure 1

FL_DOWN_BOX see figure 1

FL_UP_FRAME see figure 1

FL_DOWN_FRAME see figure 1

FL_THIN_UP_BOX see figure 1

FL_THIN_DOWN_BOX see figure 1

FL_THIN_UP_FRAME see figure 1

FL_THIN_DOWN_FRAME see figure 1

FL_ENGRAVED_BOX see figure 1

FL_EMBOSSSED_BOX see figure 1

FL_ENGRAVED_FRAME see figure 1

FL_EMBOSSSED_FRAME see figure 1

FL_BORDER_BOX see figure 1

FL_SHADOW_BOX see figure 1

FL_BORDER_FRAME see figure 1
FL_SHADOW_FRAME see figure 1
FL_ROUNDED_BOX see figure 1
FL_RSHADOW_BOX see figure 1
FL_ROUNDED_FRAME see figure 1
FL_RFLAT_BOX see figure 1
FL_ROUND_UP_BOX see figure 1
FL_ROUND_DOWN_BOX see figure 1
FL_DIAMOND_UP_BOX see figure 1
FL_DIAMOND_DOWN_BOX see figure 1
FL_OVAL_BOX see figure 1
FL_OSHADOW_BOX see figure 1
FL_OVAL_FRAME see figure 1
FL_OFLAT_BOX see figure 1
FL_PLASTIC_UP_BOX plastic version of FL_UP_BOX
FL_PLASTIC_DOWN_BOX plastic version of FL_DOWN_BOX
FL_PLASTIC_UP_FRAME plastic version of FL_UP_FRAME
FL_PLASTIC_DOWN_FRAME plastic version of FL_DOWN_FRAME
FL_PLASTIC_THIN_UP_BOX plastic version of FL_THIN_UP_BOX
FL_PLASTIC_THIN_DOWN_BOX plastic version of FL_THIN_DOWN_BOX
FL_PLASTIC_ROUND_UP_BOX plastic version of FL_ROUND_UP_BOX
FL_PLASTIC_ROUND_DOWN_BOX plastic version of FL_ROUND_DOWN_BOX
FL_GTK_UP_BOX gtk+ version of FL_UP_BOX
FL_GTK_DOWN_BOX gtk+ version of FL_DOWN_BOX
FL_GTK_UP_FRAME gtk+ version of FL_UP_FRAME
FL_GTK_DOWN_FRAME gtk+ version of FL_DOWN_FRAME
FL_GTK_THIN_UP_BOX gtk+ version of FL_THIN_UP_BOX
FL_GTK_THIN_DOWN_BOX gtk+ version of FL_THIN_DOWN_BOX
FL_GTK_THIN_UP_FRAME gtk+ version of FL_UP_FRAME
FL_GTK_THIN_DOWN_FRAME gtk+ version of FL_THIN_DOWN_FRAME
FL_GTK_ROUND_UP_BOX gtk+ version of FL_ROUND_UP_BOX
FL_GTK_ROUND_DOWN_BOX gtk+ version of FL_ROUND_DOWN_BOX
FL_FREE_BOXTYPE the first free box type for creation of new box types

31.1.4.2 enum *Fl_Color*

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.

Todo

enum Fl_Color needs some more comments for values, see Fl/Enumerations.H

Enumerator:

FL_FOREGROUND_COLOR the default foreground color (0) used for labels and text

FL_BACKGROUND2_COLOR the default background color for text, list, and valuator widgets

FL_INACTIVE_COLOR the inactive foreground color

FL_SELECTION_COLOR the default selection/highlight color

31.1.4.3 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.

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 handle() method. It then becomes the [Fl::belowmouse\(\)](#) widget and will receive [FL_MOVE](#) and [FL_LEAVE](#) events.

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 *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 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 or released.

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 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. 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 foreign 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\(\)](#).

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.

31.1.4.4 enum Fl_Labeltype

The [labeltype\(\)](#) method sets the type of the label.

The following standard label types are included:

[Todo](#)

The doxygen comments are incomplete, and some labeltypes are starting with an underscore. Also, there are three external functions undocumented (yet):

- [fl_define_FL_SHADOW_LABEL\(\)](#)
- [fl_define_FL_ENGRAVED_LABEL\(\)](#)
- [fl_define_FL_EMBOSSSED_LABEL\(\)](#)

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_EMBORESSED_LABEL draws edges as thought the text is raised
_FL_MULTI_LABEL ?
_FL_ICON_LABEL draws the icon associated with the text
_FL_IMAGE_LABEL ?
FL_FREE_LABELTYPE first free labeltype to use for creating own labeltypes

31.1.4.5 enum Fl_When

These constants determine when a callback is performed.

See also:

[Fl_Widget::when\(\)](#);

Todo

doxygen comments for values are incomplete and maybe wrong or unclear

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 ?

31.1.5 Variable Documentation

31.1.5.1 const Fl_Align FL_ALIGN_BOTTOM = (Fl_Align)2

Align the label at the bottom of the widget.

31.1.5.2 const Fl_Align FL_ALIGN_CENTER = (Fl_Align)0

Align the label horizontally in the middle.

31.1.5.3 const Fl_Align FL_ALIGN_CLIP = (Fl_Align)64

All parts of the label that are larger than the widget will not be drawn .

31.1.5.4 const Fl_Align FL_ALIGN_IMAGE_OVER_TEXT = (Fl_Align)0

If the label contains an image, draw the text below the image.

31.1.5.5 const Fl_Align FL_ALIGN_INSIDE = (Fl_Align)16

Draw the label inside of the widget.

31.1.5.6 const Fl_Align FL_ALIGN_LEFT = (Fl_Align)4

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.

31.1.5.7 const Fl_Align FL_ALIGN_RIGHT = (Fl_Align)8

Align the label to the right of the widget.

31.1.5.8 const Fl_Align FL_ALIGN_TEXT_OVER_IMAGE = (Fl_Align)32

If the label contains an image, draw the text on top of the image.

31.1.5.9 const Fl_Align FL_ALIGN_TOP = (Fl_Align)1

Align the label at the top of the widget.

Inside labels appear below the top, outside labels are drawn on top of the widget.

31.1.5.10 const Fl_Align FL_ALIGN_WRAP = (Fl_Align)128

Wrap text that does not fit the width of the widget.

31.2 fl_arc.cxx File Reference

Utility functions for drawing arcs and circles.

```
#include <FL/fl_draw.H>
#include <FL/math.h>
```

Functions

- 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\(\)](#).

31.2.1 Detailed Description

Utility functions for drawing arcs and circles.

31.2.2 Function Documentation

31.2.2.1 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\(\)](#).

Parameters:

← *x,y,r* center and radius of circular arc
← *start,end* angles of start and end of arc measured in degrees counter-clockwise from 3 o'clock. If *end* is less than *start* then it draws the ark in a clockwise direction.

31.3 fl_arci.hxx File Reference

Utility functions for drawing circles using integers.

```
#include <FL/fl_draw.H>
#include <FL/x.H>
#include <config.h>
```

Functions

- void [fl_arc](#) (int x, int y, int w, int h, double a1, double a2)
Draw ellipse sections using integer coordinates.
- void [fl_pie](#) (int x, int y, int w, int h, double a1, double a2)
Draw filled ellipse sections using integer coordinates.

31.3.1 Detailed Description

Utility functions for drawing circles using integers.

31.3.2 Function Documentation

31.3.2.1 void fl_arc (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 WIN32. 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 counterclockwise from 3'oclock 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\(double x, double y, double r, double start, double a\)](#)

Parameters:

- ← **x,y,w,h** bounding box of complete circle
- ← **a1,a2** start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. a2 must be greater than or equal to a1.

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

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:

$\leftarrow \mathbf{x,y,w,h}$ bounding box of complete circle

$\leftarrow \mathbf{a1,a2}$ start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. a2 must be greater than or equal to a1.

31.4 fl_boxtype.cxx File Reference

drawing code for common box types.

```
#include <FL/F1.H>
#include <FL/F1_Widget.H>
#include <FL/fl_draw.H>
#include <config.h>
```

Defines

- #define **D1** BORDER_WIDTH
- #define **D2** (BORDER_WIDTH+BORDER_WIDTH)
- #define **fl_border_box** fl_rectbound
allow consistent naming

Functions

- **uchar * fl_gray_ramp ()**
- **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_no_box (int, int, int, int, Fl_Color)**
Draws a box of type FL_NO_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_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_up_frame (int x, int y, int w, int h, Fl_Color)**
Draws a frame of type FL_THIN_UP_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_up_frame (int x, int y, int w, int h, Fl_Color)**
Draws a frame of type FL_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_down_frame (int x, int y, int w, int h, Fl_Color)**

Draws a frame of type FL_DOWN_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_engraved_frame` (int x, int y, int w, int h, `Fl_Color`)

Draws a frame of type FL_ENGRAVED_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_embossed_frame` (int x, int y, int w, int h, `Fl_Color`)

Draws a frame of type FL_EMBOSSSED_FRAME.

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

Draws a box of type FL_EMBOSSSED_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, Equivalent to drawing a box of type FL_BORDER_BOX.

- 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_internal_boxtype` (`Fl_Boxtype` t, `Fl_Box_Draw_F` *f)

Set the drawing function for a given box type.

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

Draw box using given type, position, size and color.

31.4.1 Detailed Description

drawing code for common box types.

31.4.2 Function Documentation

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

Draw box using given type, position, size and color.

Parameters:

← *t* box type

← *x,y,w,h* position and size

← *c* color

31.4.2.2 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 results 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:

← *s* sets of 4 grayscale values in top, left, bottom, right order

← *x,y,w,h* position and size

31.4.2.3 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 results 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:

← *s* sets of 4 grayscale values in bottom, right, top, left order

← *x,y,w,h* position and size

31.4.2.4 void fl_internal_boxtype (Fl_Boxtype t, Fl_Box_Draw_F *f)

Set the drawing function for a given box type.

Parameters:

← *t* box type

← *f* box drawing function

31.5 fl_color.hxx File Reference

Color handling.

```
#include "Fl_XColor.H"
#include <FL/Fl.H>
#include <FL/x.H>
#include <FL/fl_draw.H>
#include "fl_cmap.h"
```

Defines

- #define **fl_overlay** 0

Functions

- **ulong fl_xpixel (uchar r, uchar g, uchar b)**
- **void fl_color (uchar r, uchar g, uchar b)**

Set the color for all subsequent drawing operations.

- **ulong fl_xpixel (Fl_Color i)**
- **void fl_color (Fl_Color i)**

Sets the color for all subsequent drawing operations.

- **Fl_Color fl_color_average (Fl_Color color1, Fl_Color color2, float weight)**
- **Fl_Color fl_inactive (Fl_Color c)**
- **Fl_Color fl_contrast (Fl_Color fg, Fl_Color bg)**

Variables

- **uchar fl_redmask**
- **uchar fl_greenmask**
- **uchar fl_bluemask**
- **int fl_redshift**
- **int fl_greenshift**
- **int fl_blueshift**
- **int fl_extrashift**
- **Fl_XColor fl_xmap [1][256]**
- **Fl_Color fl_color_**

31.5.1 Detailed Description

Color handling.

31.5.2 Function Documentation

31.5.2.1 void fl_color (Fl_Color *i*)

Sets the color for all subsequent drawing operations.

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.

Parameters:

$\leftarrow i$ color

31.5.2.2 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.

Parameters:

$\leftarrow r,g,b$ color components

31.6 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.

31.6.1 Detailed Description

[Fl_Color_Chooser](#) widget .

31.7 fl_curve.cxx File Reference

Utility for drawing Bezier curves, adding the points to the current fl_begin/fl_vertex/fl_end path.

```
#include <FL/fl_draw.H>
#include <math.h>
```

Functions

- 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 Bezier curve to the path.

31.7.1 Detailed Description

Utility for drawing Bezier 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!

31.7.2 Function Documentation

31.7.2.1 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 Bezier curve to the path.

The curve ends (and two of the points) are at X0,Y0 and X3,Y3.

Parameters:

← **X0,Y0** curve start point
← **X1,Y1** curve control point
← **X2,Y2** curve control point
← **X3,Y3** curve end point

31.8 fl_draw.H File Reference

utility header to pull drawing functions together

```
#include "Enumerations.H"
```

Defines

- #define `fl_clip` `fl_push_clip`

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

Typedefs

- `typedef void(* Fl_Draw_Image_Cb)(void *, int, int, int, uchar *)`

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

- `FL_EXPORT void fl_color(Fl_Color i)`

Sets the color for all subsequent drawing operations.

- `void fl_color(int c)`

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

Set the color for all subsequent drawing operations.

- `Fl_Color fl_color()`

Returns the last `fl_color()` that was set.

- `FL_EXPORT 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.

- `FL_EXPORT void fl_push_no_clip()`

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

- `FL_EXPORT void fl_pop_clip()`

Restore the previous clip region.

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

Does the rectangle intersect the current clip region?

- FL_EXPORT int **fl_clip_box** (int, int, int, int, int &x, int &y, int &w, int &h)
Intersect the rectangle with the current clip region and return the bounding box of the result.
- FL_EXPORT void **fl_point** (int x, int y)
Draw a single pixel at the given coordinates.
- FL_EXPORT void **fl_line_style** (int style, int width=0, char *dashes=0)
- FL_EXPORT void **fl_rect** (int x, int y, int w, int h)
Draw a 1-pixel border inside the given bounding box.
- void **fl_rect** (int x, int y, int w, int h, **Fl_Color** c)
Draw a 1-pixel border inside the given bounding box.
- FL_EXPORT void **fl_rectf** (int x, int y, int w, int h)
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 a rectangle that exactly fills the given bounding box.
- FL_EXPORT void **fl_line** (int x, int y, int x1, int y1)
Draw a line from x,y to x1,y1.
- FL_EXPORT 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.
- FL_EXPORT void **fl_loop** (int x, int y, int x1, int y1, int x2, int y2)
Outline a 3-sided polygon with lines.
- FL_EXPORT 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.
- FL_EXPORT void **fl_polygon** (int x, int y, int x1, int y1, int x2, int y2)
Fill a 3-sided polygon.
- FL_EXPORT void **fl_polygon** (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
Fill a 4-sided polygon.
- FL_EXPORT void **fl_xyline** (int x, int y, int x1)
Draw horizontal line from x,y to x1,y.
- FL_EXPORT void **fl_xyline** (int x, int y, int x1, int y2)
Draw horizontal line from x,y to x1,y, then vertical from x1,y to x1,y2.
- FL_EXPORT void **fl_xyline** (int x, int y, int x1, int y2, int x3)
Draw 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.
- FL_EXPORT void **fl_yxline** (int x, int y, int y1)
Draw a vertical line from x,y to x,y1.

- FL_EXPORT 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.
- FL_EXPORT 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.
- FL_EXPORT void **fl_arc** (int x, int y, int w, int h, double a1, double a2)
Draw ellipse sections using integer coordinates.
- FL_EXPORT void **fl_pie** (int x, int y, int w, int h, double a1, double a2)
Draw filled ellipse sections using integer coordinates.
- FL_EXPORT 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
- FL_EXPORT void **fl_push_matrix** ()
Save the current transformation matrix on the stack.
- FL_EXPORT void **fl_pop_matrix** ()
Restore the current transformation matrix from the stack.
- FL_EXPORT void **fl_scale** (double x, double y)
Concatenate scaling transformation onto the current one.
- FL_EXPORT void **fl_scale** (double x)
Concatenate scaling transformation onto the current one.
- FL_EXPORT void **fl_translate** (double x, double y)
Concatenate translation transformation onto the current one.
- FL_EXPORT void **fl_rotate** (double d)
Concatenate rotation transformation onto the current one.
- FL_EXPORT void **fl_mult_matrix** (double a, double b, double c, double d, double x, double y)
Concatenate another transformation onto the current one.
- FL_EXPORT void **fl_begin_points** ()
Start drawing a list of points.
- FL_EXPORT void **fl_begin_line** ()
Start drawing a list of lines.
- FL_EXPORT void **fl_begin_loop** ()
Start drawing a closed sequence of lines.
- FL_EXPORT void **fl_begin_polygon** ()
Start drawing a convex filled polygon.
- FL_EXPORT void **fl_vertex** (double x, double y)

Add a single vertex to the current path.

- FL_EXPORT 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 Bezier curve to the path.

- FL_EXPORT void [fl_arc](#) (double x, double y, double r, double start, double a)

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\(\)](#).

- FL_EXPORT void [fl_circle](#) (double x, double y, double r)

[fl_circle\(\)](#) is equivalent to [fl_arc\(\)](#).

- FL_EXPORT void [fl_end_points](#) ()

End list of points, and draw.

- FL_EXPORT void [fl_end_line](#) ()

End list of lines, and draw.

- FL_EXPORT void [fl_end_loop](#) ()

End closed sequence of lines, and draw.

- FL_EXPORT void [fl_end_polygon](#) ()

End convex filled polygon, and draw.

- FL_EXPORT void [fl_begin_complex_polygon](#) ()

Start drawing a complex filled polygon.

- FL_EXPORT void [fl_gap](#) ()

Call [fl_gap\(\)](#) to separate loops of the path.

- FL_EXPORT void [fl_end_complex_polygon](#) ()

End complex filled polygon, and draw.

- FL_EXPORT double [fl_transform_x](#) (double x, double y)

Transform coordinate using current transformation matrix.

- FL_EXPORT double [fl_transform_y](#) (double x, double y)

Transform coordinate using current transformation matrix.

- FL_EXPORT double [fl_transform_dx](#) (double x, double y)

Transform distance using current transformation matrix.

- FL_EXPORT double [fl_transform_dy](#) (double x, double y)

Transform distance using current transformation matrix.

- FL_EXPORT void [fl_transformed_vertex](#) (double x, double y)

Add coordinate pair to the vertex list without further transformations.

- FL_EXPORT void [fl_font](#) ([Fl_Font](#) face, [Fl_Fontsize](#) size)

- `Fl_Font fl_font()`
- `Fl_Fontsize fl_size()`
- `FL_EXPORT int fl_height()`
- `int fl_height(int, int size)`
- `FL_EXPORT int fl_descent()`
- `FL_EXPORT double fl_width(const char *)`
- `FL_EXPORT double fl_width(const char *, int n)`
- `FL_EXPORT double fl_width(Fl_Unichar)`
- `FL_EXPORT void fl_draw(const char *, int x, int y)`
- `FL_EXPORT void fl_draw(const char *, int n, int x, int y)`
- `FL_EXPORT void fl_rtl_draw(const char *, int n, int x, int y)`
- `FL_EXPORT void fl_measure(const char *, int &x, int &y, int draw_symbols=1)`
- `FL_EXPORT void fl_draw(const char *, int, int, int, int, Fl_Align, Fl_Image *img=0, int draw_symbols=1)`
- `FL_EXPORT void fl_draw(const char *, int, int, int, int, Fl_Align, void(*callthis)(const char *, int n, int x, int y), Fl_Image *img=0, int draw_symbols=1)`
- `FL_EXPORT const char * fl_latin1_to_local(const char *, int n=-1)`
- `FL_EXPORT const char * fl_local_to_latin1(const char *, int n=-1)`
- `FL_EXPORT const char * fl_mac_roman_to_local(const char *, int n=-1)`
- `FL_EXPORT const char * fl_local_to_mac_roman(const char *, int n=-1)`
- `FL_EXPORT void fl_frame(const char *s, int x, int y, int w, int h)`

Draws a series of line segments around the given box.
- `FL_EXPORT void fl_frame2(const char *s, int x, int y, int w, int h)`

Draws a series of line segments around the given box.
- `FL_EXPORT void fl_draw_box(Fl_Boxtype, int x, int y, int w, int h, Fl_Color)`

Draw box using given type, position, size and color.

 - `FL_EXPORT void fl_draw_image(const uchar *, int, int, int, int, int delta=3, int ldelta=0)`
 - `FL_EXPORT void fl_draw_image_mono(const uchar *, int, int, int, int, int delta=1, int ld=0)`
 - `FL_EXPORT void fl_draw_image(Fl_Draw_Image_Cb, void *, int, int, int, int, int delta=3)`
 - `FL_EXPORT void fl_draw_image_mono(Fl_Draw_Image_Cb, void *, int, int, int, int delta=1)`
 - `FL_EXPORT void fl_rectf(int x, int y, int w, int h, uchar r, uchar g, uchar b)`
 - `FL_EXPORT char fl_can_do_alpha_blending()`
 - `FL_EXPORT uchar * fl_read_image(uchar *p, int x, int y, int w, int h, int alpha=0)`
 - `FL_EXPORT int fl_draw_pixmap(char *const *data, int x, int y, Fl_Color=FL_GRAY)`
 - `FL_EXPORT int fl_measure_pixmap(char *const *data, int &w, int &h)`
 - `FL_EXPORT int fl_draw_pixmap(const char *const *data, int x, int y, Fl_Color=FL_GRAY)`
 - `FL_EXPORT int fl_measure_pixmap(const char *const *data, int &w, int &h)`
 - `FL_EXPORT 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)`
 - `FL_EXPORT const char * fl_shortcut_label(int)`
 - `FL_EXPORT void fl_overlay_rect(int, int, int, int)`
 - `FL_EXPORT void fl_overlay_clear()`
 - `FL_EXPORT void fl_cursor(Fl_Cursor, Fl_Color=FL_BLACK, Fl_Color=FL_WHITE)`
 - `FL_EXPORT const char * fl_expand_text(const char *from, char *buf, int maxbuf, double maxw, int &n, double &width, int wrap, int draw_symbols=0)`
 - `FL_EXPORT void fl_set_status(int X, int Y, int W, int H)`

- FL_EXPORT void **fl_set_spot** (int font, int size, int x, int y, int w, int h)
- FL_EXPORT void **fl_reset_spot** (void)
- FL_EXPORT int **fl_draw_symbol** (const char *label, int x, int y, int w, int h, **Fl_Color**)
- FL_EXPORT int **fl_add_symbol** (const char *name, void(*drawit)(**Fl_Color**), int scalable)

Variables

- FL_EXPORT char **fl_draw_shortcut**
- FL_EXPORT **Fl_Color** **fl_color_**
- FL_EXPORT **Fl_Font** **fl_font_**
- FL_EXPORT **Fl_Fontsize** **fl_size_**

31.8.1 Detailed Description

utility header to pull drawing functions together

31.8.2 Function Documentation

31.8.2.1 FL_EXPORT 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()**.

Parameters:

- ← *x,y,r* center and radius of circular arc
 ← *start,end* angles of start and end of arc measured in degrees counter-clockwise from 3 o'clock. If *end* is less than *start* then it draws the arc in a clockwise direction.

31.8.2.2 FL_EXPORT void fl_arc (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 WIN32. 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 counterclockwise from 3'oclock 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 a)**

Parameters:

- ← *x,y,w,h* bounding box of complete circle
 ← *a1,a2* start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. a2 must be greater than or equal to a1.

31.8.2.3 FL_EXPORT void fl_begin_complex_polygon ()

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.

31.8.2.4 FL_EXPORT void fl_begin_points ()

Start drawing a list of points.

Points are added to the list with [fl_vertex\(\)](#)

31.8.2.5 FL_EXPORT void fl_circle (double *x*, double *y*, double *r*)

[fl_circle\(\)](#) is equivalent to [fl_arc\(](#).

..,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\(\)](#)

Parameters:

← *x,y,r* center and radius of circle

31.8.2.6 FL_EXPORT int fl_clip_box (int *x*, int *y*, int *w*, int *h*, int & *X*, int & *Y*, int & *W*, int & *H*)

Intersect the 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. 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.

Parameters:

← *x,y,w,h* position and size of rectangle

→ *X,Y,W,H* position and size of resulting bounding box. *W* and *H* are set to zero if the rectangle is completely outside the region.

Returns:

Non-zero if the resulting rectangle is different to the original.

31.8.2.7 Fl_Color fl_color () [inline]

Returns the last [fl_color\(\)](#) that was set.

This can be used for state save/restore.

31.8.2.8 FL_EXPORT 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.

Parameters:

$\leftarrow r,g,b$ color components

31.8.2.9 FL_EXPORT void fl_color (Fl_Color *i*)

Sets the color for all subsequent drawing operations.

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.

Parameters:

$\leftarrow i$ color

31.8.2.10 FL_EXPORT 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 Bezier curve to the path.

The curve ends (and two of the points) are at X0,Y0 and X3,Y3.

Parameters:

$\leftarrow X0,Y0$ curve start point
 $\leftarrow X1,Y1$ curve control point
 $\leftarrow X2,Y2$ curve control point
 $\leftarrow X3,Y3$ curve end point

31.8.2.11 FL_EXPORT void fl_draw_box (Fl_Boxtype *t*, int *x*, int *y*, int *w*, int *h*, Fl_Color *c*)

Draw box using given type, position, size and color.

Parameters:

$\leftarrow t$ box type
 $\leftarrow x,y,w,h$ position and size
 $\leftarrow c$ color

31.8.2.12 FL_EXPORT 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 results 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:

- ← *s* sets of 4 grayscale values in top, left, bottom, right order
- ← *x,y,w,h* position and size

31.8.2.13 FL_EXPORT 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 results 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:

- ← *s* sets of 4 grayscale values in bottom, right, top, left order
- ← *x,y,w,h* position and size

31.8.2.14 FL_EXPORT void fl_gap ()

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 vertex, or several times in a row.

31.8.2.15 FL_EXPORT void fl_mult_matrix (double *a*, double *b*, double *c*, double *d*, double *x*, double *y*)

Concatenate another transformation onto the current one.

Parameters:

- ← *a,b,c,d,x,y* transformation matrix elements such that $X' = aX + cY + x$ and $Y' = bX + dY + y$

31.8.2.16 FL_EXPORT int fl_not_clipped (int *x*, int *y*, int *w*, int *h*)

Does the rectangle intersect the current clip region?

Parameters:

- ← *x,y,w,h* 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 is it is entirely inside the clip region.

31.8.2.17 FL_EXPORT void fl_pie (int *x*, int *y*, int *w*, int *h*, double *a1*, double *a2*)

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:

← *x,y,w,h* bounding box of complete circle

← *a1,a2* start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. a2 must be greater than or equal to a1.

31.8.2.18 FL_EXPORT void fl_polygon (int *x*, int *y*, int *x1*, int *y1*, int *x2*, int *y2*, int *x3*, int *y3*)

Fill a 4-sided polygon.

The polygon must be convex.

31.8.2.19 FL_EXPORT void fl_polygon (int *x*, int *y*, int *x1*, int *y1*, int *x2*, int *y2*)

Fill a 3-sided polygon.

The polygon must be convex.

31.8.2.20 FL_EXPORT void fl_pop_clip ()

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.

31.8.2.21 FL_EXPORT 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.

Parameters:

← *x,y,w,h* position and size

31.8.2.22 FL_EXPORT void fl_push_matrix ()

Save the current transformation matrix on the stack.

The maximum depth of the stack is 4.

31.8.2.23 FL_EXPORT void fl_rotate (double *d*)

Concatenate rotation transformation onto the current one.

Parameters:

← *d* - rotation angle, counter-clockwise in degrees (not radians)

31.8.2.24 FL_EXPORT void fl_scale (double *x*)

Concatenate scaling transformation onto the current one.

Parameters:

← *x* scale factor in both x-direction and y-direction

31.8.2.25 FL_EXPORT void fl_scale (double *x*, double *y*)

Concatenate scaling transformation onto the current one.

Parameters:

← *x,y* scale factors in x-direction and y-direction

31.8.2.26 FL_EXPORT double fl_transform_dx (double *x*, double *y*)

Transform distance using current transformation matrix.

Parameters:

← *x,y* coordinate

31.8.2.27 FL_EXPORT double fl_transform_dy (double *x*, double *y*)

Transform distance using current transformation matrix.

Parameters:

← *x,y* coordinate

31.8.2.28 FL_EXPORT double fl_transform_x (double *x*, double *y*)

Transform coordinate using current transformation matrix.

Parameters:

← *x,y* coordinate

31.8.2.29 FL_EXPORT double fl_transform_y (double x, double y)

Transform coordinate using current transformation matrix.

Parameters:

← *x,y* coordinate

31.8.2.30 FL_EXPORT void fl_transformed_vertex (double xf, double yf)

Add coordinate pair to the vertex list without further transformations.

Parameters:

← *xf,yf* transformed coordinate

31.8.2.31 FL_EXPORT void fl_translate (double x, double y)

Concatenate translation transformation onto the current one.

Parameters:

← *x,y* translation factor in x-direction and y-direction

31.8.2.32 FL_EXPORT void fl_vertex (double x, double y)

Add a single vertex to the current path.

Parameters:

← *x,y* coordinate

31.9 fl_rect.cxx File Reference

Drawing and clipping routines for rectangles.

```
#include <config.h>
#include <FL/F1.H>
#include <FL/F1_Widget.H>
#include <FL/fl_draw.H>
#include <FL/x.H>
```

Defines

- #define **STACK_SIZE** 10
- #define **STACK_MAX** (STACK_SIZE - 1)

Functions

- void **fl_rect** (int x, int y, int w, int h)
Draw a 1-pixel border inside the given bounding box.
- void **fl_rectf** (int x, int y, int w, int h)
Color a rectangle that exactly fills the given bounding box.
- void **fl_xyline** (int x, int y, int x1)
Draw horizontal line from x,y to x1,y.
- void **fl_xyline** (int x, int y, int x1, int y2)
Draw 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 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.
- 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_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_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_point** (int x, int y)
Draw a single pixel at the given coordinates.
- Fl_Region **XRectangleRegion** (int x, int y, int w, int h)
- void **fl_restore_clip** ()
Undoes any clobbering of clip done by your program.
- void **fl_clip_region** (Fl_Region r)
Replace the top of the clipping stack with a clipping region of any shape.
- Fl_Region **fl_clip_region** ()
- 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_no_clip** ()
Pushes an empty clip region onto the stack so nothing will be clipped.
- void **fl_pop_clip** ()
Restore the previous clip region.
- int **fl_not_clipped** (int x, int y, int w, int h)
Does the rectangle intersect the current 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 with the current clip region and return the bounding box of the result.

Variables

- int **fl_clip_state_number** = 0

31.9.1 Detailed Description

Drawing and clipping routines for rectangles.

31.9.2 Function Documentation

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

Intersect the 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. 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.

Parameters:

← *x,y,w,h* position and size of rectangle

→ *X,Y,W,H* position and size of resulting bounding box. *W* and *H* are set to zero if the rectangle is completely outside the region.

Returns:

Non-zero if the resulting rectangle is different to the original.

31.9.2.2 Fl_Region fl_clip_region ()

Returns:

the current clipping region.

31.9.2.3 void fl_clip_region (Fl_Region *r*)

Replace the top of the clipping stack with a clipping region of any shape.

Fl_Region is an operating system specific type.

Parameters:

← *r* clipping region

31.9.2.4 int fl_not_clipped (int *x*, int *y*, int *w*, int *h*)

Does the rectangle intersect the current clip region?

Parameters:

← *x,y,w,h* 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.

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

Fill a 4-sided polygon.

The polygon must be convex.

31.9.2.6 void fl_polygon (int *x*, int *y*, int *x1*, int *y1*, int *x2*, int *y2*)

Fill a 3-sided polygon.

The polygon must be convex.

31.9.2.7 void fl_pop_clip ()

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.

31.9.2.8 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.

Parameters:

$\leftarrow x, y, w, h$ position and size

31.10 fl_types.h File Reference

This file contains simple "C"-style type definitions.

Typedefs

Miscellaneous

- `typedef unsigned char uchar`
unsigned char
- `typedef unsigned long ulong`
unsigned long
- `typedef char * Fl_String`
Flexible length utf8 Unicode text.
- `typedef const char * Fl_CString`
Flexible length utf8 Unicode read-only string.
- `typedef unsigned int Fl_Unichar`
24-bit Unicode character + 8-bit indicator for keyboard flags

31.10.1 Detailed Description

This file contains simple "C"-style type definitions.

31.10.2 Typedef Documentation

31.10.2.1 `typedef const char* Fl_CString`

Flexible length utf8 Unicode read-only string.

See also:

[Fl_String](#)

31.10.2.2 `typedef char* Fl_String`

Flexible length utf8 Unicode text.

Todo

FIXME: temporary (?) typedef to mark UTF8 and Unicode conversions

31.11 fl_vertex.hxx File Reference

Portable drawing code for drawing arbitrary shapes with simple 2D transformations.

```
#include <config.h>
#include <FL/fl_draw.H>
#include <FL/x.H>
#include <FL/Fl.H>
#include <FL/math.h>
#include <stdlib.h>
```

Defines

- #define XPOINT XPoint

Typedefs

- typedef short COORD_T

Enumerations

- enum { LINE, LOOP, POLYGON, POINT_ }

Functions

- void **fl_push_matrix** ()

Save the current transformation matrix on the stack.
- void **fl_pop_matrix** ()

Restore the current transformation matrix from the stack.
- void **fl_mult_matrix** (double a, double b, double c, double d, double x, double y)

Concatenate another transformation onto the current one.
- void **fl_scale** (double x, double y)

Concatenate scaling transformation onto the current one.
- void **fl_scale** (double x)

Concatenate scaling transformation onto the current one.
- void **fl_translate** (double x, double y)

Concatenate translation transformation onto the current one.
- void **fl_rotate** (double d)

Concatenate rotation transformation onto the current one.
- void **fl_begin_points** ()

Start drawing a list of points.

- void `fl_begin_line()`

Start drawing a list of lines.

- void `fl_begin_loop()`

Start drawing a closed sequence of lines.

- void `fl_begin_polygon()`

Start drawing a convex filled polygon.

- double `fl_transform_x(double x, double y)`

Transform coordinate using current transformation matrix.

- double `fl_transform_y(double x, double y)`

Transform coordinate using current transformation matrix.

- 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.

- void `fl_transformed_vertex(double xf, double yf)`

Add coordinate pair to the vertex list without further transformations.

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

Add a single vertex to the current path.

- void `fl_end_points()`

End list of points, 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_polygon()`

End convex filled polygon, and draw.

- void `fl_begin_complex_polygon()`

Start drawing a complex filled polygon.

- void `fl_gap()`

Call `fl_gap()` to separate loops of the path.

- void `fl_end_complex_polygon()`

End complex filled polygon, and draw.

- void [fl_circle](#) (double x, double y, double r)
fl_circle() is equivalent to [fl_arc](#).

31.11.1 Detailed Description

Portable drawing code for drawing arbitrary shapes with simple 2D transformations.

31.11.2 Function Documentation

31.11.2.1 void [fl_begin_complex_polygon](#) ()

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.

31.11.2.2 void [fl_begin_points](#) ()

Start drawing a list of points.

Points are added to the list with [fl_vertex\(\)](#)

31.11.2.3 void [fl_circle](#) (double x, double y, double r)

[fl_circle\(\)](#) is equivalent to [fl_arc](#).

..,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\(\)](#)

Parameters:

$\leftarrow x,y,r$ center and radius of circle

31.11.2.4 void [fl_gap](#) ()

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 vertex, or several times in a row.

31.11.2.5 void fl_mult_matrix (double *a*, double *b*, double *c*, double *d*, double *x*, double *y*)

Concatenate another transformation onto the current one.

Parameters:

$\leftarrow a, b, c, d, x, y$ transformation matrix elements such that $X' = aX + cY + x$ and $Y' = bX + dY + y$

31.11.2.6 void fl_push_matrix ()

Save the current transformation matrix on the stack.

The maximum depth of the stack is 4.

31.11.2.7 void fl_rotate (double *d*)

Concatenate rotation transformation onto the current one.

Parameters:

$\leftarrow d$ - rotation angle, counter-clockwise in degrees (not radians)

31.11.2.8 void fl_scale (double *x*)

Concatenate scaling transformation onto the current one.

Parameters:

$\leftarrow x$ scale factor in both x-direction and y-direction

31.11.2.9 void fl_scale (double *x*, double *y*)

Concatenate scaling transformation onto the current one.

Parameters:

$\leftarrow x, y$ scale factors in x-direction and y-direction

31.11.2.10 double fl_transform_dx (double *x*, double *y*)

Transform distance using current transformation matrix.

Parameters:

$\leftarrow x, y$ coordinate

31.11.2.11 double fl_transform_dy (double x, double y)

Transform distance using current transformation matrix.

Parameters:

← x,y coordinate

31.11.2.12 double fl_transform_x (double x, double y)

Transform coordinate using current transformation matrix.

Parameters:

← x,y coordinate

31.11.2.13 double fl_transform_y (double x, double y)

Transform coordinate using current transformation matrix.

Parameters:

← x,y coordinate

31.11.2.14 void fl_transformed_vertex (double xf, double yf)

Add coordinate pair to the vertex list without further transformations.

Parameters:

← xf,yf transformed coordinate

31.11.2.15 void fl_translate (double x, double y)

Concatenate translation transformation onto the current one.

Parameters:

← x,y translation factor in x-direction and y-direction

31.11.2.16 void fl_vertex (double x, double y)

Add a single vertex to the current path.

Parameters:

← x,y coordinate

Index

~Fl_Browser
 Fl_Browser, [284](#)
~Fl_Check_Browser
 Fl_Check_Browser, [317](#)
~Fl_Double_Window
 Fl_Double_Window, [346](#)
~Fl_File_Chooser
 Fl_File_Chooser, [357](#)
~Fl_Group
 Fl_Group, [396](#)
~Fl_Help_View
 Fl_Help_View, [410](#)
~Fl_Menu_Window
 Fl_Menu_Window, [470](#)
~Fl_Preferences
 Fl_Preferences, [496](#)
~Fl_RGB_Image
 Fl_RGB_Image, [516](#)
~Fl_Scrollbar
 Fl_Scrollbar, [529](#)
~Fl_Shared_Image
 Fl_Shared_Image, [535](#)
~Fl_Text_Display
 Fl_Text_Display, [578](#)
~Fl_Widget
 Fl_Widget, [640](#)
~Fl_Window
 Fl_Window, [667](#)
_FL_DIAMOND_DOWN_BOX
 Enumerations.H, [686](#)
_FL_DIAMOND_UP_BOX
 Enumerations.H, [686](#)
_FL_EMBOSSED_LABEL
 Enumerations.H, [689](#)
_FL_ENGRAVED_LABEL
 Enumerations.H, [689](#)
_FL_GTK_DOWN_BOX
 Enumerations.H, [686](#)
_FL_GTK_DOWN_FRAME
 Enumerations.H, [686](#)
_FL_GTK_ROUND_DOWN_BOX
 Enumerations.H, [686](#)
_FL_GTK_ROUND_UP_BOX
 Enumerations.H, [686](#)
_FL_GTK_THIN_DOWN_BOX
 Enumerations.H, [686](#)
_FL_GTK_THIN_UP_FRAME
 Enumerations.H, [686](#)
_FL_ICON_LABEL
 Enumerations.H, [690](#)
_FL_IMAGE_LABEL
 Enumerations.H, [690](#)
_FL_MULTI_LABEL
 Enumerations.H, [690](#)
_FL_OFLAT_BOX
 Enumerations.H, [686](#)
_FL_OSHADOW_BOX
 Enumerations.H, [686](#)
_FL_OVAL_BOX
 Enumerations.H, [686](#)
_FL_OVAL_FRAME
 Enumerations.H, [686](#)
_FL_PLASTIC_DOWN_BOX
 Enumerations.H, [686](#)
_FL_PLASTIC_DOWN_FRAME
 Enumerations.H, [686](#)
_FL_PLASTIC_ROUND_DOWN_BOX
 Enumerations.H, [686](#)
_FL_PLASTIC_ROUND_UP_BOX
 Enumerations.H, [686](#)
_FL_PLASTIC_THIN_DOWN_BOX
 Enumerations.H, [686](#)
_FL_PLASTIC_THIN_UP_BOX
 Enumerations.H, [686](#)
_FL_PLASTIC_UP_BOX
 Enumerations.H, [686](#)
_FL_PLASTIC_UP_FRAME
 Enumerations.H, [686](#)
_FL_RFLAT_BOX
 Enumerations.H, [686](#)
_FL_ROUNDED_BOX
 Enumerations.H, [686](#)

_FL_ROUNDED_FRAME
 Enumerations.H, 686
_FL_ROUND_DOWN_BOX
 Enumerations.H, 686
_FL_ROUND_UP_BOX
 Enumerations.H, 686
_FL_RSHADOW_BOX
 Enumerations.H, 686
_FL_SHADOW_BOX
 Enumerations.H, 685
_FL_SHADOW_FRAME
 Enumerations.H, 686
_FL_SHADOW_LABEL
 Enumerations.H, 689
_remove
 Fl_Browser, 284

activate
 Fl_Menu_Item, 462
 Fl_Widget, 641
active
 Fl_Menu_Item, 462
 Fl_Widget, 641
active_r
 Fl_Widget, 641
activevisible
 Fl_Menu_Item, 463
add
 Fl_Browser, 284
 Fl_Chart, 311
 Fl_Check_Browser, 318
 Fl_File_Icon, 363
 Fl_Input_Choice, 434
 Fl_Menu_, 446
 Fl_Menu_Item, 463
add_awake_handler_
 Fl, 259
add_check
 Fl, 259
add_color
 Fl_File_Icon, 363
add_default_key_bindings
 Fl_Text_Editor, 592
add_extra
 Fl_File_Chooser, 357
add_fd
 Fl, 260
add_handler
 fl_events, 220
add_idle
 Fl, 260
add_modify_callback
 Fl_Text_Buffer, 562
add_pdelete_callback

 Fl_Text_Buffer, 562
add_timeout
 Fl, 260
add_vertex
 Fl_File_Icon, 363
align
 Fl_Widget, 641, 642
angle1
 Fl_Dial, 343
append
 Fl_Text_Buffer, 562
appendfile
 Fl_Text_Buffer, 562
arg
 Fl, 261
args
 Fl, 261
argument
 Fl_Menu_Item, 463
 Fl_Widget, 642
array
 Fl_Group, 396
atclose
 fl_windows, 217
autosize
 Fl_Chart, 311
awake
 fl_multithread, 236

b
 Fl_Color_Chooser, 335
background
 Fl, 262
background2
 Fl, 262
begin
 Fl_Group, 396
belowmouse
 fl_events, 221
bitmap
 Fl_FormsBitmap, 374
border
 Fl_Window, 667
bottomline
 Fl_Browser, 285
bound_key_function
 Fl_Text_Editor, 592
bounds
 Fl_Chart, 312
 Fl_Slider, 543
 Fl_Valuator, 615
box
 Fl_Widget, 642
box_dh

Fl, 262
 box_dw
 Fl, 263
 box_dx
 Fl, 263
 box_dy
 Fl, 263
 buffer
 Fl_Text_Display, 578
 Cairo support functions and classes, 240
 cairo_autolink_context
 group_cairo, 240
 cairo_cc
 group_cairo, 241
 cairo_make_current
 group_cairo, 241
 calc_line_starts
 Fl_Text_Display, 578
 callback
 Fl_Menu_Item, 463
 Fl_Widget, 643
 can_do
 Fl_Gl_Window, 385
 can_do_overlay
 Fl_Gl_Window, 385
 CHANGED
 Fl_Widget, 640
 changed
 Fl_Input_Choice, 434
 Fl_Widget, 644
 character
 Fl_Text_Buffer, 562
 character_width
 Fl_Text_Buffer, 562
 check
 Fl, 263
 Fl_Menu_Item, 463
 check_all
 Fl_Check_Browser, 318
 check_none
 Fl_Check_Browser, 318
 checkbox
 Fl_Menu_Item, 463
 checked
 Fl_Check_Browser, 318
 Fl_Menu_Item, 463
 child
 Fl_Group, 396
 clamp
 Fl_Valuator, 615
 clear
 Fl_Button, 303
 Fl_Check_Browser, 318
 Fl_File_Icon, 363
 Fl_Group, 396
 Fl_Input_Choice, 434
 Fl_Menu_, 447
 Fl_Menu_Item, 464
 Fl_Scroll, 526
 clear_border
 Fl_Window, 667
 clear_changed
 Fl_Input_Choice, 434
 Fl_Widget, 644
 clear_damage
 Fl_Widget, 644
 clear_output
 Fl_Widget, 644
 clear_overlay
 Fl_Menu_Window, 470
 clear_rectangular
 Fl_Text_Buffer, 562
 clear_selection
 Fl_Help_View, 410
 clear_visible
 Fl_Widget, 645
 clear_visible_focus
 Fl_Widget, 645
 clip_children
 Fl_Group, 397
 col
 FL_CHART_ENTRY, 315
 color
 Fl_File_Chooser, 357, 358
 Fl_Tooltip, 610
 Fl_Widget, 645
 Color & Font functions, 233
 color2
 Fl_Widget, 646
 color_average
 Fl_Image, 416
 Fl_Pixmap, 484
 Fl_RGB_Image, 516
 Fl_Shared_Image, 535
 Fl_Tiled_Image, 603
 column_char
 Fl_Browser, 285
 column_widths
 Fl_Browser, 285
 Common Dialogs classes and functions, 242
 compose
 fl_events, 221
 compose_reset
 fl_events, 221
 contains
 Fl_Widget, 646
 context

Fl_Gl_Window, 385
context_valid
 Fl_Gl_Window, 385
COPIED_LABEL
 Fl_Widget, 640
copy
 Fl_Bitmap, 275
 fl_clipboard, 228
 Fl_Image, 416
 Fl_Input_, 426
 Fl_Menu_, 447
 Fl_Pixmap, 484
 Fl_RGB_Image, 516
 Fl_Shared_Image, 535, 536
 Fl_Tiled_Image, 603
copy_cuts
 Fl_Input_, 426
copy_label
 Fl_Widget, 646
 Fl_Window, 667
count
 Fl_File_Chooser, 358
 Fl_Image, 416
count_displayed_characters
 Fl_Text_Buffer, 563
count_lines
 Fl_Text_Buffer, 563
 Fl_Text_Display, 578
current
 Fl_Group, 397
 Fl_Tooltip, 610
 Fl_Window, 668
current_
 Fl_Window, 672
cursor
 Fl_Window, 668
cursor_color
 Fl_Input_, 427
 Fl_Text_Display, 578, 579
 Fl_Value_Input, 621
cursor_style
 Fl_Text_Display, 579
cut
 Fl_Input_, 427
d
 Fl_Image, 416, 417
damage
 Fl, 264
 Fl_Widget, 646, 647
damage_resize
 Fl_Widget, 647
data
 Fl_Browser, 285
Fl_Image, 417
deactivate
 Fl_Menu_Item, 464
Fl_Repeat_Button, 510
Fl_Widget, 647
default_atclose
 fl_windows, 216
default_callback
 Fl_Widget, 648
default_cursor
 Fl_Window, 668
default_key_function
 Fl_Text_Editor, 592
deimage
 Fl_Widget, 648
delay
 Fl_Tooltip, 610, 611
delete_widget
 fl_del_widget, 238
deleteEntry
 Fl_Preferences, 496
deleteGroup
 Fl_Preferences, 497
deleting
 Fl_Browser_, 296
desaturate
 Fl_Image, 417
 Fl_Pixmap, 484
 Fl_RGB_Image, 517
 Fl_Shared_Image, 536
 Fl_Tiled_Image, 603
deselect
 Fl_Browser_, 296
direction
 Fl_Timer, 606
directory
 Fl_File_Chooser, 358
 Fl_Help_View, 410
disable
 Fl_Tooltip, 611
display
 Fl, 264
 Fl_Browser_, 296
display_insert
 Fl_Text_Display, 579
dnd
 fl_clipboard, 228
dnd_text_ops
 Fl, 264
do_callback
 Fl_Menu_Item, 464
 Fl_Widget, 649
do_widget_deletion
 fl_del_widget, 238

down_box
 Fl_Button, 303
 Fl_File_Input, 368
 Fl_Menu_, 447
 draw
 Fl_Adjuster, 272
 Fl_Bitmap, 275, 276
 Fl_Box, 279
 Fl_Browser_, 296
 Fl_Button, 303
 Fl_Chart, 312
 Fl_Choice, 324
 Fl_Clock_Output, 330
 Fl_Counter, 340
 Fl_Dial, 343
 Fl_File_Icon, 363
 Fl_FormsBitmap, 374
 Fl_FormsPixmap, 377
 Fl_Free, 379
 Fl_Gl_Window, 385
 Fl_Glut_Window, 391
 Fl_Group, 397
 Fl_Image, 417
 Fl_Input, 421
 Fl_Label, 439
 Fl_Light_Button, 441
 Fl_Menu_Bar, 452
 Fl_Menu_Button, 455
 Fl_Menu_Item, 464
 Fl_Pack, 481
 Fl_Pixmap, 484
 Fl_Positioner, 490
 Fl_Progress, 509
 Fl_Return_Button, 513
 Fl_RGB_Image, 517
 Fl_Roller, 520
 Fl_Scroll, 526
 Fl_Scrollbar, 529
 Fl_Shared_Image, 536
 Fl_Slider, 543
 Fl_Tabs, 552
 Fl_Text_Display, 579
 Fl_Tiled_Image, 603, 604
 Fl_Timer, 606
 Fl_Value_Input, 621
 Fl_Value_Output, 626
 Fl_Value_Slider, 630
 Fl_Widget, 649
 Fl_Window, 668
 draw_box
 Fl_Widget, 650
 draw_box_active
 Fl, 264
 draw_child
 Fl_Group, 397
 draw_children
 Fl_Group, 397
 draw_empty
 Fl_Image, 417
 draw_focus
 Fl_Widget, 650
 draw_line_numbers
 Fl_Text_Display, 579
 draw_outside_label
 Fl_Group, 397
 draw_overlay
 Fl_Glut_Window, 391
 draw_range
 Fl_Text_Display, 579
 draw_string
 Fl_Text_Display, 580
 draw_text
 Fl_Text_Display, 580
 drawtext
 Fl_Input_, 427
 enable
 Fl_Tooltip, 611
 enabled
 Fl_Tooltip, 611
 end
 Fl_Group, 398
 enter_area
 Fl_Tooltip, 611
 entries
 Fl_Preferences, 497
 entry
 Fl_Preferences, 497
 entryExists
 Fl_Preferences, 497
 Enumerations.H, 679
 _FL_DIAMOND_DOWN_BOX, 686
 _FL_DIAMOND_UP_BOX, 686
 _FL_EMBORESSED_LABEL, 689
 _FL_ENGRAVED_LABEL, 689
 _FL_GTK_DOWN_BOX, 686
 _FL_GTK_DOWN_FRAME, 686
 _FL_GTK_ROUND_DOWN_BOX, 686
 _FL_GTK_ROUND_UP_BOX, 686
 _FL_GTK_THIN_DOWN_BOX, 686
 _FL_GTK_THIN_DOWN_FRAME, 686
 _FL_GTK_THIN_UP_BOX, 686
 _FL_GTK_THIN_UP_FRAME, 686
 _FL_GTK_UP_BOX, 686
 _FL_GTK_UP_FRAME, 686
 _FL_ICON_LABEL, 690
 _FL_IMAGE_LABEL, 690
 _FL_MULTI_LABEL, 690

_FL_OFLAT_BOX, 686
_FL_OSHADOW_BOX, 686
_FL_OVAL_BOX, 686
_FL_OVAL_FRAME, 686
_FL_PLASTIC_DOWN_BOX, 686
_FL_PLASTIC_DOWN_FRAME, 686
_FL_PLASTIC_ROUND_DOWN_BOX, 686
_FL_PLASTIC_ROUND_UP_BOX, 686
_FL_PLASTIC_THIN_DOWN_BOX, 686
_FL_PLASTIC_THIN_UP_BOX, 686
_FL_PLASTIC_UP_BOX, 686
_FL_PLASTIC_UP_FRAME, 686
_FL_RFLAT_BOX, 686
_FL_ROUNDED_BOX, 686
_FL_ROUNDED_FRAME, 686
_FL_ROUND_DOWN_BOX, 686
_FL_ROUND_UP_BOX, 686
_FL_RSHADOW_BOX, 686
_FL_SHADOW_BOX, 685
_FL_SHADOW_FRAME, 686
_FL_SHADOW_LABEL, 689
FL_ACTIVATE, 688
FL_BACKGROUND2_COLOR, 687
FL_BORDER_BOX, 685
FL_BORDER_FRAME, 685
FL_CLOSE, 688
FL_DEACTIVATE, 688
FL_DND_DRAG, 689
FL_DND_ENTER, 689
FL_DND_LEAVE, 689
FL_DND_RELEASE, 689
FL_DOWN_BOX, 685
FL_DOWN_FRAME, 685
FL_DRAG, 687
FL_EMBOSSSED_BOX, 685
FL_EMBOSSSED_FRAME, 685
FL_ENGRAVED_BOX, 685
FL_ENGRAVED_FRAME, 685
FL_ENTER, 687
FL_FLAT_BOX, 685
FL_FOCUS, 687
FL_FOREGROUND_COLOR, 687
FL_FREE_BOXTYPE, 686
FL_FREELABELTYPE, 690
FL_HIDE, 688
FL_INACTIVE_COLOR, 687
FL_KEYBOARD, 688
FL_KEYDOWN, 688
FL_KEYUP, 688
FL_LEAVE, 687
FL_MOUSEWHEEL, 689
FL_MOVE, 688
FL_NO_BOX, 685
FL_NO_EVENT, 687
FL_NO_LABEL, 689
FL_NORMAL_LABEL, 689
FL_PASTE, 689
FL_PUSH, 687
FL_RELEASE, 687
FL_SELECTION_COLOR, 687
FL_SELECTIONCLEAR, 689
FL_SHORTCUT, 688
FL_SHOW, 689
FL_THIN_DOWN_BOX, 685
FL_THIN_DOWN_FRAME, 685
FL_THIN_UP_BOX, 685
FL_THIN_UP_FRAME, 685
FL_UNFOCUS, 688
FL_UP_BOX, 685
FL_UP_FRAME, 685
FL_WHEN_CHANGED, 690
FL_WHEN_ENTER_KEY, 690
FL_WHEN_ENTER_KEY_ALWAYS, 690
FL_WHEN_ENTER_KEY_CHANGED, 690
FL_WHEN_NEVER, 690
FL_WHEN_NOT_CHANGED, 690
FL_WHEN_RELEASE, 690
FL_WHEN_RELEASE_ALWAYS, 690
FL_Align, 685
FL_ALIGN_BOTTOM, 690
FL_ALIGN_CENTER, 690
FL_ALIGN_CLIP, 690
FL_ALIGN_IMAGE_OVER_TEXT, 690
FL_ALIGN_INSIDE, 691
FL_ALIGN_LEFT, 691
FL_ALIGN_RIGHT, 691
FL_ALIGN_TEXT_OVER_IMAGE, 691
FL_ALIGN_TOP, 691
FL_ALIGN_WRAP, 691
FL_Boxtype, 685
FL_Color, 686
FL_Event, 687
FL_Font, 685
FL_Fontsize, 685
FL_Labeltype, 689
FL_MAJOR_VERSION, 684
FL_MINOR_VERSION, 684
FL_PATCH_VERSION, 684
FL_VERSION, 684
FL_When, 690
error
 group_comdlg, 247
errorcolor
 Fl_File_Input, 368
event
 fl_events, 221
event_alt
 fl_events, 222

event_button
 fl_events, 222
 event_button1
 fl_events, 222
 event_button2
 fl_events, 222
 event_button3
 fl_events, 222
 event_buttons
 fl_events, 222
 event_clicks
 fl_events, 223
 event_ctrl
 fl_events, 223
 event_dx
 fl_events, 223
 event_dy
 fl_events, 223
 event_inside
 fl_events, 223
 event_is_click
 fl_events, 224
 event_key
 fl_events, 224
 event_length
 fl_events, 225
 event_original_key
 fl_events, 225
 event_shift
 fl_events, 225
 event_state
 fl_events, 225
 event_text
 fl_events, 225
 event_x_root
 fl_events, 226
 event_y_root
 fl_events, 226
 Events handling functions, 218
 expand_character
 Fl_Text_Buffer, 563

 fatal
 group_comdlg, 247
 filename
 Fl_Help_View, 410
 filetype
 Fl_File_Browser, 350
 filter
 Fl_File_Browser, 350
 Fl_File_Chooser, 358
 filter_value
 Fl_File_Chooser, 358
 find
 Fl_File_Icon, 364
 Fl_Group, 398
 find_item
 Fl_Browser_, 296
 Fl_Menu_, 447
 find_line_end
 Fl_Text_Display, 580
 find_shortcut
 Fl_Menu_Item, 464
 find_wrap_range
 Fl_Text_Display, 580
 findchar_backward
 Fl_Text_Buffer, 563
 findchar_forward
 Fl_Text_Buffer, 563
 findchars_backward
 Fl_Text_Buffer, 564
 findchars_forward
 Fl_Text_Buffer, 564
 first
 Fl_File_Icon, 364
 Fl_Menu_Item, 464, 465
 first_window
 fl_windows, 216
 Fl, 249
 add_awake_handler_, 259
 add_check, 259
 add_fd, 260
 add_idle, 260
 add_timeout, 260
 arg, 261
 args, 261
 background, 262
 background2, 262
 box_dh, 262
 box_dw, 263
 box_dx, 263
 box_dy, 263
 check, 263
 damage, 264
 display, 264
 dnd_text_ops, 264
 draw_box_active, 264
 flush, 264
 foreground, 264
 get_awake_handler_, 264
 get_boxtype, 265
 get_system_colors, 265
 gl_visual, 265
 help, 269
 idle, 269
 own_colormap, 265
 ready, 265
 release, 265

reload_scheme, 266
remove_check, 266
remove_fd, 266
remove_timeout, 266
repeat_timeout, 266
run, 266
scheme, 267
set_boxtype, 267
set_idle, 267
set_labeltype, 267
version, 267
visible_focus, 267, 268
visual, 268
wait, 268

FL_ACTIVATE
 Enumerations.H, 688

FL_BACKGROUND2_COLOR
 Enumerations.H, 687

FL_BORDER_BOX
 Enumerations.H, 685

FL_BORDER_FRAME
 Enumerations.H, 685

FL_CLOSE
 Enumerations.H, 688

FL_DEACTIVATE
 Enumerations.H, 688

FL_DND_DRAG
 Enumerations.H, 689

FL_DND_ENTER
 Enumerations.H, 689

FL_DND_LEAVE
 Enumerations.H, 689

FL_DND_RELEASE
 Enumerations.H, 689

FL_DOWN_BOX
 Enumerations.H, 685

FL_DOWN_FRAME
 Enumerations.H, 685

FL_DRAG
 Enumerations.H, 687

FL_EMBOSSDED_BOX
 Enumerations.H, 685

FL_EMBOSSDED_FRAME
 Enumerations.H, 685

FL_ENGRAVED_BOX
 Enumerations.H, 685

FL_ENGRAVED_FRAME
 Enumerations.H, 685

FL_ENTER
 Enumerations.H, 687

FL_FLAT_BOX
 Enumerations.H, 685

FL_FOCUS
 Enumerations.H, 687

FL_FOREGROUND_COLOR
 Enumerations.H, 687

FL_FREE_BOXTYPE
 Enumerations.H, 686

FL_FREE_LABELTYPE
 Enumerations.H, 690

FL_HIDE
 Enumerations.H, 688

FL_INACTIVE_COLOR
 Enumerations.H, 687

FL_KEYBOARD
 Enumerations.H, 688

FL_KEYDOWN
 Enumerations.H, 688

FL_KEYUP
 Enumerations.H, 688

FL_LEAVE
 Enumerations.H, 687

FL_MOUSEWHEEL
 Enumerations.H, 689

FL_MOVE
 Enumerations.H, 688

FL_NO_BOX
 Enumerations.H, 685

FL_NO_EVENT
 Enumerations.H, 687

FL_NO_LABEL
 Enumerations.H, 689

FL_NORMAL_LABEL
 Enumerations.H, 689

FL_PASTE
 Enumerations.H, 689

Fl_Preferences
 SYSTEM, 495
 USER, 495

FL_PUSH
 Enumerations.H, 687

FL_RELEASE
 Enumerations.H, 687

FL_SELECTION_COLOR
 Enumerations.H, 687

FL_SELECTIONCLEAR
 Enumerations.H, 689

FL_SHORTCUT
 Enumerations.H, 688

FL_SHOW
 Enumerations.H, 689

FL_THIN_DOWN_BOX
 Enumerations.H, 685

FL_THIN_DOWN_FRAME
 Enumerations.H, 685

FL_THIN_UP_BOX
 Enumerations.H, 685

FL_THIN_UP_FRAME
 Enumerations.H, 685

Enumerations.H, 685
FL_UNFOCUS
 Enumerations.H, 688
FL_UP_BOX
 Enumerations.H, 685
FL_UP_FRAME
 Enumerations.H, 685
FL_WHEN_CHANGED
 Enumerations.H, 690
FL_WHEN_ENTER_KEY
 Enumerations.H, 690
FL_WHEN_ENTER_KEY_ALWAYS
 Enumerations.H, 690
FL_WHEN_ENTER_KEY_CHANGED
 Enumerations.H, 690
FL_WHEN_NEVER
 Enumerations.H, 690
FL_WHEN_NOT_CHANGED
 Enumerations.H, 690
FL_WHEN_RELEASE
 Enumerations.H, 690
FL_WHEN_RELEASE_ALWAYS
 Enumerations.H, 690
Fl_Widget
 CHANGED, 640
 COPIED_LABEL, 640
 INACTIVE, 640
 INVISIBLE, 640
 OUTPUT, 640
 SHORTCUT_LABEL, 640
 VISIBLE_FOCUS, 640
Fl_Adjuster, 271
 draw, 272
 Fl_Adjuster, 272
 Fl_Adjuster, 272
 handle, 272
 soft, 273
fl_alert
 group_comdlg, 243
Fl_Align
 Enumerations.H, 685
FL_ALIGN_BOTTOM
 Enumerations.H, 690
FL_ALIGN_CENTER
 Enumerations.H, 690
FL_ALIGN_CLIP
 Enumerations.H, 690
FL_ALIGN_IMAGE_OVER_TEXT
 Enumerations.H, 690
FL_ALIGN_INSIDE
 Enumerations.H, 691
FL_ALIGN_LEFT
 Enumerations.H, 691
FL_ALIGN_RIGHT
 Enumerations.H, 691
FL_ALIGN_TEXT_OVER_IMAGE
 Enumerations.H, 691
FL_ALIGN_TOP
 Enumerations.H, 691
FL_ALIGN_WRAP
 Enumerations.H, 691
fl_arc
 fl_arc.cxx, 692
 fl_arci.cxx, 693
 fl_draw.H, 707
fl_arc.cxx, 692
 fl_arc, 692
fl_arci.cxx, 693
 fl_arc, 693
 fl_pie, 693
fl_ask
 group_comdlg, 243
fl_attributes
 free_color, 234
 get_color, 234
 get_font, 234
 get_font_name, 234
 get_font_sizes, 234
 set_color, 234
 set_font, 235
 set_fonts, 235
fl_begin_complex_polygon
 fl_draw.H, 707
 fl_vertex.cxx, 721
fl_begin_points
 fl_draw.H, 708
 fl_vertex.cxx, 721
Fl_Bitmap, 274
 copy, 275
 draw, 275, 276
 Fl_Bitmap, 275
 Fl_Bitmap, 275
 label, 276
 uncache, 276
Fl_BMP_Image, 277
 Fl_BMP_Image, 277
 Fl_BMP_Image, 277
Fl_Box, 278
 draw, 279
 Fl_Box, 278
 Fl_Box, 278
 handle, 279
Fl_Boxtype
 Enumerations.H, 685
fl_boxtype.cxx, 695
 fl_draw_box, 696
 fl_frame, 696
 fl_frame2, 697

fl_internal_boxtype, 697
Fl_Browser, 280
 ~Fl_Browser, 284
 _remove, 284
 add, 284
 bottomline, 285
 column_char, 285
 column_widths, 285
 data, 285
 Fl_Browser, 284
 Fl_Browser, 284
 format_char, 285, 286
 full_height, 286
 hide, 286, 287
 incr_height, 287
 insert, 287
 item_first, 287
 item_next, 287
 item_prev, 287
 item_select, 288
 item_selected, 288
 item_width, 288
 lineposition, 288
 load, 288
 make_visible, 288
 middleline, 288
 replace, 289
 select, 289
 selected, 289
 show, 289
 size, 289, 290
 swap, 290
 text, 290
 topline, 290
 value, 290
Fl_Browser_, 292
 deleting, 296
 deselect, 296
 display, 296
 draw, 296
 find_item, 296
Fl_Browser_, 296
Fl_Browser_, 296
 full_height, 296
 full_width, 297
 handle, 297
 has_scrollbar, 297
 incr_height, 297
 inserting, 297
 item_first, 297
 item_height, 298
 item_next, 298
 item_prev, 298
 item_quick_height, 298
item_select, 298
item_selected, 298
item_width, 298
new_list, 299
redraw_lines, 299
replacing, 299
resize, 299
scrollbar, 300
scrollbar_left, 299
scrollbar_right, 299
select, 299
select_only, 299
selection, 299
top, 300
Fl_Button, 301
 clear, 303
 down_box, 303
 draw, 303
 Fl_Button, 303
 Fl_Button, 303
 handle, 303
 set, 304
 shortcut, 304
 value, 305
Fl_Cairo_State, 306
Fl_Cairo_Window, 307
Fl_Chart, 309
 add, 311
 autosize, 311
 bounds, 312
 draw, 312
 Fl_Chart, 311
 Fl_Chart, 311
 insert, 312
 maxsize, 312
 replace, 313
 size, 313
 textcolor, 313
 textfont, 313
 textsize, 313
FL_CHART_ENTRY, 315
 col, 315
 str, 315
 val, 315
Fl_Check_Browser, 316
 ~Fl_Check_Browser, 317
 add, 318
 check_all, 318
 check_none, 318
 checked, 318
 clear, 318
 Fl_Check_Browser, 317
 Fl_Check_Browser, 317
 handle, 318

nchecked, 318
 nitems, 318
 remove, 318
 set_checked, 319
 text, 319
 value, 319
Fl_Check_Button, 320
 Fl_Check_Button, 321
 Fl_Check_Button, 321
Fl_Choice, 322
 draw, 324
 Fl_Choice, 323
 Fl_Choice, 323
 handle, 324
 value, 324, 325
fl_choice
 group_comdlg, 243
fl_circle
 fl_draw.H, 708
 fl_vertex.cxx, 721
fl_clip_box
 fl_draw.H, 708
 fl_rect.cxx, 716
fl_clip_region
 fl_rect.cxx, 716
fl_clipboard
 copy, 228
 dnd, 228
 paste, 229
 selection, 229
 selection_owner, 229
Fl_Clock, 326
 Fl_Clock, 327
 Fl_Clock, 327
 handle, 328
 update, 328
Fl_Clock_Output, 329
 draw, 330
 Fl_Clock_Output, 330
 Fl_Clock_Output, 330
 hour, 331
 minute, 331
 second, 331
 value, 331
Fl_Color
 Enumerations.H, 686
fl_color
 fl_color.cxx, 699
 fl_draw.H, 708, 709
 fl_color.cxx, 698
 fl_color, 699
Fl_Color_Chooser, 333
 b, 335
Fl_Color_Chooser, 335
Fl_Color_Chooser, 335
 g, 335
 hsv, 335
 hsv2rgb, 335
 hue, 336
 r, 336
 rgb, 336
 rgb2hsv, 336
 saturation, 336
 value, 336
fl_color_chooser
 group_comdlg, 244
Fl_Color_Chooser.H, 700
Fl_Counter, 338
 draw, 340
 Fl_Counter, 340
 Fl_Counter, 340
 handle, 340
 lstep, 340
 step, 341
Fl_CString
 fl_types.h, 718
fl_curve
 fl_curve.cxx, 701
 fl_draw.H, 709
 fl_curve.cxx, 701
 fl_curve, 701
fl_del_widget
 delete_widget, 238
 do_widget_deletion, 238
 watch_widget_pointer, 238
Fl_Dial, 342
 angle1, 343
 draw, 343
 Fl_Dial, 343
 Fl_Dial, 343
 handle, 344
fl_dir_chooser
 group_comdlg, 245
Fl_Double_Window, 345
 ~Fl_Double_Window, 346
 flush, 346
 hide, 346
 resize, 347
 show, 347
fl_draw.H, 702
 fl_arc, 707
 fl_begin_complex_polygon, 707
 fl_begin_points, 708
 fl_circle, 708
 fl_clip_box, 708
 fl_color, 708, 709
 fl_curve, 709
 fl_draw_box, 709

fl_frame, 709
fl_frame2, 710
fl_gap, 710
fl_mult_matrix, 710
fl_not_clipped, 710
fl_pie, 711
fl_polygon, 711
fl_pop_clip, 711
fl_push_clip, 711
fl_push_matrix, 711
fl_rotate, 711
fl_scale, 712
fl_transform_dx, 712
fl_transform_dy, 712
fl_transform_x, 712
fl_transform_y, 712
fl_transformed_vertex, 713
fl_translate, 713
fl_vertex, 713
fl_draw_box
 fl_boxtyle.cxx, 696
 fl_draw.H, 709
Fl_End, 348
Fl_Event
 Enumerations.H, 687
fl_events
 add_handler, 220
 belowmouse, 221
 compose, 221
 compose_reset, 221
 event, 221
 event_alt, 222
 event_button, 222
 event_button1, 222
 event_button2, 222
 event_button3, 222
 event_buttons, 222
 event_clicks, 223
 event_ctrl, 223
 event_dx, 223
 event_dy, 223
 event_inside, 223
 event_is_click, 224
 event_key, 224
 event_length, 225
 event_original_key, 225
 event_shift, 225
 event_state, 225
 event_text, 225
 event_x_root, 226
 event_y_root, 226
 focus, 226
 get_key, 226
 get_mouse, 226
 handle, 227
 pushed, 227
 test_shortcut, 227
Fl_File_Browser, 349
 filetype, 350
 filter, 350
 Fl_File_Browser, 350
 Fl_File_Browser, 350
 iconsize, 350
 load, 351
Fl_File_Chooser, 352
 ~Fl_File_Chooser, 357
 add_extra, 357
 color, 357, 358
 count, 358
 directory, 358
 filter, 358
 filter_value, 358
 Fl_File_Chooser, 357
 Fl_File_Chooser, 357
 hide, 358
 iconsize, 358
 label, 359
 preview, 359
 rescan, 359
 show, 359
 textcolor, 359
 textfont, 359
 textsize, 359, 360
 type, 360
 value, 360
 visible, 360
fl_file_chooser
 group_comdlg, 245
fl_file_chooser_callback
 group_comdlg, 246
fl_file_chooser_ok_label
 group_comdlg, 246, 247
Fl_File_Icon, 361
 add, 363
 add_color, 363
 add_vertex, 363
 clear, 363
 draw, 363
 find, 364
 first, 364
 Fl_File_Icon, 362
 Fl_File_Icon, 362
 label, 364
 labeltype, 364
 load, 364
 load_fti, 365
 load_image, 365
 load_system_icons, 365

next, 365
 pattern, 365
 size, 365
 type, 366
 value, 366
Fl_File_Input, 367
 down_box, 368
 errorcolor, 368
Fl_File_Input, 368
Fl_File_Input, 368
 handle, 368
 value, 369
Fl_Fill_Dial, 370
Fl_Fill_Dial, 370
Fl_Fill_Dial, 370
Fl_Fill_Slider, 371
Fl_Fill_Slider, 371
Fl_Fill_Slider, 371
Fl_Float_Input, 372
Fl_Float_Input, 372
Fl_Float_Input, 372
Fl_Font
 Enumerations.H, 685
Fl_Font_Descriptor, 373
Fl_Fontsize
 Enumerations.H, 685
Fl_FormsBitmap, 374
 bitmap, 374
 draw, 374
 set, 375
Fl_FormsPixmap, 376
 draw, 377
Fl_FormsPixmap, 376
Fl_FormsPixmap, 376
 Pixmap, 377
 set, 377
fl_frame
 fl_boxtyle.cxx, 696
 fl_draw.H, 709
fl_frame2
 fl_boxtyle.cxx, 697
 fl_draw.H, 710
Fl_Free, 378
 draw, 379
Fl_Free, 379
Fl_Free, 379
 handle, 379
fl_gap
 fl_draw.H, 710
 fl_vertex.cxx, 721
Fl_GIF_Image, 381
Fl_GIF_Image, 381
Fl_GIF_Image, 381
Fl_Gl_Window, 382
 can_do, 385
 can_do_overlay, 385
 context, 385
 context_valid, 385
 draw, 385
Fl_Gl_Window, 384
Fl_Gl_Window, 384
 flush, 386
 make_current, 386
 make_overlay_current, 386
 mode, 386
 ortho, 387
 redraw_overlay, 387
 resize, 387
 show, 387
 swap_buffers, 387
 valid, 387
Fl_Glut_Bitmap_Font, 389
Fl_Glut_Window, 390
 draw, 391
 draw_overlay, 391
Fl_Glut_Window, 391
Fl_Glut_Window, 391
 handle, 392
 make_current, 392
Fl_Group, 393
 ~Fl_Group, 396
 array, 396
 begin, 396
 child, 396
 clear, 396
 clip_children, 397
 current, 397
 draw, 397
 draw_child, 397
 draw_children, 397
 draw_outside_label, 397
 end, 398
 find, 398
Fl_Group, 396
Fl_Group, 396
 focus, 398
 handle, 398
 init_sizes, 398
 insert, 399
 remove, 399
 resizable, 399
 resize, 400
 sizes, 401
 update_child, 401
Fl_Help_Dialog, 402
Fl_Help_Dialog, 403
Fl_Help_Dialog, 403
 h, 403

hide, 403
load, 404
position, 404
resize, 404
show, 404
textsize, 404
value, 404
visible, 404
w, 405
x, 405
y, 405
Fl_Help_Link, 406
Fl_Help_Target, 407
Fl_Help_View, 408
 ~**Fl_Help_View**, 410
 clear_selection, 410
 directory, 410
 filename, 410
 leftline, 410
 link, 410
 load, 411
 resize, 411
 select_all, 411
 size, 411
 textcolor, 411
 textfont, 411
 textsize, 411, 412
 title, 412
 topline, 412
 value, 412
Fl_Hold_Browser, 413
 Fl_Hold_Browser, 413
 Fl_Hold_Browser, 413
Fl_Image, 414
 color_average, 416
 copy, 416
 count, 416
 d, 416, 417
 data, 417
 desaturate, 417
 draw, 417
 draw_empty, 417
Fl_Image, 416
 Fl_Image, 416
 h, 417
 inactive, 418
 label, 418
 ld, 418
 uncache, 418
 w, 418
Fl_Input, 419
 draw, 421
Fl_Input, 421
Fl_Input, 421
 handle, 421
fl_input
 group_comdlg, 247
Fl_Input_, 423
 copy, 426
 copy_cuts, 426
 cursor_color, 427
 cut, 427
 drawtext, 427
Fl_Input_, 426
Fl_Input_, 426
 index, 427
 input_type, 427
 insert, 427
 mark, 428
 maximum_size, 428
 position, 428
 readonly, 428
 replace, 428
 resize, 429
 shortcut, 429
 size, 429, 430
 static_value, 430
 textcolor, 430
 textfont, 430
 textsize, 430
 undo, 430
 up_down_position, 431
 value, 431
 wrap, 431
Fl_Input_Choice, 432
 add, 434
 changed, 434
 clear, 434
 clear_changed, 434
 Fl_Input_Choice, 434
 Fl_Input_Choice, 434
 input, 434
 menu, 434, 435
 menubutton, 435
 resize, 435
 set_changed, 435
 value, 435
Fl_Int_Input, 436
 Fl_Int_Input, 436
 Fl_Int_Input, 436
 fl_internal_boxtype
 fl_boxtype.cxx, 697
Fl_JPEG_Image, 437
 Fl_JPEG_Image, 437
 Fl_JPEG_Image, 437
Fl_Label, 438
 draw, 439
 measure, 439

type, 439
Fl_Labeltype
 Enumerations.H, 689
Fl_Light_Button, 440
 draw, 441
Fl_Light_Button, 441
Fl_Light_Button, 441
 handle, 441
FL_MAJOR_VERSION
 Enumerations.H, 684
Fl_Menu_, 443
 add, 446
 clear, 447
 copy, 447
 down_box, 447
 find_item, 447
Fl_Menu_, 446
Fl_Menu_, 446
 global, 447
 menu, 447
 mode, 447, 448
 mvalue, 448
 picked, 448
 remove, 448
 replace, 448
 shortcut, 448
 size, 448, 449
 test_shortcut, 449
 text, 449
 textcolor, 449
 textfont, 449
 textsize, 449
 value, 450
Fl_Menu_Bar, 451
 draw, 452
Fl_Menu_Bar, 452
Fl_Menu_Bar, 452
 handle, 452
Fl_Menu_Button, 454
 draw, 455
Fl_Menu_Button, 455
Fl_Menu_Button, 455
 handle, 455
 popup, 456
Fl_Menu_Item, 457
 activate, 462
 active, 462
 activevisible, 463
 add, 463
 argument, 463
 callback, 463
 check, 463
 checkbox, 463
 checked, 463
 clear, 464
 deactivate, 464
 do_callback, 464
 draw, 464
 find_shortcut, 464
 first, 464, 465
 hide, 465
 label, 465
 labelcolor, 465
 labelfont, 465
 labelsize, 465
 labeltype, 465, 466
 measure, 466
 next, 466
 popup, 466
 pulldown, 466
 radio, 467
 set, 467
 setonly, 467
 shortcut, 467
 show, 467
 submenu, 467
 test_shortcut, 468
 uncheck, 468
 value, 468
 visible, 468
Fl_Menu_Window, 469
 ~Fl_Menu_Window, 470
 clear_overlay, 470
Fl_Menu_Window, 470
Fl_Menu_Window, 470
 flush, 470
 hide, 470
 set_overlay, 470
 show, 470
fl_message
 group_comdlg, 247
FL_MINOR_VERSION
 Enumerations.H, 684
fl_mult_matrix
 fl_draw.H, 710
 fl_vertex.cxx, 721
Fl_Multi_Browser, 472
 Fl_Multi_Browser, 472
 Fl_Multi_Browser, 472
Fl_Multiline_Input, 473
 Fl_Multiline_Input, 473
 Fl_Multiline_Input, 473
Fl_Multiline_Output, 474
 Fl_Multiline_Output, 474
 Fl_Multiline_Output, 474
fl_multithread
 awake, 236
 lock, 236

thread_message, 237
unlock, 237
fl_not_clipped
 fl_draw.H, 710
 fl_rect.cxx, 716
Fl_Output, 475
 Fl_Output, 476
 Fl_Output, 476
Fl_Overlay_Window, 477
 Fl_Overlay_Window, 478
 Fl_Overlay_Window, 478
 hide, 478
 redraw_overlay, 478
 resize, 478
 show, 479
Fl_Pack, 480
 draw, 481
 Fl_Pack, 481
 Fl_Pack, 481
fl_password
 group_comdlg, 247
FL_PATCH_VERSION
 Enumerations.H, 684
fl_pie
 fl_arci.cxx, 693
 fl_draw.H, 711
Fl_Pixmap, 482
 color_average, 484
 copy, 484
 desaturate, 484
 draw, 484
 Fl_Pixmap, 483
 Fl_Pixmap, 483
 label, 484, 485
 uncache, 485
Fl_PNG_Image, 486
 Fl_PNG_Image, 486
 Fl_PNG_Image, 486
Fl_PNM_Image, 487
 Fl_PNM_Image, 487
 Fl_PNM_Image, 487
fl_polygon
 fl_draw.H, 711
 fl_rect.cxx, 716, 717
fl_pop_clip
 fl_draw.H, 711
 fl_rect.cxx, 717
Fl_Positioner, 488
 draw, 490
 Fl_Positioner, 490
 Fl_Positioner, 490
 handle, 490
 value, 490
 xbounds, 490
 xstep, 491
 xvalue, 491
 ybounds, 491
 ystep, 491
 yvalue, 491
Fl_Preferences, 492
 ~Fl_Preferences, 496
 deleteEntry, 496
 deleteGroup, 497
 entries, 497
 entry, 497
 entryExists, 497
 Fl_Preferences, 495, 496
 Fl_Preferences, 495, 496
 flush, 498
 get, 498–500
 getUserdataPath, 501
 group, 501
 groupExists, 501
 groups, 502
 Root, 494
 set, 502–504
 size, 504
Fl_Preferences::Entry, 505
Fl_Preferences::Name, 506
 Name, 506
Fl_Progress, 508
 draw, 509
 Fl_Progress, 509
 Fl_Progress, 509
 maximum, 509
 minimum, 509
 value, 509
fl_push_clip
 fl_draw.H, 711
 fl_rect.cxx, 717
fl_push_matrix
 fl_draw.H, 711
 fl_vertex.cxx, 722
fl_rect.cxx, 714
 fl_clip_box, 716
 fl_clip_region, 716
 fl_not_clipped, 716
 fl_polygon, 716, 717
 fl_pop_clip, 717
 fl_push_clip, 717
Fl_Repeat_Button, 510
 deactivate, 510
 Fl_Repeat_Button, 510
 Fl_Repeat_Button, 510
 handle, 511
Fl_Return_Button, 512
 draw, 513
 Fl_Return_Button, 513

Fl_Return_Button, 513
 handle, 513
Fl_RGB_Image, 515
 ~Fl_RGB_Image, 516
 color_average, 516
 copy, 516
 desaturate, 517
 draw, 517
 Fl_RGB_Image, 516
 Fl_RGB_Image, 516
 label, 517
 uncache, 517
Fl_Roller, 519
 draw, 520
 Fl_Roller, 520
 Fl_Roller, 520
 handle, 520
fl_rotate
 fl_draw.H, 711
 fl_vertex.cxx, 722
Fl_Round_Button, 521
Fl_Round_Clock, 523
 Fl_Round_Clock, 523
 Fl_Round_Clock, 523
fl_scale
 fl_draw.H, 712
 fl_vertex.cxx, 722
fl_screen
 h, 231
 screen_xywh, 231, 232
 w, 232
 x, 232
 y, 232
Fl_Scroll, 524
 clear, 526
 draw, 526
 Fl_Scroll, 526
 Fl_Scroll, 526
 handle, 526
 resize, 527
 scroll_to, 527
 xposition, 527
 yposition, 527
Fl_Scrollbar, 528
 ~Fl_Scrollbar, 529
 draw, 529
Fl_Scrollbar, 529
 Fl_Scrollbar, 529
 handle, 529
 linesize, 530
 value, 530
Fl_Secret_Input, 531
 Fl_Secret_Input, 531
 Fl_Secret_Input, 531
Fl_Select_Browser, 532
 Fl_Select_Browser, 532
 Fl_Select_Browser, 532
Fl_Shared_Image, 533
 ~Fl_Shared_Image, 535
 color_average, 535
 copy, 535, 536
 desaturate, 536
 draw, 536
 Fl_Shared_Image, 535
 Fl_Shared_Image, 535
 get, 536
 num_images, 536
 refcount, 537
 release, 537
 uncache, 537
Fl_Simple_Counter, 538
Fl_Single_Window, 539
 flush, 540
 make_current, 540
 show, 540
Fl_Slider, 541
 bounds, 543
 draw, 543
 Fl_Slider, 542
 Fl_Slider, 542
 handle, 543
 scrollvalue, 543
 slider, 543, 544
 slider_size, 544
Fl_Spinner, 545
 Fl_Spinner, 547
 Fl_Spinner, 547
 format, 547
 handle, 547
 maximum, 547
 maxinum, 547
 minimum, 548
 mininum, 548
 range, 548
 resize, 548
 step, 548
 textcolor, 548, 549
 textfont, 549
 textsize, 549
 type, 549
 value, 549
Fl_String
 fl_types.h, 718
Fl_Tabs, 550
 draw, 552
 Fl_Tabs, 551
 Fl_Tabs, 551
 handle, 552

value, 552
Fl_Text_Buffer, 554
add_modify_callback, 562
add_pdelete_callback, 562
append, 562
appendfile, 562
character, 562
character_width, 562
clear_rectangular, 562
count_displayed_characters, 563
count_lines, 563
expand_character, 563
findchar_backward, 563
findchar_forward, 563
findchars_backward, 564
findchars_forward, 564
Fl_Text_Buffer, 562
Fl_Text_Buffer, 562
highlight, 564
highlight_position, 564
highlight_selection, 564
highlight_text, 564
insert, 564
insert_, 565
insert_column, 565
insert_column_, 565
insertfile, 565
length, 565
line_start, 565
line_text, 565
mNodifyProcs, 570
mNullSubsChar, 570
mPredeleteProcs, 570
mTabDist, 570
null_substitution_character, 565
outputfile, 566
overlay_rectangular, 566
overlay_rectangular_, 566
primary_selection, 566
rectangular_selection_boundaries, 566
remove, 566
remove_, 566
remove_modify_callback, 567
remove_pdelete_callback, 567
remove_rectangular_, 567
remove_secondary_selection, 567
remove_selection, 567
remove_selection_, 567
replace_rectangular, 567
replace_secondary_selection, 567
replace_selection, 567
replace_selection_, 568
rewind_lines, 568
secondary_select, 568
secondary_selection, 568
secondary_selection_position, 568
secondary_selection_text, 568
secondary_unselect, 568
select, 568
selection_text, 568
substitute_null_characters, 569
tab_distance, 569
text, 569
text_in_rectangle, 569
text_range, 569
unhighlight, 569
unsubstitute_null_characters, 569
word_end, 569
Fl_Text_Display, 571
~Fl_Text_Display, 578
buffer, 578
calc_line_starts, 578
count_lines, 578
cursor_color, 578, 579
cursor_style, 579
display_insert, 579
draw, 579
draw_line_numbers, 579
draw_range, 579
draw_string, 580
draw_text, 580
find_line_end, 580
find_wrap_range, 580
Fl_Text_Display, 578
Fl_Text_Display, 578
get_absolute_top_line_number, 580
handle, 580
highlight_data, 581
insert, 581
line_end, 581
maintain_absolute_top_line_number, 582
measure_deleted_lines, 582
measure_proportional_character, 582
move_down, 582
move_left, 582
move_right, 582
move_up, 582
next_word, 583
offset_line_starts, 583
overstrike, 583
position_style, 583
position_to_line, 583
position_to_linecol, 583
position_to_xy, 583
previous_word, 584
redisplay_range, 584
reset_absolute_top_line_number, 584
scroll, 584

scrollbar_width, 584
 shortcut, 584
 show_insert_position, 584
 skip_lines, 585
 textcolor, 585
 textfont, 585
 textsize, 585
 word_end, 585
 word_start, 585
 wrap_mode, 585
 wrap_uses_character, 585
 wrapped_column, 586
 wrapped_line_counter, 586
 wrapped_row, 586
 xy_to_position, 586
 xy_to_rowcol, 587
Fl_Text_Display::Style_Table_Entry, 588
Fl_Text_Editor, 589
 add_default_key_bindings, 592
 bound_key_function, 592
 default_key_function, 592
Fl_Text_Editor, 592
Fl_Text_Editor, 592
 handle, 592
 insert_mode, 593
 kf_backspace, 593
 kf_c_s_move, 593
 kf_copy, 593
 kf_cut, 593
 kf_delete, 593
 kf_down, 593
 kf_end, 594
 kf_home, 594
 kf_insert, 594
 kf_left, 594
 kf_move, 594
 kf_page_down, 594
 kf_page_up, 594
 kf_paste, 594
 kf_right, 594
 kf_select_all, 594
 kf_shift_move, 594
 kf_undo, 595
 kf_up, 595
 remove_all_key_bindings, 595
 remove_key_binding, 595
Fl_Text_Editor::Key_Binding, 596
Fl_Text_Selection, 597
Fl_Tile, 599
 Fl_Tile, 600
 Fl_Tile, 600
 handle, 600
 position, 601
 resize, 601
Fl_Tiled_Image, 602
 color_average, 603
 copy, 603
 desaturate, 603
 draw, 603, 604
Fl_Tiled_Image, 603
Fl_Tiled_Image, 603
Fl_Timer, 605
 direction, 606
 draw, 606
Fl_Timer, 606
Fl_Timer, 606
 handle, 606
 suspended, 607
Fl_Toggle_Button, 608
Fl_Toggle_Button, 608
Fl_Toggle_Button, 608
Fl_Tooltip, 609
 color, 610
 current, 610
 delay, 610, 611
 disable, 611
 enable, 611
 enabled, 611
 enter_area, 611
 font, 611
 hoverdelay, 611
 size, 612
 textcolor, 612
fl_transform_dx
 fl_draw.H, 712
 fl_vertex.cxx, 722
fl_transform_dy
 fl_draw.H, 712
 fl_vertex.cxx, 722
fl_transform_x
 fl_draw.H, 712
 fl_vertex.cxx, 723
fl_transform_y
 fl_draw.H, 712
 fl_vertex.cxx, 723
fl_transformed_vertex
 fl_draw.H, 713
 fl_vertex.cxx, 723
fl_translate
 fl_draw.H, 713
 fl_vertex.cxx, 723
fl_types.h, 718
 Fl_CString, 718
 Fl_String, 718
Fl_Valuator, 613
 bounds, 615
 clamp, 615
Fl_Valuator, 615

Fl_Valuator, 615
format, 616
handle_drag, 616
handle_release, 616
increment, 616
maximum, 616
minimum, 616
precision, 616
range, 617
round, 617
set_value, 617
step, 617
value, 617

Fl_Value_Input, 619
cursor_color, 621
draw, 621
Fl_Value_Input, 621
Fl_Value_Input, 621
handle, 622
resize, 622
shortcut, 623
soft, 623
textcolor, 623
textfont, 623
textsize, 623

Fl_Value_Output, 625
draw, 626
Fl_Value_Output, 626
Fl_Value_Output, 626
handle, 627
soft, 627
textcolor, 627
textfont, 627, 628
textsize, 628

Fl_Value_Slider, 629
draw, 630
Fl_Value_Slider, 630
Fl_Value_Slider, 630
handle, 630
textcolor, 631
textfont, 631
textsize, 631

FL_VERSION
 Enumerations.H, 684

fl_vertex
 fl_draw.H, 713
 fl_vertex.cxx, 723

fl_vertex.cxx, 719
 fl_begin_complex_polygon, 721
 fl_begin_points, 721
 fl_circle, 721
 fl_gap, 721
 fl_mult_matrix, 721
 fl_push_matrix, 722

fl_rotate, 722
fl_scale, 722
fl_transform_dx, 722
fl_transform_dy, 722
fl_transform_x, 723
fl_transform_y, 723
fl_transformed_vertex, 723
fl_translate, 723
fl_vertex, 723

Fl_When
 Enumerations.H, 690

Fl_Widget, 632
 ~Fl_Widget, 640
 activate, 641
 active, 641
 active_r, 641
 align, 641, 642
 argument, 642
 box, 642
 callback, 643
 changed, 644
 clear_changed, 644
 clear_damage, 644
 clear_output, 644
 clear_visible, 645
 clear_visible_focus, 645
 color, 645
 color2, 646
 contains, 646
 copy_label, 646
 damage, 646, 647
 damage_resize, 647
 deactivate, 647
 default_callback, 648
 deimage, 648
 do_callback, 649
 draw, 649
 draw_box, 650
 draw_focus, 650
 Fl_Widget, 640
 Fl_Widget, 640
 h, 650
 handle, 650
 hide, 651
 image, 651
 inside, 651
 label, 652
 label_shortcut, 652
 labelcolor, 653
 labelfont, 653
 labelsize, 653, 654
 labeltype, 654
 measure_label, 654
 output, 654

parent, 655
 position, 655
 redraw, 655
 redraw_label, 655
 resize, 656
 selection_color, 656
 set_changed, 657
 set_output, 657
 set_visible, 657
 set_visible_focus, 657
 show, 657
 size, 658
 take_focus, 658
 takesevents, 658
 test_shortcut, 658
 tooltip, 658, 659
 type, 659
 user_data, 659
 visible, 660
 visible_focus, 660
 visible_r, 660
 w, 660, 661
 when, 661
 window, 661
 x, 662
 y, 662
Fl_Window, 663
 ~Fl_Window, 667
 border, 667
 clear_border, 667
 copy_label, 667
 current, 668
 current_, 672
 cursor, 668
 default_cursor, 668
 draw, 668
Fl_Window, 666, 667
Fl_Window, 666, 667
 flush, 668
 fullscreen, 668
 handle, 669
 hide, 669
 hotspot, 669
 iconize, 669
 iconlabel, 670
 label, 670
 make_current, 670
 modal, 670
 non_modal, 670
 override, 670
 resize, 670
 set_modal, 671
 set_non_modal, 671
 show, 671
 shown, 671
 size_range, 671
 xclass, 672
fl_windows
 atclose, 217
 default_atclose, 216
 first_window, 216
 grab, 216
 modal, 216
 next_window, 217
 set_atclose, 217
Fl_Wizard, 674
 Fl_Wizard, 674
 Fl_Wizard, 674
 next, 675
 prev, 675
 value, 675
Fl_XBM_Image, 676
 Fl_XBM_Image, 676
 Fl_XBM_Image, 676
Fl_XPM_Image, 677
 Fl_XPM_Image, 677
 Fl_XPM_Image, 677
flush
 Fl, 264
 Fl_Double_Window, 346
 Fl_Gl_Window, 386
 Fl_Menu_Window, 470
 Fl_Preferences, 498
 Fl_Single_Window, 540
 Fl_Window, 668
focus
 fl_events, 226
 Fl_Group, 398
font
 Fl_Tooltip, 611
foreground
 Fl, 264
format
 Fl_Spinner, 547
 Fl_Valuator, 616
format_char
 Fl_Browser, 285, 286
free_color
 fl_attributes, 234
full_height
 Fl_Browser, 286
 Fl_Browser_, 296
full_width
 Fl_Browser_, 297
fullscreen
 Fl_Window, 668
g

Fl_Color_Chooser, 335
get
 Fl_Preferences, 498–500
 Fl_Shared_Image, 536
get_absolute_top_line_number
 Fl_Text_Display, 580
get_awake_handler
 Fl, 264
get_boxtype
 Fl, 265
get_color
 fl_attributes, 234
get_font
 fl_attributes, 234
get_font_name
 fl_attributes, 234
get_font_sizes
 fl_attributes, 234
get_key
 fl_events, 226
get_mouse
 fl_events, 226
get_system_colors
 Fl, 265
getUserdataPath
 Fl_Preferences, 501
gl_visual
 Fl, 265
global
 Fl_Menu_, 447
grab
 fl_windows, 216
group
 Fl_Preferences, 501
group_cairo
 cairo_autolink_context, 240
 cairo_cc, 241
 cairo_make_current, 241
group_comdlg
 error, 247
 fatal, 247
 fl_alert, 243
 fl_ask, 243
 fl_choice, 243
 fl_color_chooser, 244
 fl_dir_chooser, 245
 fl_file_chooser, 245
 fl_file_chooser_callback, 246
 fl_file_chooser_ok_label, 246, 247
 fl_input, 247
 fl_message, 247
 fl_password, 247
 warning, 248
groupExists
 Fl_Preferences, 501
groups
 Fl_Preferences, 502
h
 Fl_Help_Dialog, 403
 Fl_Image, 417
 fl_screen, 231
 Fl_Widget, 650
handle
 Fl_Adjuster, 272
 Fl_Box, 279
 Fl_Browser_, 297
 Fl_Button, 303
 Fl_Check_Browser, 318
 Fl_Choice, 324
 Fl_Clock, 328
 Fl_Counter, 340
 Fl_Dial, 344
 fl_events, 227
 Fl_File_Input, 368
 Fl_Free, 379
 Fl_Glut_Window, 392
 Fl_Group, 398
 Fl_Input, 421
 Fl_Light_Button, 441
 Fl_Menu_Bar, 452
 Fl_Menu_Button, 455
 Fl_Positioner, 490
 Fl_Repeat_Button, 511
 Fl_Return_Button, 513
 Fl_Roller, 520
 Fl_Scroll, 526
 Fl_Scrollbar, 529
 Fl_Slider, 543
 Fl_Spinner, 547
 Fl_Tabs, 552
 Fl_Text_Display, 580
 Fl_Text_Editor, 592
 Fl_Tile, 600
 Fl_Timer, 606
 Fl_Value_Input, 622
 Fl_Value_Output, 627
 Fl_Value_Slider, 630
 Fl_Widget, 650
 Fl_Window, 669
handle_drag
 Fl_Valuator, 616
handle_release
 Fl_Valuator, 616
has_scrollbar
 Fl_Browser_, 297
help
 Fl, 269

hide
 Fl_Browser, 286, 287
 Fl_Double_Window, 346
 Fl_File_Chooser, 358
 Fl_Help_Dialog, 403
 Fl_Menu_Item, 465
 Fl_Menu_Window, 470
 Fl_Overlay_Window, 478
 Fl_Widget, 651
 Fl_Window, 669

highlight
 Fl_Text_Buffer, 564

highlight_data
 Fl_Text_Display, 581

highlight_position
 Fl_Text_Buffer, 564

highlight_selection
 Fl_Text_Buffer, 564

highlight_text
 Fl_Text_Buffer, 564

hotspot
 Fl_Window, 669

hour
 Fl_Clock_Output, 331

hoverdelay
 Fl_Tooltip, 611

hsv
 Fl_Color_Chooser, 335

hsv2rgb
 Fl_Color_Chooser, 335

hue
 Fl_Color_Chooser, 336

iconize
 Fl_Window, 669

iconlabel
 Fl_Window, 670

iconsize
 Fl_File_Browser, 350
 Fl_File_Chooser, 358

idle
 Fl, 269

image
 Fl_Widget, 651

INACTIVE
 Fl_Widget, 640

inactive
 Fl_Image, 418

incr_height
 Fl_Browser, 287
 Fl_Browser_, 297

increment
 Fl_Valuator, 616

index
 Fl_Input_, 427
 init_sizes
 Fl_Group, 398
 input
 Fl_Input_Choice, 434
 input_type
 Fl_Input_, 427
 insert
 Fl_Browser, 287
 Fl_Chart, 312
 Fl_Group, 399
 Fl_Input_, 427
 Fl_Text_Buffer, 564
 Fl_Text_Display, 581
 insert_
 Fl_Text_Buffer, 565
 insert_column
 Fl_Text_Buffer, 565
 insert_column_
 Fl_Text_Buffer, 565
 insert_mode
 Fl_Text_Editor, 593
 insertfile
 Fl_Text_Buffer, 565
 inserting
 Fl_Browser_, 297
 inside
 Fl_Widget, 651
 INVISIBLE
 Fl_Widget, 640
 item_first
 Fl_Browser, 287
 Fl_Browser_, 297
 item_height
 Fl_Browser_, 298
 item_next
 Fl_Browser, 287
 Fl_Browser_, 298
 item_prev
 Fl_Browser, 287
 Fl_Browser_, 298
 item_quick_height
 Fl_Browser_, 298
 item_select
 Fl_Browser, 288
 Fl_Browser_, 298
 item_selected
 Fl_Browser, 288
 Fl_Browser_, 298
 item_width
 Fl_Browser, 288
 Fl_Browser_, 298
 kf_backspace

Fl_Text_Editor, 593
kf_c_s_move
 Fl_Text_Editor, 593
kf_copy
 Fl_Text_Editor, 593
kf_cut
 Fl_Text_Editor, 593
kf_delete
 Fl_Text_Editor, 593
kf_down
 Fl_Text_Editor, 593
kf_end
 Fl_Text_Editor, 594
kf_home
 Fl_Text_Editor, 594
kf_insert
 Fl_Text_Editor, 594
kf_left
 Fl_Text_Editor, 594
kf_move
 Fl_Text_Editor, 594
kf_page_down
 Fl_Text_Editor, 594
kf_page_up
 Fl_Text_Editor, 594
kf_paste
 Fl_Text_Editor, 594
kf_right
 Fl_Text_Editor, 594
kf_select_all
 Fl_Text_Editor, 594
kf_shift_move
 Fl_Text_Editor, 594
kf_undo
 Fl_Text_Editor, 595
kf_up
 Fl_Text_Editor, 595

label
 Fl_Bitmap, 276
 Fl_File_Chooser, 359
 Fl_File_Icon, 364
 Fl_Image, 418
 Fl_Menu_Item, 465
 Fl_Pixmap, 484, 485
 Fl_RGB_Image, 517
 Fl_Widget, 652
 Fl_Window, 670
label_shortcut
 Fl_Widget, 652
labelcolor
 Fl_Menu_Item, 465
 Fl_Widget, 653
labelfont

Fl_Menu_Item, 465
Fl_Widget, 653
labelsize
 Fl_Menu_Item, 465
 Fl_Widget, 653, 654
labeltype
 Fl_File_Icon, 364
 Fl_Menu_Item, 465, 466
 Fl_Widget, 654
ld
 Fl_Image, 418
leftline
 Fl_Help_View, 410
length
 Fl_Text_Buffer, 565
line_end
 Fl_Text_Display, 581
line_start
 Fl_Text_Buffer, 565
line_text
 Fl_Text_Buffer, 565
lineposition
 Fl_Browser, 288
linesize
 Fl_Scrollbar, 530
link
 Fl_Help_View, 410
load
 Fl_Browser, 288
 Fl_File_Browser, 351
 Fl_File_Icon, 364
 Fl_Help_Dialog, 404
 Fl_Help_View, 411
load_fti
 Fl_File_Icon, 365
load_image
 Fl_File_Icon, 365
load_system_icons
 Fl_File_Icon, 365
lock
 fl_multithread, 236
lstep
 Fl_Counter, 340

maintain_absolute_top_line_number
 Fl_Text_Display, 582
make_current
 Fl_Gl_Window, 386
 Fl_Glut_Window, 392
 Fl_Single_Window, 540
 Fl_Window, 670
make_overlay_current
 Fl_Gl_Window, 386
make_visible

Fl_Browser, 288
mark
 Fl_Input_, 428
maximum
 Fl_Progress, 509
 Fl_Spinner, 547
 Fl_Valuator, 616
maximum_size
 Fl_Input_, 428
maximun
 Fl_Spinner, 547
maxsize
 Fl_Chart, 312
measure
 Fl_Label, 439
 Fl_Menu_Item, 466
measure_deleted_lines
 Fl_Text_Display, 582
measure_label
 Fl_Widget, 654
measure_proportional_character
 Fl_Text_Display, 582
menu
 Fl_Input_Choice, 434, 435
 Fl_Menu_, 447
menubutton
 Fl_Input_Choice, 435
middleline
 Fl_Browser, 288
minimum
 Fl_Progress, 509
 Fl_Spinner, 548
 Fl_Valuator, 616
mininum
 Fl_Spinner, 548
minute
 Fl_Clock_Output, 331
mNodifyProcs
 Fl_Text_Buffer, 570
mNullSubsChar
 Fl_Text_Buffer, 570
modal
 Fl_Window, 670
 fl_windows, 216
mode
 Fl_Gl_Window, 386
 Fl_Menu_, 447, 448
move_down
 Fl_Text_Display, 582
move_left
 Fl_Text_Display, 582
move_right
 Fl_Text_Display, 582
move_up
 Fl_Text_Display, 582
Fl_Text_Display, 582
mPredeleteProcs
 Fl_Text_Buffer, 570
mTabDist
 Fl_Text_Buffer, 570
Multithreading support functions, 236
mvalue
 Fl_Menu_, 448
Name
 Fl_Preferences::Name, 506
nchecked
 Fl_Check_Browser, 318
new_list
 Fl_Browser_, 299
next
 Fl_File_Icon, 365
 Fl_Menu_Item, 466
 Fl_Wizard, 675
next_window
 fl_windows, 217
next_word
 Fl_Text_Display, 583
items
 Fl_Check_Browser, 318
non_modal
 Fl_Window, 670
null_substitution_character
 Fl_Text_Buffer, 565
num_images
 Fl_Shared_Image, 536
offset_line_starts
 Fl_Text_Display, 583
ortho
 Fl_Gl_Window, 387
OUTPUT
 Fl_Widget, 640
output
 Fl_Widget, 654
outputfile
 Fl_Text_Buffer, 566
overlay_rectangular
 Fl_Text_Buffer, 566
overlay_rectangular_
 Fl_Text_Buffer, 566
override
 Fl_Window, 670
overstrike
 Fl_Text_Display, 583
own_colormap
 Fl, 265
parent

Fl_Widget, 655
paste
 fl_clipboard, 229
pattern
 Fl_File_Icon, 365
picked
 Fl_Menu_, 448
Pixmap
 Fl_FormsPixmap, 377
popup
 Fl_Menu_Button, 456
 Fl_Menu_Item, 466
position
 Fl_Help_Dialog, 404
 Fl_Input_, 428
 Fl_Tile, 601
 Fl_Widget, 655
position_style
 Fl_Text_Display, 583
position_to_line
 Fl_Text_Display, 583
position_to_linecol
 Fl_Text_Display, 583
position_to_xy
 Fl_Text_Display, 583
precision
 Fl_Valuator, 616
prev
 Fl_Wizard, 675
preview
 Fl_File_Chooser, 359
previous_word
 Fl_Text_Display, 584
primary_selection
 Fl_Text_Buffer, 566
pulldown
 Fl_Menu_Item, 466
pushed
 fl_events, 227

r
 Fl_Color_Chooser, 336
radio
 Fl_Menu_Item, 467
range
 Fl_Spinner, 548
 Fl_Valuator, 617
readonly
 Fl_Input_, 428
ready
 Fl, 265
rectangular_selection_boundaries
 Fl_Text_Buffer, 566
redisplay_range

Fl_Text_Display, 584
redraw
 Fl_Widget, 655
redraw_label
 Fl_Widget, 655
redraw_lines
 Fl_Browser_, 299
redraw_overlay
 Fl_Gl_Window, 387
 Fl_Overlay_Window, 478
refcount
 Fl_Shared_Image, 537
release
 Fl, 265
 Fl_Shared_Image, 537
reload_scheme
 Fl, 266
remove
 Fl_Check_Browser, 318
 Fl_Group, 399
 Fl_Menu_, 448
 Fl_Text_Buffer, 566
remove_
 Fl_Text_Buffer, 566
remove_all_key_bindings
 Fl_Text_Editor, 595
remove_check
 Fl, 266
remove_fd
 Fl, 266
remove_key_binding
 Fl_Text_Editor, 595
remove_modify_callback
 Fl_Text_Buffer, 567
remove_predelete_callback
 Fl_Text_Buffer, 567
remove_rectangular_
 Fl_Text_Buffer, 567
remove_secondary_selection
 Fl_Text_Buffer, 567
remove_selection
 Fl_Text_Buffer, 567
remove_selection_
 Fl_Text_Buffer, 567
remove_timeout
 Fl, 266
repeat_timeout
 Fl, 266
replace
 Fl_Browser, 289
 Fl_Chart, 313
 Fl_Input_, 428
 Fl_Menu_, 448
replace_rectangular

Fl_Text_Buffer, 567
 replace_secondary_selection
 Fl_Text_Buffer, 567
 replace_selection
 Fl_Text_Buffer, 567
 replace_selection_
 Fl_Text_Buffer, 568
 replacing
 Fl_Browser_, 299
 rescan
 Fl_File_Chooser, 359
 reset_absolute_top_line_number
 Fl_Text_Display, 584
 resizable
 Fl_Group, 399
 resize
 Fl_Browser_, 299
 Fl_Double_Window, 347
 Fl_Gl_Window, 387
 Fl_Group, 400
 Fl_Help_Dialog, 404
 Fl_Help_View, 411
 Fl_Input_, 429
 Fl_Input_Choice, 435
 Fl_Overlay_Window, 478
 Fl_Scroll, 527
 Fl_Spinner, 548
 Fl_Tile, 601
 Fl_Value_Input, 622
 Fl_Widget, 656
 Fl_Window, 670
 rewind_lines
 Fl_Text_Buffer, 568
 rgb
 Fl_Color_Chooser, 336
 rgb2hsv
 Fl_Color_Chooser, 336
 Root
 Fl_Preferences, 494
 round
 Fl_Valuator, 617
 run
 Fl, 266

 Safe widget deletion support functions, 238
 saturation
 Fl_Color_Chooser, 336
 scheme
 Fl, 267
 Screen functions, 231
 screen_xywh
 fl_screen, 231, 232
 scroll
 Fl_Text_Display, 584

 scroll_to
 Fl_Scroll, 527
 scrollbar
 Fl_Browser_, 300
 scrollbar_left
 Fl_Browser_, 299
 scrollbar_right
 Fl_Browser_, 299
 scrollbar_width
 Fl_Text_Display, 584
 scrollvalue
 Fl_Slider, 543
 second
 Fl_Clock_Output, 331
 secondary_select
 Fl_Text_Buffer, 568
 secondary_selection
 Fl_Text_Buffer, 568
 secondary_selection_position
 Fl_Text_Buffer, 568
 secondary_selection_text
 Fl_Text_Buffer, 568
 secondary_unselect
 Fl_Text_Buffer, 568
 select
 Fl_Browser, 289
 Fl_Browser_, 299
 Fl_Text_Buffer, 568
 select_all
 Fl_Help_View, 411
 select_only
 Fl_Browser_, 299
 selected
 Fl_Browser, 289
 selection
 Fl_Browser_, 299
 fl_clipboard, 229
 Selection & Clipboard functions, 228
 selection_color
 Fl_Widget, 656
 selection_owner
 fl_clipboard, 229
 selection_text
 Fl_Text_Buffer, 568
 set
 Fl_Button, 304
 Fl_FormsBitmap, 375
 Fl_FormsPixmap, 377
 Fl_Menu_Item, 467
 Fl_Preferences, 502–504
 set_atclose
 fl_windows, 217
 set_boxtype
 Fl, 267

set_changed
 Fl_Input_Choice, 435
 Fl_Widget, 657
set_checked
 Fl_Check_Browser, 319
set_color
 fl_attributes, 234
set_font
 fl_attributes, 235
set_fonts
 fl_attributes, 235
set_idle
 Fl, 267
set_labeltype
 Fl, 267
set_modal
 Fl_Window, 671
set_non_modal
 Fl_Window, 671
set_output
 Fl_Widget, 657
set_overlay
 Fl_Menu_Window, 470
set_value
 Fl_Valuator, 617
set_visible
 Fl_Widget, 657
set_visible_focus
 Fl_Widget, 657
setonly
 Fl_Menu_Item, 467
shortcut
 Fl_Button, 304
 Fl_Input_, 429
 Fl_Menu_, 448
 Fl_Menu_Item, 467
 Fl_Text_Display, 584
 Fl_Value_Input, 623
SHORTCUT_LABEL
 Fl_Widget, 640
show
 Fl_Browser, 289
 Fl_Double_Window, 347
 Fl_File_Chooser, 359
 Fl_Gl_Window, 387
 Fl_Help_Dialog, 404
 Fl_Menu_Item, 467
 Fl_Menu_Window, 470
 Fl_Overlay_Window, 479
 Fl_Single_Window, 540
 Fl_Widget, 657
 Fl_Window, 671
show_insert_position
 Fl_Text_Display, 584
shown
 Fl_Window, 671
size
 Fl_Browser, 289, 290
 Fl_Chart, 313
 Fl_File_Icon, 365
 Fl_Help_View, 411
 Fl_Input_, 429, 430
 Fl_Menu_, 448, 449
 Fl_Preferences, 504
 Fl_Tooltip, 612
 Fl_Widget, 658
size_range
 Fl_Window, 671
sizes
 Fl_Group, 401
skip_lines
 Fl_Text_Display, 585
slider
 Fl_Slider, 543, 544
slider_size
 Fl_Slider, 544
soft
 Fl_Adjuster, 273
 Fl_Value_Input, 623
 Fl_Value_Output, 627
static_value
 Fl_Input_, 430
step
 Fl_Counter, 341
 Fl_Spinner, 548
 Fl_Valuator, 617
str
 FL_CHART_ENTRY, 315
submenu
 Fl_Menu_Item, 467
substitute_null_characters
 Fl_Text_Buffer, 569
suspended
 Fl_Timer, 607
swap
 Fl_Browser, 290
swap_buffers
 Fl_Gl_Window, 387
SYSTEM
 Fl_Preferences, 495
tab_distance
 Fl_Text_Buffer, 569
take_focus
 Fl_Widget, 658
takesevents
 Fl_Widget, 658
test_shortcut

fl_events, 227
 Fl_Menu_, 449
 Fl_Menu_Item, 468
 Fl_Widget, 658
 text
 Fl_Browser, 290
 Fl_Check_Browser, 319
 Fl_Menu_, 449
 Fl_Text_Buffer, 569
 text_in_rectangle
 Fl_Text_Buffer, 569
 text_range
 Fl_Text_Buffer, 569
 textcolor
 Fl_Chart, 313
 Fl_File_Chooser, 359
 Fl_Help_View, 411
 Fl_Input_, 430
 Fl_Menu_, 449
 Fl_Spinner, 548, 549
 Fl_Text_Display, 585
 Fl_Tooltip, 612
 Fl_Value_Input, 623
 Fl_Value_Output, 627
 Fl_Value_Slider, 631
 textfont
 Fl_Chart, 313
 Fl_File_Chooser, 359
 Fl_Help_View, 411
 Fl_Input_, 430
 Fl_Menu_, 449
 Fl_Spinner, 549
 Fl_Text_Display, 585
 Fl_Value_Input, 623
 Fl_Value_Output, 627, 628
 Fl_Value_Slider, 631
 textszie
 Fl_Chart, 313
 Fl_File_Chooser, 359, 360
 Fl_Help_Dialog, 404
 Fl_Help_View, 411, 412
 Fl_Input_, 430
 Fl_Menu_, 449
 Fl_Spinner, 549
 Fl_Text_Display, 585
 Fl_Value_Input, 623
 Fl_Value_Output, 628
 Fl_Value_Slider, 631
 thread_message
 fl_multithread, 237
 title
 Fl_Help_View, 412
 tooltip
 Fl_Widget, 658, 659
 top
 Fl_Browser_, 300
 topline
 Fl_Browser, 290
 Fl_Help_View, 412
 type
 Fl_File_Chooser, 360
 Fl_File_Icon, 366
 Fl_Label, 439
 Fl_Spinner, 549
 Fl_Widget, 659
 uncache
 Fl_Bitmap, 276
 Fl_Image, 418
 Fl_Pixmap, 485
 Fl_RGB_Image, 517
 Fl_Shared_Image, 537
 uncheck
 Fl_Menu_Item, 468
 undo
 Fl_Input_, 430
 unhighlight
 Fl_Text_Buffer, 569
 unlock
 fl_multithread, 237
 unsubstitute_null_characters
 Fl_Text_Buffer, 569
 up_down_position
 Fl_Input_, 431
 update
 Fl_Clock, 328
 update_child
 Fl_Group, 401
 USER
 Fl_Preferences, 495
 user_data
 Fl_Widget, 659
 val
 FL_CHART_ENTRY, 315
 valid
 Fl_Gl_Window, 387
 value
 Fl_Browser, 290
 Fl_Button, 305
 Fl_Check_Browser, 319
 Fl_Choice, 324, 325
 Fl_Clock_Output, 331
 Fl_Color_Chooser, 336
 Fl_File_Chooser, 360
 Fl_File_Icon, 366
 Fl_File_Input, 369
 Fl_Help_Dialog, 404

Fl_Help_View, 412
Fl_Input_, 431
Fl_Input_Choice, 435
Fl_Menu_, 450
Fl_Menu_Item, 468
Fl_Positioner, 490
Fl_Progress, 509
Fl_Scrollbar, 530
Fl_Spinner, 549
Fl_Tabs, 552
Fl_Valuator, 617
Fl_Wizard, 675
version
 Fl, 267
visible
 Fl_File_Chooser, 360
 Fl_Help_Dialog, 404
 Fl_Menu_Item, 468
 Fl_Widget, 660
VISIBLE_FOCUS
 Fl_Widget, 640
visible_focus
 Fl, 267, 268
 Fl_Widget, 660
visible_r
 Fl_Widget, 660
visual
 Fl, 268

w
 Fl_Help_Dialog, 405
 Fl_Image, 418
 fl_screen, 232
 Fl_Widget, 660, 661

wait
 Fl, 268

warning
 group_comdlg, 248

watch_widget_pointer
 fl_del_widget, 238

when
 Fl_Widget, 661

window
 Fl_Widget, 661

Windows handling functions, 215

word_end
 Fl_Text_Buffer, 569
 Fl_Text_Display, 585

word_start
 Fl_Text_Display, 585

wrap
 Fl_Input_, 431

wrap_mode
 Fl_Text_Display, 585

wrap_uses_character
 Fl_Text_Display, 585

wrapped_column
 Fl_Text_Display, 586

wrapped_line_counter
 Fl_Text_Display, 586

wrapped_row
 Fl_Text_Display, 586

x
 Fl_Help_Dialog, 405
 fl_screen, 232
 Fl_Widget, 662

xbounds
 Fl_Positioner, 490

xclass
 Fl_Window, 672

xposition
 Fl_Scroll, 527

xstep
 Fl_Positioner, 491

xvalue
 Fl_Positioner, 491

xy_to_position
 Fl_Text_Display, 586

xy_to_rowcol
 Fl_Text_Display, 587

y
 Fl_Help_Dialog, 405
 fl_screen, 232
 Fl_Widget, 662

ybounds
 Fl_Positioner, 491

yposition
 Fl_Scroll, 527

ystep
 Fl_Positioner, 491

yvalue
 Fl_Positioner, 491