

**NAME**

Xft - X FreeType interface library

**DESCRIPTION**

**Xft** is a simple library which draws text and graphics:

- ⊕ using information provided by the Fontconfig library,
- ⊕ **Xft** converts font glyphs using the FreeType rasterizer, and
- ⊕ displays the converted font data using the X Rendering Extension.

This manual page barely scratches the surface of this library.

**HEADER FILE**

```
#include <X11/Xft/Xft.h>
```

**CONSTANTS****XFT\_MAJOR**

is the major version number of **Xft**.

**XFT\_MINOR**

is the minor version number of **Xft**.

**XFT\_REVISION**

is the revision number of **Xft**.

**XFT\_VERSION**

is **XFT\_MAJOR** times 10000 (ten thousand), plus **XFT\_MINOR** times 100, plus **XFT\_REVISION**.

**XftVersion**

is an alias for **XFT\_VERSION**.

The following example illustrates how **Xft**'s version constants might be used:

```
#if (XFT_VERSION >= 20107)
(void) puts("Version 2.1.7 or later of the Xft library is in"
          " use.");
#else
(void) printf("Insufficient version of Xft (%d.%d.%d) installed;
```

```

    " need at least version 2.1.7.\n", XFT_MAJOR,
    XFT_MINOR,
    XFT_REVISION);
#endif

```

## DATA TYPES

Xft datatypes follow a naming convention, prefixing all names with "Xft"

### From Xlib...

Xlib datatypes do not follow a naming convention. They are documented in *Xlib - C Language Interface*.

**Xft** uses these names: Bool, Colormap, Display, Drawable, Pixmap, Region, Visual, and XRectangle.

Some datatypes are especially relevant to **Xft**:

### Drawable

Declared in `<X11/X.h>`, this is an X resource ID, e.g., a window associated with a display. Both windows and pixmaps can be used as sources and destinations in graphics operations. These windows and pixmaps are collectively known as drawables. However, an **InputOnly** window cannot be used as a source or destination in a graphics operation.

### Region

Declared in `<X11/Xutil.h>` and `<X11/Xregion.h>`, a **Region** is an arbitrary set of pixel locations which Xlib can manipulate. Internally, a **Region** is represented by the union of an arbitrary number of rectangles. Xlib maintains a rectangle which tells it the extent of this union.

### Visual

Declared in `<X11/Xutil.h>`, this structure contains information about the possible color mapping.

### From XRender...

The X Render Extension library datatypes are inspired by Xlib, but lack the corresponding documentation. Refer to the header file for details:

```
<X11/extensions/Xrender.h>
```

or read the source code (which provides an outline of libXrender).

**Xft** uses these names: Picture, XGlyphInfo, XRenderColor.

**From Fontconfig...**

Fontconfig datatypes follow a naming convention, prefixing all names with "Fc" which are documented in *Fontconfig Developers Reference*.

**Xft** uses these Fontconfig names: FcBool, FcChar8, FcChar16, FcChar32, FcCharSet, FcEndian, FcFontSet, FcPattern, and FcResult.

**From FreeType 2...**

FreeType 2 datatypes follow a naming convention, prefixing all names with "FT\_" which are documented in *FreeType API Reference*.

**Xft** uses these names: FT\_Face, FT\_Library, and FT\_UInt.

FreeType 2 uses **FT\_UInt** (an unsigned integer) to represent *glyphs*.

**XftFont**

```
typedef struct _XftFont {
    int          ascent;
    int          descent;
    int          height;
    int          max_advance_width;
    FcCharSet   *charset;
    FcPattern   *pattern;
} XftFont;
```

An **XftFont** is the primary data structure of interest to programmers using **Xft**; it contains general font metrics and pointers to the Fontconfig character set and pattern associated with the font.

**XftFonts** are populated with any of **XftFontOpen()**, **XftFontOpenName()**, **XftFontOpenXlfd()**, **XftFontOpenInfo()**, or **XftFontOpenPattern()**. **XftFontCopy()** is used to duplicate **XftFonts**, and **XftFontClose()** is used to mark an **XftFont** as unused. **XftFonts** are internally allocated, reference-counted, and freed by **Xft**; the programmer does not ordinarily need to allocate or free storage for them.

**XftDrawGlyphs()**, the **XftDrawString\*()** family, **XftDrawCharSpec()**, and **XftDrawGlyphSpec()** use **XftFonts** to render text to an **XftDraw** object, which may correspond to either a core X drawable or an X Rendering Extension drawable.

**XftGlyphExtents()** and the **XftTextExtents\*()** family are used to determine the extents (maximum dimensions) of an **XftFont**.

An **XftFont**'s glyph or character coverage can be determined with **XftFontCheckGlyph()** or **XftCharExists()**. **XftCharIndex()** returns the **XftFont**-specific character index corresponding to a given Unicode codepoint.

**XftGlyphRender()**, **XftGlyphSpecRender()**, **XftCharSpecRender()**, and the **XftTextRender\*()** family use **XftFonts** to draw into X Rendering Extension **Picture** structures.

**Note:** **XftDrawGlyphs()**, the **XftDrawString\*()** family, **XftDrawCharSpec()**, and **XftDrawGlyphSpec()** provide a means of rendering fonts that is independent of the availability of the X Rendering Extension on the X server.

### **XftFontInfo**

is an opaque object that stores information about a font. **XftFontInfo** structures are created with **XftFontInfoCreate()**, freed with **XftFontInfoDestroy()**, and compared with **XftFontInfoEqual()**. **XftFontInfo** objects are internally allocated and freed by **Xft**; the programmer does not ordinarily need to allocate or free storage for them.

Each **XftFontInfo** structure in use is associated with a unique identifier, which can be retrieved with **XftFontInfoHash()**. An **XftFont** can be opened based on **XftFontInfo** data with **XftFontOpenInfo()**.

### **XftColor**

```
typedef struct _XftColor {
    unsigned long          pixel;
    XRenderColor          color;
} XftColor;
```

An **XftColor** object permits text and other items to be rendered in a particular color (or the closest approximation offered by the X visual in use).

**XftColorAllocName()** and **XftColorAllocValue()** request a color allocation from the X server (if necessary) and initialize the members of **XftColor**. **XftColorFree()** instructs the X server to free the color currently allocated for an **XftColor**.

Once an **XftColor** has been initialized, **XftDrawSrcPicture()**, **XftDrawGlyphs()**, the **XftDrawString\*()** family, **XftDrawCharSpec()**, **XftDrawCharFontSpec()**, **XftDrawGlyphSpec()**, **XftDrawGlyphFontSpec()**, and **XftDrawRect()** may be used to draw various objects using it.

### **XftDraw**

is an opaque object which holds information used to render to an X drawable using either the core protocol or the X Rendering extension.

**XftDraw** objects are created with any of **XftDrawCreate()** (which associates an **XftDraw** with an existing X drawable), **XftDrawCreateBitmap()**, or **XftDrawCreateAlpha()**, and destroyed with **XftDrawDestroy()**. The X drawable associated with an **XftDraw** can be changed with **XftDrawChange()**. **XftDraw** objects are internally allocated and freed by **Xft**; the programmer does not ordinarily need to allocate or free storage for them.

The X **Display**, **Drawable**, **Colormap**, and **Visual** properties of an **XftDraw** can be queried with **XftDrawDisplay()**, **XftDrawDrawable()**, **XftDrawColormap()**, and **XftDrawVisual()**, respectively.

Several functions use **XftDraw** objects: **XftDrawCharFontSpec()**, **XftDrawCharSpec()**, **XftDrawGlyphFontSpec()**, **XftDrawGlyphSpec()**, **XftDrawGlyphs()**, **XftDrawRect()**, **XftDrawSetClip()**, **XftDrawSetClipRectangles()**, **XftDrawSetSubwindowMode()**, and the **XftDrawString\*()** family.

The X Rendering Extension **Picture** associated with an **XftDraw** is returned by **XftDrawPicture()**, and **XftDrawSrcPicture()**. It is used by **XftCharFontSpecRender()**, **XftCharSpecRender()**, **XftGlyphFontSpecRender()**, **XftGlyphRender()**, **XftGlyphSpecRender()**, and the **XftTextRender\*()** family.

### **XftCharSpec**

```
typedef struct _XftCharSpec {
    FcChar32          ucs4;
    short             x;
    short             y;
} XftCharSpec;
```

**XftCharSpec** is used by **XftDrawCharSpec()**, and **XftCharSpecRender()**.

### **XftCharFontSpec**

```
typedef struct _XftCharFontSpec {
    XftFont           *font;
    FcChar32          ucs4;
    short             x;
    short             y;
} XftCharFontSpec;
```

**XftCharFontSpec** is used by **XftCharFontSpecRender()**.

### **XftGlyphSpec**

```
typedef struct _XftGlyphSpec {
```

```

        FT_UInt          glyph;
        short            x;
        short            y;
    } XftGlyphSpec;

```

**XftGlyphSpec** is used by **XftDrawGlyphSpec()**.

### **XftGlyphFontSpec**

```

typedef struct _XftGlyphFontSpec {
    XftFont          *font;
    FT_UInt          glyph;
    short            x;
    short            y;
} XftGlyphFontSpec;

```

**XftGlyphFontSpec** is used by **XftDrawGlyphFontSpec()**, and **XftGlyphFontSpecRender()**.

## **FUNCTIONS**

### **Initialization**

A typical application using **Xft** does not explicitly initialize the library. That is usually done as a side-effect of opening a font.

When **Xft** initializes, it collects information about the display, and stores some of that information in a Fontconfig pattern (essentially a collection of properties with typed values). The calling application can modify that pattern to change the library's behavior.

Not all of the collected information is stored in a pattern. The remainder is stored in internal data structures. **Xft** makes some of that available to the application via functions.

**Bool XftDefaultHasRender (**  
                   **Display**                  *\*dpy*);

Obtain information about the display *dpy* if not done already, and return true if **Xft** found that the display supports the X Render extension, and if it is able to find a suitable **XRenderPictFormat** (X Render's datatype which is analogous to Xlib's Visual) on the display.

**Bool XftDefaultSet (**  
                   **Display**                  *\*dpy*,

**FcPattern** *\*defaults*);

Obtain information about the display *dpy* if not done already, and set the Fontconfig pattern holding default properties which **Xft** will use for this display.

**Xft** uses those properties initially to obtain these limits:

XFT\_MAX\_GLYPH\_MEMORY

(maxglyphmemory). This is the maximum amount of glyph memory for all fonts used by **Xft** (default: 4\*1024\*1024).

XFT\_MAX\_UNREF\_FONTS

(maxunreffonts). This is the maximum number of unreferenced fonts (default: 16).

XFT\_TRACK\_MEM\_USAGE

(trackmemusage). When true, **Xft** tracks usage of glyph memory to improve performance when deciding which to unload when the maximum amount of glyph memory is reached (default: false).

**Xft** also uses these default properties in **XftDefaultSubstitute()**.

```
void XftDefaultSubstitute (
    Display          *dpy,
    int              screen,
    FcPattern        *pattern);
```

**Xft** fills in missing properties in the given *pattern* using default properties for the specified display *dpy*, e.g., as set in **XftDefaultSet()**.

Typical **Xft** applications use this function to help Fontconfig choose a suitable font. These properties are substituted before calling **FcDefaultSubstitute()**:

FC\_ANTIALIAS

True if FreeType should use antialiasing (default: False). (default: True).

FC\_AUTOHINT

True if FreeType should use autohinting (default: False).

FC\_DPI

Dots/inch used for resolution (default: computed from the display height).

#### FC\_EMBOLDEN

True if **FT\_GlyphSlot\_Embolden()** should be used to embolden a font (default: False).

#### FC\_HINTING

True if hinting should be used when filling in properties to open a font (default: True).

#### FC\_HINT\_STYLE

Hinting style used when filling in properties to open a font (default: FC\_HINT\_FULL).

#### FC\_LCD\_FILTER

Parameter passed to **FT\_Library\_SetLcdFilter()** when loading glyphs (default: FC\_LCD\_DEFAULT).

#### FC\_MINSPACE

Minimum space value used when filling in properties to open a font (default: False).

#### FC\_RGBA

RGBA value used when filling in properties to open a font (default: computed by calling **XRenderQuerySubpixelOrder()**).

#### FC\_SCALE

Scale used in Fontconfig (default: 1.0).

#### XFT\_MAX\_GLYPH\_MEMORY

Maximum memory for one font (default: 1024\*1024).

#### XFT\_RENDER

True if the display supports X Render extension (default: result from **XftDefaultHasRender()**).

```
FcBool XftInit (  
    _Xconst char                *config);
```

Initializes the Fontconfig library (calling **FcInit()**).



The *config* parameter is unused.

**Xft** does not deinitialize the Fontconfig library when it is done.

### **FcBool XftInitFtLibrary (void);**

Initializes the FreeType library (calling **FT\_Init\_FreeType()** to create a library object) if it has not already been initialized. This is needed before using the FreeType library to read font data from a file.

**Xft** calls **XftInitFtLibrary()** internally via **XftFontInfoCreate()** and **XftFontOpenPattern()**.

**Xft** does not discard the library object (e.g., using **FT\_Done\_FreeType()**) when it is done.

### **int XftGetVersion (void);**

Return **XftVersion**, enabling an application to determine the actual version of **Xft** which is in use.

### **Opening and Matching Fonts**

```
XftFont *XftFontOpen (
    Display                *dpy,
    int                    screen,
    ...);
```

**XftFontOpen** takes a list of pattern element triples of the form *field, type, value* (terminated with a NULL), matches that pattern against the available fonts, and opens the matching font, sizing it correctly for screen number *screen* on display *dpy*. Return the matched font, or NULL if no match is found.

Example:

```
font = XftFontOpen (dpy, screen,
    XFT_FAMILY, XftTypeString, "charter",
    XFT_SIZE, XftTypeDouble, 12.0,
    NULL);
```

This opens the "charter" font at 12 points. The point size is automatically converted to the correct pixel size based on the resolution of the monitor.

```
XftFont *XftFontOpenName (
    Display                *dpy,
    int                    screen,
    _Xconst char         *name);
```

**XftFontOpenName** behaves as **XftFontOpen** does, except that it takes a Fontconfig pattern string (which is passed to the Fontconfig library's **FcNameParse()** function).

```
XftFont *XftFontOpenXlfd (
    Display                *dpy,
    int                    screen,
    _Xconst char         *xlfd)
```

**XftFontOpenXlfd** behaves as **XftFontOpen** does, except that it takes a string containing an X Logical Font Description (XLFD), and uses the **XftXlfdParse()** function.

```
FcPattern *XftFontMatch (
    Display                *dpy,
    int                    screen,
    _Xconst FcPattern     *pattern,
    FcResult              *result);
```

Also used internally by the **XftFontOpen\*** functions, **XftFontMatch** can also be used directly to determine the Fontconfig font pattern resulting from an **Xft** font open request.

```
FcPattern *XftXlfdParse (
    _Xconst char         *xlfd_orig,
    Bool                 ignore_scalable,
    Bool                 complete);
```

**XftXlfdParse** parses the *xlfd\_orig* parameter according to the *X Logical Font Description Conventions* document, but ignores some of the fields: *setwidth\_name*, *add\_style\_name*, *spacing*, and *average\_width*.

**XftXlfdParse** creates a Fontconfig pattern, setting the property **XFT\_XLFD** to the *xlfd\_orig* value, and maps the collected information to Fontconfig properties. Empty or "\*" fields are ignored:

```
FC_FOUNDRY
    from foundry.
```

FC\_FAMILY

from *family*.

FC\_WEIGHT

*weight\_name*, defaulting to FC\_WEIGHT\_MEDIUM.

FC\_SLANT

from *slant*, defaulting to FC\_SLANT\_ROMAN.

FC\_SIZE

from *point\_size*.

FC\_PIXEL\_SIZE

from *pixel\_size*. If *point\_size* was set, as well as *resolution\_x* and *resolution\_y*, then the value is scaled convert the font's height to points.

### Families of Functions

**Xft** provides groups of drawing functions which differ according to the way the data is encoded, e.g., 8-bit (ISO-8859-1) versus UTF-8. Here is a summary of these related functions:

	<b>EncodingXftDrawString*</b>	<b>XftTextExtents*</b>	<b>XftTextRender*</b>
8	XftDrawString8	XftTextExtents8	XftTextRender8
16	XftDrawString16	XftTextExtents16	XftTextRender16
16BE	XftDrawString16	XftTextExtents16	XftTextRender16BE
16LE	XftDrawString16	XftTextExtents16	XftTextRender16LE
32	XftDrawString32	XftTextExtents32	XftTextRender32
32BE	XftDrawString32	XftTextExtents32	XftTextRender32BE
32LE	XftDrawString32	XftTextExtents32	XftTextRender32LE
UTF-8	XftDrawStringUtf8	XftTextExtentsUtf8	XftTextRenderUtf8
UTF-16	XftDrawStringUtf16	XftTextExtentsUtf16	XftTextRenderUtf16

### Determining Text Extents

**Xft** provides several functions for determining the required height and width for displaying a text-string. After accounting for the *offset*, in cases where the string will be shifted up, down, left or right, these numbers are referred to as *text extents*.

```
void XftTextExtents8 (
    Display *dpy,
```

```

XftFont                *font,
  _Xconst FcChar8        *string,
  int                    len,
  XGlyphInfo             *extents);

```

**XftTextExtents8** computes the pixel extents on display *dpy* of no more than *len* glyphs of a *string* consisting of eight-bit characters when drawn with *font*, storing them in *extents*.

```

void XftTextExtents16 (
  Display                *dpy,
  XftFont               *font,
  _Xconst FcChar16      *string,
  int                   len,
  XGlyphInfo            *extents);

```

**XftTextExtents16** computes the pixel extents on display *dpy* of no more than *len* glyphs of a *string* consisting of sixteen-bit characters when drawn with *font*, storing them in *extents*.

```

void XftTextExtents32 (
  Display                *dpy,
  XftFont               *font,
  _Xconst FcChar32      *string,
  int                   len,
  XGlyphInfo            *extents);

```

**XftTextExtents32** computes the pixel extents on display *dpy* of no more than *len* glyphs of a *string* consisting of thirty-two-bit characters when drawn with *font*, storing them in *extents*.

```

void XftTextExtentsUtf8 (
  Display                *dpy,
  XftFont               *font,
  _Xconst FcChar8       *string,
  int                   len,
  XGlyphInfo            *extents);

```

**XftTextExtentsUtf8** computes the pixel extents on display *dpy* of no more than *len* bytes of a UTF-8 encoded *string* when drawn with *font*, storing them in *extents*.

```

void XftTextExtentsUtf16 (
  Display                *dpy,

```

<b>XftFont</b>	<i>*font,</i>
<b>_Xconst FcChar8</b>	<i>*string,</i>
<b>FcEndian</b>	<i>endian,</i>
<b>int</b>	<i>len,</i>
<b>XGlyphInfo</b>	<i>*extents);</i>

**XftTextExtentsUtf16** computes the pixel extents on display *dpy* of no more than *len* bytes of a UTF-16LE- or UTF-16BE-encoded *string* when drawn with *font*, storing them in *extents*. The endianness of *string* must be specified in *endian*.

```
void XftGlyphExtents (
    Display                *dpy,
    XftFont                *font,
    _Xconst FT_UInt        *glyphs,
    int                    nglyphs,
    XGlyphInfo             *extents);
```

Also used internally by the **XftTextExtents\***() functions, **XftGlyphExtents** computes the pixel extents on display *dpy* of no more than *nglyphs* in the array *glyphs* drawn with *font*, storing them in *extents*.

If any of the *glyphs* are missing (determined by a check with **XftFontCheckGlyph()**), the corresponding entry in *extents* is filled with zeroes.

### Managing XftColor

```
Bool XftColorAllocName (
    Display                *dpy,
    _Xconst Visual        *visual,
    Colormap               cmap,
    _Xconst char          *name,
    XftColor              *result);
```

Use **XAllocNamedColor()** to look up the named color *name* for the screen associated with the colormap *cmap*.

- ⊕ If **XAllocNamedColor()** returns nonzero, **XftColorAllocName()** fills in the resulting **XftColor** pixel field with the closest color supported by the screen, as well as the exact red, green and blue fields from the database, and returns True.
- ⊕ If **XAllocNamedColor()** returns zero, **XftColorAllocName()** returns False, and does not

update the **XftColor** referenced by *result*.

The *visual* parameter is unused.

```

Bool XftColorAllocValue (
    Display                *dpy,
    Visual                 *visual,
    Colormap               cmap,
    _Xconst XRenderColor  *color,
    XftColor              *result);

```

Allocate a color value:

- ⊕ If the *visual* class is TrueColor, **XftColorAllocValue()** sets the *pixel* field in the **XftColor** referenced by *result* using the red, green and blue fields from the *color* parameter.
- ⊕ If the *visual* class is not TrueColor, **XftColorAllocValue()** calls **XAllocColor()** to allocate an entry in the colormap *cmap*. which returns the pixel value of the color closest to the specified RGB elements supported by the hardware.

If **XAllocColor()** succeeds **XftColorAllocValue()** stores that pixel value in the **XRenderColor** referenced by *result* and returns True.

If **XAllocColor()** fails, **XftColorAllocValue()** returns False and does not modify the result.

```

void XftColorFree (
    Display                *dpy,
    Visual                 *visual,
    Colormap               cmap,
    XftColor              *color);

```

If the *visual* class is not TrueColor, **Xft** calls **XFreeColors()** to free the entry from the colormap *cmap* whose pixel value in the *color* parameter was allocated by **XftColorAllocName()**.

### Managing XftDraw

```

XftDraw *XftDrawCreate (
    Display                *dpy,

```

<b>Drawable</b>	<i>drawable,</i>
<b>Visual</b>	<i>*visual,</i>
<b>Colormap</b>	<i>colormap);</i>

**XftDrawCreate** creates a structure that can be used to render text and rectangles using the specified *drawable*, *visual*, and *colormap* on *display*.

```
XftDraw *XftDrawCreateBitmap (  
    Display          *dpy,  
    Pixmap          bitmap);
```

**XftDrawCreateBitmap** behaves as **XftDrawCreate()**, except that it uses an X pixmap of color depth 1 instead of an X drawable.

```
XftDraw * XftDrawCreateAlpha (  
    Display          *dpy,  
    Pixmap          pixmap,  
    int             depth);
```

**XftDrawCreateAlpha** behaves as **XftDrawCreate()**, except that it uses an X pixmap of color depth *depth* instead of an X drawable.

```
void XftDrawChange (  
    XftDraw          *draw,  
    Drawable        drawable);
```

**XftDrawChange** changes the X drawable association of the existing **Xft** draw object *draw* from its current value to *drawable*.

```
Display *XftDrawDisplay (  
    XftDraw          *draw);
```

**XftDrawDisplay** returns a pointer to the display associated with the **Xft** draw object *draw*.

```
Drawable XftDrawable (  
    XftDraw          *draw);
```

**XftDrawable** returns the X drawable associated with the **Xft** draw object *draw*.

```
Colormap XftDrawColormap (  
    XftDraw          *draw);
```

```
XftDraw *draw);
```

**XftDrawColormap()** returns the colormap associated with the **Xft** draw object *draw*.

```
Visual *XftDrawVisual (  
    XftDraw *draw);
```

**XftDrawVisual** returns a pointer to the visual associated with the **Xft** draw object *draw*.

```
Picture XftDrawPicture (  
    XftDraw *draw);
```

**XftDrawPicture** returns the picture associated with the **Xft** draw object *draw*.

If the the X server does not support the X Rendering Extension, 0 is returned.

```
Picture XftDrawSrcPicture (  
    XftDraw *draw,  
    _Xconst XftColor *color);
```

Return an X Render Picture object, which is used for rendering glyphs, e.g., with **XftGlyphRender()**, **XftGlyphSpecRender()**, or **XftGlyphFontSpecRender()**, by **XftDrawGlyphs()**, **XftDrawGlyphSpec()**, **XftDrawGlyphFontSpec()**, respectively.

If the X server does not support the X Render extension, those functions use **XftGlyphCore()**, **XftGlyphSpecCore()**, or **XftGlyphFontSpecCore()**.

```
void XftDrawDestroy (  
    XftDraw *draw);
```

**XftDrawDestroy** destroys *draw* (created by one of the **XftDrawCreate\***() functions) and frees the memory that was allocated for it.

```
Bool XftDrawSetClip (  
    XftDraw *draw,  
    Region r);
```

Set up clipping for the given **XftDraw** parameter *draw* starting with a **Region**:



- ⊕ If the **Region** parameter *r* is not null, **Xft** creates a new **Region** (to copy the parameter),
- ⊕ **Xft** destroys any existing clipping region.
- ⊕ **Xft** sets the clip\_type for the *draw* parameter to **XftClipTypeRegion** if the *r* parameter was not null. Otherwise it sets the clip\_type to **XftClipTypeNone**.
- ⊕ Finally, **Xft** updates clipping for existing objects, updates the clip\_mask for its X Render **Picture** object and sets the clipping-mask in the graphic context (GC) associated with the **XftDraw** parameter.

**XftDrawSetClip()** returns **True** if no change was necessary, or if the operation succeeded. It returns **False** if it was unable to create the new **Region()**.

```

Bool XftDrawSetClipRectangles (
    XftDraw                *draw,
    int                    xOrigin,
    int                    yOrigin,
    _Xconst XRectangle    *rects,
    int                    n);

```

Like **XftDrawSetClip()**, **XftDrawSetClipRectangles()** sets up clipping for the given **XftDraw** parameter *draw* but uses a set of *n* rectangles (the *rects* parameter) which could be used to construct a **Region** .

**Xft** sets the clip\_type for *draw* to **XftClipTypeRectangles** and uses **XSetClipRectangles()** for core (X11) clipping and **XRenderSetPictureClipRectangles()** for X Render clipping.

```

void XftDrawSetSubwindowMode (
    XftDraw                *draw,
    int                    mode);

```

Sets the subwindow-mode for the given **XftDraw** parameter *draw*. The mode can be either **ClipByChildren** (the default), or **IncludeInferiors**:

- ⊕ For **ClipByChildren**, both source and destination windows are additionally clipped by all viewable **InputOutput** children.

- ⊕ For **IncludeInferiors**, neither source nor destination window is clipped by inferiors. This will result in including subwindow contents in the source and drawing through subwindow boundaries of the destination.

In addition to the subwindow-mode maintained by **Xft**, it updates the subwindow mode for any associated graphics context **GC** using **XSetSubwindowMode()** as well as for an X Render **Picture** using **XRenderChangePicture()**.

### Drawing Strings

```
void XftDrawString8 (
    XftDraw          *d,
    _Xconst XftColor *color,
    XftFont          *font,
    int              x,
    int              y,
    _Xconst FcChar8  *string,
    int              len);
```

**XftDrawString8** draws no more than *len* glyphs of *string* to **Xft** drawable *d* using *font* in *color* at position *x*, *y*.

### Drawing Other Things

```
void XftDrawRect (
    XftDraw          *d,
    _Xconst XftColor *color,
    int              x,
    int              y,
    unsigned int     width,
    unsigned int     height);
```

**XftDrawRect** draws a solid rectangle of the specified *color*, *width*, and *height* at position *x*, *y* to **Xft** drawable *d*.

```
void XftCharFontSpecRender (
    Display          *dpy,
    int              op,
    Picture          src,
    Picture          dst,
    int              srcx,
```

```

int                                srcy,
    _Xconst XftCharFontSpec         *chars,
int                                len);

```

**XftCharFontSpecRender()** converts the *chars* parameter from **XftCharFontSpec** to **XftGlyphFontSpec**, passing the converted array along with the other parameters unchanged to **XftGlyphFontSpecRender()** to render the data.

```

void XftDrawGlyphFontSpec (
    XftDraw                                *draw,
    _Xconst XftColor                       *color,
    _Xconst XftGlyphFontSpec             *glyphs,
int                                       len);

```

Draw a list of glyphs associated with fonts at specified coordinates, passed as an array of *len* **XftGlyphFontSpec** structures via the parameter *glyphs*. All of the glyphs are drawn using the color specified in the *color* parameter.

For each entry in the *glyphs* array:

- ⊕ If the associated font uses the X Render extension, then **Xft** uses **XftGlyphFontSpecRender()** to draw the glyph, using a **Picture** obtained from calling **XftDrawSrcPicture ()** with the *draw* and *color* parameters.
- ⊕ Otherwise, **Xft** provides an analogous feature using Xlib.

```

void XftGlyphFontSpecRender (
    Display                                *dpy,
int                                       op,
Picture                                    src,
Picture                                    dst,
int                                       srcx,
int                                       srcy,
    _Xconst XftGlyphFontSpec             *glyphs,
int                                       nglyphs);

```

This involves several steps:

- ⊕ First, **Xft** ensures that the *glyphs* array is complete using **XftFontCheckGlyph()** and loading any missing glyphs with **XftFontLoadGlyphs()**.
- ⊕ Then **Xft** examines the glyphs to find the maximum Unicode value. That determines the encoding size, i.e., the *width*.
- ⊕ Then, for each glyph, **Xft** checks if its Unicode value is handled by the corresponding font. If not, the value is set to zero (0), to ignore it. While doing this, **Xft** also remembers which was the first font used, and computes the position at which each glyph will be drawn.
- ⊕ **Xft** then constructs an equivalent array of glyphs in the format expected by the X Render library.
- ⊕ Finally, **XftGlyphFontSpecRender()** uses the X Render extension to draw the glyphs, with the appropriate **XRenderCompositeText\*()** function according to the *width*, and discards temporary data.

The *op*, *dst*, *src*, *srcx*, and *srcy* parameters are used as described in the documentation for the X Render library.

### Manipulating patterns

```
FcFontSet *XftListFonts (
    Display                *dpy,
    int                    screen,
    ...);
```

**Xft** uses **FcPatternVapBuild()** and **FcObjectSetVapBuild()** to process the variable-length parameter list, and **FcFontList()** to obtain a list of matching Fontconfig patterns, which it returns to the caller. The caller can dispose of the return value using **FcPatternDestroy()**.

```
FcPattern *XftNameParse (
    _Xconst char          *name);
```

**Xft** uses Fontconfig to parse the name, passing the *name* to **FcNameParse()**, returning the result.

```
FcBool XftNameUnparse (
    FcPattern             *pat,
```

```

char          *dest,
int           len);

```

Like **XfgNameParse()**, **Xft** uses Fontconfig. In this case, it uses **FcNameUnparse()**, which converts the pattern *pat* back into a string that can be parsed. **XftNameUnparse()** stores the result via the caller's pointer *dest*, but checks first if it will fit, using the *len* parameter. If it fits, **Xft** copies the string and returns **FcTrue**, otherwise it returns **FcFalse**.

### Manipulating Font data

```

void XftFontLoadGlyphs (
    Display          *dpy,
    XftFont          *pub,
    FcBool           need_bitmaps,
    _Xconst FT_UInt *glyphs,
    int              nglyph);

```

Using **FT\_Load\_Glyph()**, load *nglyphs* for the glyph indices (Unicode values) listed in the array *glyphs* from the given font *pub*.

Loading a glyph entails more than just reading data into memory. **Xft** uses the Fontconfig pattern associated with the display *dpy* (e.g., via **XftDefaultSet()**) to determine whether to use a bounding box, clip the glyphs into those bounds, scale the glyphs, compute font metrics, and add it to the X Render extension using **XRenderAddGlyphs()**.

```

void XftFontUnloadGlyphs (
    Display          *dpy,
    XftFont          *pub,
    _Xconst FT_UInt *glyphs,
    int              nglyph);

```

Discards data for up to *nglyph* glyphs whose glyph indices (Unicode values) are listed in the array *glyphs* for the given font *pub*. If the glyphs were added to the X Render extension, **Xft** removes those using **XRenderFreeGlyphs()**. **Xft** keeps track of the amount of memory used for glyphs, and updates the usage associated with the display *dpy*.

```

FT_Face XftLockFace (
    XftFont          *pub);

```

If no FreeType 2 "face" (in-memory representation of a given typeface in a given style) has been created for the *pub* font, create one using **FT\_New\_Face()**. Face-locks are a reference count used by **Xft** to ensure that only one face is created, and that it is retained until the font is no longer used.

Face-locking is used directly in **XftCharIndex()** and **XftFontLoadGlyphs()**, which in turn are used in many functions of **Xft**.

Face-locking was introduced in version 1 (October 2002). A few applications, such as Gdk/Gimp relied upon these functions. In version 2.1.9 (June 2006), face-locking was retained as part of the public API when improved shared-library configurations provided for hiding private symbols.

```
void XftUnlockFace (  
    XftFont                *pub);
```

Decrements the reference count for the FreeType 2 "face" associated with the font.

**FT\_Face** objects are deallocated using **FT\_Done\_Face()**. **Xft** does this in **XftFontInfoDestroy()** and when cleaning up on failure in **XftFontInfoCreate()** and **XftFontOpenPattern()**.

## DEBUGGING

**Xft** reads the environment variable **XFT\_DEBUG** and converts that to an integer. Each bit in the resulting value tells **Xft** to print debugging information to the standard output:

- 1 font-opening
- 2 additional font-matching and opening (verbose)
- 4 shows details about the **XRenderPictFormat** which will be used.
- 8 shows the string which **XftDrawString8()** will draw.
- 16 shows which font-ids are matched.
- 32 shows useful information about the glyphs which will be drawn
- 64 shows an ASCII-art representation of the glyphs.
- 128 shows details about the memory-cache management

256 shows details about managing glyph cached-memory

512 shows a report on memory-usage

1024 shows details on extended management of glyph cached-memory

## COMPATIBILITY

As of version 2 (May 2002), **Xft** became relatively stable. It is expected to retain source and binary compatibility in future releases.

**Xft** provides a compatibility interface to its previous major version, Xft 1.x, described below.

### Xft 1.x Header File

```
#include <X11/Xft/XftCompat.h>
```

### Xft 1.x Data Types

#### **XftPattern**

holds a set of names with associated value lists; each name refers to a property of a font.

**XftPatterns** are used as inputs to the matching code as well as holding information about specific fonts.

#### **XftFontSet**

contains a list of **XftPatterns**. Internally, **Xft** uses this data structure to hold sets of fonts.

Externally, **Xft** returns the results of listing fonts in this format.

#### **XftObjectSet**

holds a set of names and is used to specify which fields from fonts are placed in the the list of returned patterns when listing fonts.

## AUTHOR

Keith Packard

Thomas E. Dickey (performance improvements)

## SEE ALSO

*Fontconfig Developers Reference*

*FreeType API Reference*

*Xlib - C Language Interface*

*X Logical Font Description Conventions*