Xmu and Xmuu Library API Reference

X Version 11, Release 7.7

Copyright © 1989 X Consortium

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the “Software”), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED “AS IS”, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE X CONSORTIUM BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Except as contained in this notice, the name of the X Consortium shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization from the X Consortium.

X Window System™ is a trademark of The Open Group.

Abstract

“Don't ask.”

Table of Contents

Introduction

The Xmu Library is a collection of miscellaneous (some might say random) utility functions that have been useful in building various applications and widgets. This library is required by the Athena Widgets.

Starting in XFree86 4.1.0, and incorporated into X11R6.7 and later releases, a subset of the functions that do not rely on the Athena Widgets (libXaw) or X Toolkit Instrinsics (libXt) are provided in a second library, libXmuu.

Programs using either of these libraries are encouraged to determine the correct compiler and linker options via the **`xmu`** or **`xmuu`** module names for **pkg-config**, such as:

```
cc -c xapplication.c `pkg-config --cflags xmu`
cc -o xapplication xapplication.o `pkg-config --libs xmu`
```

Atom Functions

To use the functions and macros defined in this section, you should include the header file <`X11/Xmu/Atoms.h`> and link against the libXmu library.

XA_ATOM_PAIR(*d*);

XA_CHARACTER_POSITION(*d*);

XA_CLASS(*d*);

XA_CLIENT_WINDOW(*d*);

XA_CLIPBOARD(*d*);

XA_COMPOUND_TEXT(*d*);

XA_DECNET_ADDRESS(*d*);

XA_DELETE(*d*);

XA_FILENAME(*d*);

XA_HOSTNAME(*d*);

XA_IP_ADDRESS(*d*);

XA_LENGTH(*d*);

XA_LIST_LENGTH(*d*);

XA_NAME(*d*);

XA_NET_ADDRESS(*d*);

XA_NULL(*d*);

XA_OWNER_OS(*d*);

XA_SPAN(*d*);

XA_TARGETS(*d*);

XA_TEXT(*d*);

XA_TIMESTAMP(*d*);

XA_USER(*d*);

XA_UTF8_STRING(*d*);

These macros take a display as argument and return an Atom. The name of the atom is obtained from the macro name by removing the leading characters “`XA_`”. The Atom value is cached, such that subsequent requests do not cause another round-trip to the server.

AtomPtr **XmuMakeAtom**(*name*);

name specifies the atom name

This function creates and initializes an opaque object, an AtomPtr, for an Atom with the given name. `XmuInternAtom` can be used to cache the Atom value for one or more displays.

char ***XmuNameOfAtom**(*atom_ptr*);

atom_ptr specifies the AtomPtr

The function returns the name of an AtomPtr.

Atom **XmuInternAtom**(*dpy*, *atom_ptr*);

dpy specifies the connection to the X server

atom_ptr specifies the AtomPtr

This function returns the Atom for an AtomPtr. The Atom is cached, such that subsequent requests do not cause another round-trip to the server.

char ***XmuGetAtomName**(*dpy*, *atom*);

dpy specifies the connection to the X server

atom specifies the atom whose name is desired

This function returns the name of an Atom. The result is cached, such that subsequent requests do not cause another round-trip to the server.

`void` **`XmuInternStrings`**`(`*`dpy`*`, `*`names`*`, `*`count`*`, `*`atoms`*`);`

`dpy`	specifies the connection to the X server
`names`	specifies the strings to intern
`count`	specifies the number of strings
`atoms`	returns the list of Atom values

This function converts a list of atom names into Atom values. The results are cached, such that subsequent requests do not cause further round-trips to the server. The caller is responsible for preallocating the array pointed at by atoms.

Error Handler Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/Error.h`> and link against the libXmu or libXmuu library.

`int` **`XmuPrintDefaultErrorMessage`**`(`*`dpy`*`, `*`event`*`, `*`fp`*`);`

`dpy`	specifies the connection to the X server
`event`	specifies the error
`fp`	specifies where to print the error message

This function prints an error message, equivalent to Xlib's default error message for protocol errors. It returns a non-zero value if the caller should consider exiting, otherwise it returns 0. This function can be used when you need to write your own error handler, but need to print out an error from within that handler.

`int` **`XmuSimpleErrorHandler`**`(`*`dpy`*`, `*`errorp`*`);`

`dpy`	specifies the connection to the X server
`errorp`	specifies the error

This function ignores errors for BadWindow errors for `XQueryTree` and `XGetWindowAttributes`, and ignores BadDrawable errors for `XGetGeometry`; it returns 0 in those cases. Otherwise, it prints the default error message, and returns a non-zero value if the caller should consider exiting, and 0 if the caller should not exit.

System Utility Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/SysUtil.h`> and link against the libXmu or libXmuu library.

`int` **`XmuGetHostname`**`(`*`buf`*`, `*`maxlen`*`);`

`buf`	returns the host name
`maxlen`	specifies the length of *`buf`*

This function stores the null terminated name of the local host in *`buf`*, and returns length of the name. This function hides operating system differences, such as whether to call `gethostname` or `uname`.

```
int XmuSnprintf(str, size, ...);
```

`str`	string to write output to
`size`	specifies the size of *`str`*

This function was provided as a portable implementation of `snprintf` before all platforms could be relied on to provide their own. It is now deprecated in favor of calling `snprintf` directly and should only be used in software that needs to continue to support non-Unix98 compliant platforms.

Window Utility Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/WinUtil.h`> . To use `XmuClientWindow`, you may link against either the libXmu or libXmuu libraries. The other functions in this section require linking against the libXmu library.

```
Screen *XmuScreenOfWindow(dpy, w);
```

`dpy`	specifies the connection to the X server
`w`	specifies the window

This function returns the Screen on which the specified window was created.

```
Window XmuClientWindow(dpy, win);
```

`dpy`	specifies the connection to the X server
`win`	specifies the window

This function finds a window, at or below the specified window, which has a WM_STATE property. If such a window is found, it is returned, otherwise the argument window is returned.

```
Bool XmuUpdateMapHints(dpy, w, hints);
```

`dpy`	specifies the connection to the X server
`win`	specifies the window

`hints` specifies the new hints, or NULL

This function clears the PPosition and PSize flags and sets the USPosition and USSize flags in the hints structure, and then stores the hints for the window using `XSetWMNormalHints` and returns True. If NULL is passed for the hints structure, then the current hints are read back from the window using `XGetWMNormalHints` and are used instead, and True is returned; otherwise False is returned.

Cursor Utility Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/CurUtil.h`> and link against the libXmu or libXmuu library.

`int` **`XmuCursorNameToIndex`**`(`*`name`*`);`

`name` specifies the name of the cursor

This function takes the name of a standard cursor and returns its index in the standard cursor font. The cursor names are formed by removing the “`XC_`” prefix from the cursor defines listed in Appendix B of the Xlib manual.

Graphics Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/Drawing.h`> and link against the libXmu library.

`void` **`XmuDrawRoundedRectangle`**`(`*`dpy, draw, gc, x, y, w, h, ew, eh`*`);`

`dpy`	specifies the connection to the X server
`draw`	specifies the drawable
`gc`	specifies the GC
`x`	specifies the upper left x coordinate
`y`	specifies the upper left y coordinate
`w`	specifies the rectangle width
`h`	specifies the rectangle height
`ew`	specifies the corner width
`eh`	specifies the corner height

This function draws a rounded rectangle, where x, y, w, h are the dimensions of the overall rectangle, and ew and eh are the sizes of a bounding box that the corners are drawn inside of; ew should be no more than half of w, and eh should be no more than half of h. The current GC line attributes control all attributes of the line.

void **XmuFillRoundedRectangle**(*dpy*, *draw*, *gc*, *x*, *y*, *w*, *h*, *ew*, *eh*);

dpy	specifies the connection to the X server
draw	specifies the drawable
gc	specifies the GC
x	specifies the upper left x coordinate
y	specifies the upper left y coordinate
w	specifies the rectangle width
h	specifies the rectangle height
ew	specifies the corner width
eh	specifies the corner height

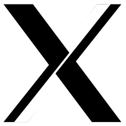
This function draws a filled rounded rectangle, where x, y, w, h are the dimensions of the overall rectangle, and ew and eh are the sizes of a bounding box that the corners are drawn inside of; ew should be no more than half of w, and eh should be no more than half of h. The current GC fill settings control all attributes of the fill contents.

XmuDrawLogo(*dpy*, *drawable*, *gcFore*, *gcBack*, *x*, *y*, *width*, *height*);

dpy	specifies the connection to the X server
drawable	specifies the drawable
gcFore	specifies the foreground GC
gcBack	specifies the background GC
x	specifies the upper left x coordinate
y	specifies the upper left y coordinate
width	specifies the logo width
height	specifies the logo height

This function draws the “official” X Window System logo (Figure 1, “The X Logo”). The bounding box of the logo in the drawable is given by x, y, width, and height. The logo itself is filled using gcFore, and the rest of the rectangle is filled using gcBack.

Figure 1. The X Logo



`Pixmap` **`XmuCreateStippledPixmap`**`(`*`screen`*`, `*`fore`*`, `*`back`*`, `*`depth`*`);`

`screen`	specifies the screen the pixmap is created on
`fore`	specifies the foreground pixel value
`back`	specifies the background pixel value
`depth`	specifies the depth of the pixmap

This function creates a two pixel by one pixel stippled pixmap of specified depth on the specified screen. The pixmap is cached so that multiple requests share the same pixmap. The pixmap should be freed with `XmuReleaseStippledPixmap` to maintain correct reference counts.

`void` **`XmuReleaseStippledPixmap`**`(`*`screen`*`, `*`pixmap`*`);`

`screen`	specifies the screen the pixmap was created on
`pixmap`	specifies the pixmap to free

This function frees a pixmap created with `XmuCreateStippledPixmap`.

`int` **`XmuReadBitmapData`**`(`*`fstream`*`, `*`width`*`, `*`height`*`, `*`datap`*`, `*`x_hot`*`, `*`y_hot`*`);`

`fstream`	specifies the stream to read from
`width`	returns the width of the bitmap
`height`	returns the height of the bitmap
`datap`	returns the parsed bitmap data
`x_hot`	returns the x coordinate of the hotspot
`y_hot`	returns the y coordinate of the hotspot

This function reads a standard bitmap file description from the specified stream, and returns the parsed data in a format suitable for passing to `XCreateBitmapFromData`. The return value of the function has the same interpretation as the return value for `XReadBitmapFile`.

`int` **`XmuReadBitmapDataFromFile`**`(`*`filename`*`, `*`width`*`, `*`height`*`, `*`datap`*`, `*`x_hot`*`, `*`y_hot`*`);`

`fstream`	specifies the file to read from
`width`	returns the width of the bitmap
`height`	returns the height of the bitmap
`datap`	returns the parsed bitmap data

x_hot	returns the x coordinate of the hotspot
y_hot	returns the y coordinate of the hotspot

This function reads a standard bitmap file description from the specified file, and returns the parsed data in a format suitable for passing to `XCreateBitmapFromData`. The return value of the function has the same interpretation as the return value for `XReadBitmapFile`.

Pixmap **XmuLocateBitmapFile**(*screen*, *name*, *srcname*, *srcnamelen*, *widthp*, *heightp*, *xhotp*, *yhotp*);

screen	specifies the screen the pixmap is created on
name	specifies the file to read from
srcname	returns the full filename of the bitmap
srcnamelen	specifies the length of the srcname buffer
width	returns the width of the bitmap
height	returns the height of the bitmap
xhotp	returns the x coordinate of the hotspot
yhotp	returns the y coordinate of the hotspot

This function reads a file in standard bitmap file format, using `XReadBitmapFile`, and returns the created bitmap. The filename may be absolute, or relative to the global resource named `bitmapFilePath` with class BitmapFilePath. If the resource is not defined, the default value is the build symbol BITMAPDIR, which is typically "`/usr/include/X11/bitmaps`". If *srcnamelen* is greater than zero and *srcname* is not NULL, the null terminated filename will be copied into *srcname*. The size and hotspot of the bitmap are also returned.

Pixmap **XmuCreatePixmapFromBitmap**(*dpy*, *d*, *bitmap*, *width*, *height*, *depth*, *fore*, *back*);

dpy	specifies the connection to the X server
screen	specifies the screen the pixmap is created on
bitmap	specifies the bitmap source
width	specifies the width of the pixmap
height	specifies the height of the pixmap
depth	specifies the depth of the pixmap
fore	specifies the foreground pixel value
back	specifies the background pixel value

This function creates a pixmap of the specified width, height, and depth, on the same screen as the specified drawable, and then performs an `XCopyPlane` from the specified bitmap to the pixmap, using the specified foreground and background pixel values. The created pixmap is returned.

Selection Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/StdSel.h`> and link against the libXmu library.

`Boolean` **`XmuConvertStandardSelection`**`(`*`w`*`, `*`time`*`, `*`selection`*`, `*`target`*`, `*`type`*`, `*`value`*`, `*`length`*`, `*`format`*`);`

`w`	specifies the widget which currently owns the selection
`time`	specifies the time at which the selection was established
`selection`	this argument is ignored
`target`	specifies the target type of the selection
`type`	returns the property type of the converted value
`value`	returns the converted value
`length`	returns the number of elements in the converted value
`format`	returns the size in bits of the elements

This function converts the following standard selections: CLASS, CLIENT_WINDOW, DECNET_ADDRESS, HOSTNAME, IP_ADDRESS, NAME, OWNER_OS, TARGETS, TIMESTAMP, and USER. It returns True if the conversion was successful, else it returns False.

Type Converter Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/Converters.h`> and link against the libXmu library.

`void` **`XmuCvtFunctionToCallback`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

`args`	this argument is ignored
`num_args`	this argument is ignored
`fromVal`	the function to convert
`toVal`	the place to store the converted value

This function converts a callback procedure to a callback list containing that procedure, with NULL closure data. To use this converter, include the following in your widget's ClassInitialize procedure:

```
XtAddConverter(XtRCallProc, XtRCallback, XmuCvtFunctionToCallback, NULL, 0);
```

`void` **`XmuCvtStringToBackingStore`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

args	this argument is ignored
num_args	this argument must be a pointer to a Cardinal containing the value 0
fromVal	specifies the string to convert
toVal	returns the converted value

This function converts a string to a backing-store integer as defined in <`X11/X.h`>. The string "notUseful" converts to NotUseful, "whenMapped" converts to WhenMapped, and "always" converts to Always. The string "default" converts to the value Always + WhenMapped + NotUseful. The case of the string does not matter. To use this converter, include the following in your widget's ClassInitialize procedure:

```
XtAddConverter(XtRString, XtRBackingStore, XmuCvtStringToBackingStore, NULL, 0);
```

`void` **`XmuCvtStringToBitmap`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

args	the sole argument specifies the Screen on which to create the bitmap
num_args	must be the value 1
fromVal	specifies the string to convert
toVal	returns the converted value

This function creates a bitmap (a Pixmap of depth one) suitable for window manager icons. The string argument is the name of a file in standard bitmap file format. For the possible filename specifications, see `XmuLocateBitmapFile` [10]. To use this converter, include the following in your widget's ClassInitialize procedure:

```
static XtConvertArgRec screenConvertArg[] = {
  {XtBaseOffset, (XtPointer)XtOffset(Widget, core.screen), sizeof(Screen *)}
};

XtAddConverter(XtRString, XtRBitmap, XmuCvtStringToBitmap,
   screenConvertArg, XtNumber(screenConvertArg));
```

`Boolean` **`XmuCvtStringToColorCursor`**`(`*`dpy`*`, `*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`, `*`data`*`);`

dpy	specifies the display to use for conversion warnings

`args`	specifies the required conversion arguments
`num_args`	specifies the number of required conversion arguments, which is 4
`fromVal`	specifies the string to convert
`toVal`	returns the converted value
`data`	this argument is ignored

This function converts a string to a Cursor with the foreground and background pixels specified by the conversion arguments. The string can either be a standard cursor name formed by removing the "`XC_`" prefix from any of the cursor defines listed in Appendix B of the Xlib Manual, a font name and glyph index in decimal of the form "FONT fontname index [[font] index]", or a bitmap filename acceptable to `XmuLocateBitmapFile` [10]. To use this converter, include the following in the widget ClassInitialize procedure:

```
static XtConvertArgRec colorCursorConvertArgs[] = {
  {XtWidgetBaseOffset, (XtPointer) XtOffsetOf(WidgetRec, core.screen),
   sizeof(Screen *)},
  {XtResourceString, (XtPointer) XtNpointerColor, sizeof(Pixel)},
  {XtResourceString, (XtPointer) XtNpointerColorBackground, sizeof(Pixel)},
  {XtWidgetBaseOffset, (XtPointer) XtOffsetOf(WidgetRec, core.colormap),
   sizeof(Colormap)}
};


XtSetTypeConverter(XtRString, XtRColorCursor, XmuCvtStringToColorCursor,
   colorCursorConvertArgs, XtNumber(colorCursorConvertArgs),
                  XtCacheByDisplay, NULL);
```

The widget must recognize XtNpointerColor and XtNpointerColorBackground as resources, or specify other appropriate foreground and background resources. The widget's Realize and SetValues methods must cause the converter to be invoked with the appropriate arguments when one of the foreground, background, or cursor resources has changed, or when the window is created, and must assign the cursor to the window of the widget.

void **`XmuCvtStringToCursor`**(*`args`*, *`num_args`*, *`fromVal`*, *`toVal`*);

`args`	specifies the required conversion argument, the screen
`num_args`	specifies the number of required conversion arguments, which is 1
`fromVal`	specifies the string to convert
`toVal`	returns the converted value

This function converts a string to a Cursor. The string can either be a standard cursor name formed by removing the "`XC_`" prefix from any of the cursor defines listed in Appendix B of the Xlib Manual, a font name and glyph index in decimal of the form "FONT fontname index [[font] index]", or a bitmap filename acceptable to `XmuLocateBitmapFile` [10]. To use this converter, include the following in your widget's ClassInitialize procedure:

```
static XtConvertArgRec screenConvertArg[] = {
  {XtBaseOffset, (XtPointer)XtOffsetOf(WidgetRec, core.screen), sizeof(Screen *)}
};

XtAddConverter(XtRString, XtRCursor, XmuCvtStringToCursor,
   screenConvertArg, XtNumber(screenConvertArg));
```

`void` **`XmuCvtStringToGravity`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

args	this argument is ignored
num_args	this argument must be a pointer to a Cardinal containing the value 0
fromVal	specifies the string to convert
toVal	returns the converted value

This function converts a string to an XtGravity enumeration value. The string "forget" and a NULL value convert to ForgetGravity, "NorthWestGravity" converts to NorthWestGravity, the strings "NorthGravity" and "top" convert to NorthGravity, "NorthEastGravity" converts to NorthEastGravity, the strings "West" and "left" convert to WestGravity, "CenterGravity" converts to CenterGravity, "EastGravity" and "right" convert to EastGravity, "SouthWestGravity" converts to SouthWestGravity, "SouthGravity" and "bottom" convert to SouthGravity, "SouthEastGravity" converts to SouthEastGravity, "StaticGravity" converts to StaticGravity, and "UnmapGravity" converts to UnmapGravity. The case of the string does not matter. To use this converter, include the following in your widget's class initialize procedure:

```
XtAddConverter(XtRString, XtRGravity, XmuCvtStringToGravity, NULL, 0);
```

`void` **`XmuCvtStringToJustify`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

args	this argument is ignored
num_args	this argument is ignored
fromVal	specifies the string to convert
toVal	returns the converted value

This function converts a string to an XtJustify enumeration value. The string "left" converts to XtJustifyLeft, "center" converts to XtJustifyCenter, and "right" converts to XtJustifyRight. The case of the string does not matter. To use this converter, include the following in your widget's ClassInitialize procedure:

```
XtAddConverter(XtRString, XtRJustify, XmuCvtStringToJustify, NULL, 0);
```

`void` **`XmuCvtStringToLong`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

`args`	this argument is ignored
`num_args`	this argument must be a pointer to a Cardinal containing 0
`fromVal`	specifies the string to convert
`toVal`	returns the converted value

This function converts a string to an integer of type long. It parses the string using `sscanf` with a format of "%ld". To use this converter, include the following in your widget's ClassInitialize procedure:

```
XtAddConverter(XtRString, XtRLong, XmuCvtStringToLong, NULL, 0);
```

`void` **`XmuCvtStringToOrientation`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

`args`	this argument is ignored
`num_args`	this argument is ignored
`fromVal`	specifies the string to convert
`toVal`	returns the converted value

This function converts a string to an XtOrientation enumeration value. The string "horizontal" converts to XtorientHorizontal and "vertical" converts to XtorientVertical. The case of the string does not matter. To use this converter, include the following in your widget's ClassInitialize procedure:

```
XtAddConverter(XtRString, XtROrientation, XmuCvtStringToOrientation, NULL, 0);
```

`Boolean` **`XmuCvtStringToShapeStyle`**`(`*`dpy`*`, `*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`, `*`data`*`);`

`dpy`	the display to use for conversion warnings
`args`	this argument is ignored
`num_args`	this argument is ignored
`fromVal`	the value to convert from

toVal	the place to store the converted value
data	this argument is ignored

This function converts a string to an integer shape style. The string "rectangle" converts to XmuShapeRectangle, "oval" converts to XmuShapeOval, "ellipse" converts to XmuShapeEllipse, and "roundedRectangle" converts to XmuShapeRoundedRectangle. The case of the string does not matter. To use this converter, include the following in your widget's ClassInitialize procedure:

```
XtSetTypeConverter(XtRString, XtRShapeStyle, XmuCvtStringToShapeStyle,
       NULL, 0, XtCacheNone, NULL);
```

`Boolean` **`XmuReshapeWidget`**`(`*`w`*`, `*`shape_style`*`, `*`corner_width`*`, `*`corner_height`*`);`

w	specifies the widget to reshape
shape_style	specifies the new shape
corner_width	specifies the width of the rounded rectangle corner
corner_height	specified the height of the rounded rectangle corner

This function reshapes the specified widget, using the Shape extension, to a rectangle, oval, ellipse, or rounded rectangle, as specified by shape_style (XmuShapeRectangle, XmuShapeOval, XmuShapeEllipse, and XmuShapeRoundedRectangle, respectively). The shape is bounded by the outside edges of the rectangular extents of the widget. If the shape is a rounded rectangle, corner_width and corner_height specify the size of the bounding box that the corners are drawn inside of (see `XmuFillRoundedRectangle` [7]); otherwise, corner_width and corner_height are ignored. The origin of the widget within its parent remains unchanged.

`void` **`XmuCvtStringToWidget`**`(`*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`);`

args	the sole argument is the parent Widget
num_args	this argument must be 1
fromVal	specifies the string to convert
toVal	returns the converted value

This function converts a string to an immediate child widget of the parent widget passed as an argument. Note that this converter only works for child widgets that have already been created; there is no lazy evaluation. The string is first compared against the names of the normal and popup children, and if a match is found the corresponding child is returned. If no match is found, the string is compared against the classes of the normal and popup children, and if a match is found the corresponding child is returned. The case of the string is significant. To use this converter, include the following in your widget's ClassInitialize procedure:

```
static XtConvertArgRec parentCvtArg[] = {
  {XtBaseOffset, (XtPointer)XtOffset(Widget, core.parent), sizeof(Widget)},
};

XtAddConverter(XtRString, XtRWidget, XmuCvtStringToWidget,
   parentCvtArg, XtNumber(parentCvtArg));
```

`Boolean` **`XmuNewCvtStringToWidget`**`(`*`dpy`*`, `*`args`*`, `*`num_args`*`, `*`fromVal`*`, `*`toVal`*`, `*`data`*`);`

`dpy`	the display to use for conversion warnings
`args`	the sole argument is the parent Widget
`num_args`	this argument must be a pointer to a Cardinal containing the value 1
`fromVal`	specifies the string to convert
`toVal`	returns the converted value
`data`	this argument is ignored

This converter is identical in functionality to `XmuCvtStringToWidget` [16], except that it is a new-style converter, allowing the specification of a cache type at the time of registration. Most widgets will not cache the conversion results, as the application may dynamically create and destroy widgets, which would cause cached values to become illegal. To use this converter, include the following in the widget's class initialize procedure:

```
static XtConvertArgRec parentCvtArg[] = {
  {XtWidgetBaseOffset, (XtPointer)XtOffsetOf(WidgetRec, core.parent),
   sizeof(Widget)}
};

XtSetTypeConverter(XtRString, XtRWidget, XmuNewCvtStringToWidget,
     parentCvtArg, XtNumber(parentCvtArg), XtCacheNone, NULL);
```

Character Set Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/CharSet.h`> and link against the libXmu or libXmuu library.

Warning

The functions in this section are *deprecated* because they don't work in most locales now supported by X11; most platforms provide alternatives in their system libraries.

`void` **`XmuCopyISOLatin1Lowered`**`(`*`dst`*`, `*`src`*`);`

`dst` returns the string copy

`src` specifies the string to copy

This function copies a null terminated string from src to dst (including the null), changing all Latin-1 uppercase letters to lowercase. The string is assumed to be encoded using ISO 8859-1.

Note that like `strcpy` the caller is responsible for ensuring the size of *`dst`* is at least as large as the size of *`src`*.

`void` **`XmuNCopyISOLatin1Lowered`**`(`*`dst`*`, `*`src`*`, `*`size`*`);`

`dst` returns the string copy

`src` specifies the string to copy

`size` maximum number of characters (including the null terminator) to write to dst

This function copies up to *`size`* `- 1` characters of a null terminated string from *`src`* to *`dst`*, and terminates it with a null, changing all Latin-1 uppercase letters to lowercase. The string is assumed to be encoded using ISO 8859-1.

`void` **`XmuCopyISOLatin1Uppered`**`(`*`dst`*`, `*`src`*`);`

`dst` returns the string copy

`src` specifies the string to copy

This function copies a null terminated string from src to dst (including the null), changing all Latin-1 lowercase letters to uppercase. The string is assumed to be encoded using ISO 8859-1.

Note that like `strcpy` the caller is responsible for ensuring the size of *`dst`* is at least as large as the size of *`src`*.

`void` **`XmuNCopyISOLatin1Uppered`**`(`*`dst`*`, `*`src`*`, `*`size`*`);`

`dst` returns the string copy

`src` specifies the string to copy

`size` maximum number of characters (including the null terminator) to write to dst

This function copies up to *`size`* `- 1` characters of a null terminated string from *`src`* to *`dst`*, and terminates it with a null, changing all Latin-1 lowercase letters to uppercase. The string is assumed to be encoded using ISO 8859-1.

`int` **`XmuCompareISOLatin1`**`(`*`first`*`, `*`second`*`);`

`first`	specifies a string to compare
`second`	specifies a string to compare

This function compares two null terminated Latin-1 strings, ignoring case differences, and returns an integer greater than, equal to, or less than 0, according to whether first is lexicographically greater than, equal to, or less than second. The two strings are assumed to be encoded using ISO 8859-1.

Keyboard Event Translation Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/Lookup.h`> . and link against the libXmu library.

Warning

The functions in this section are *deprecated* because they don't work in most locales now supported by X11; the function `XmbLookupString` provides a better alternative.

`int` **`XmuLookupLatin1`**`(`*`event`*`, `*`buffer`*`, `*`nbytes`*`, `*`keysym`*`, `*`status`*`);`

`event`	specifies the key event
`buffer`	returns the translated characters
`nbytes`	specifies the length of the buffer
`keysym`	returns the computed KeySym, or None
`status`	specifies or returns the compose state

This function is identical to `XLookupString`, and exists only for naming symmetry with other functions.

`int` **`XmuLookupLatin2`**`(`*`event`*`, `*`buffer`*`, `*`nbytes`*`, `*`keysym`*`, `*`status`*`);`

`event`	specifies the key event
`buffer`	returns the translated characters
`nbytes`	specifies the length of the buffer
`keysym`	returns the computed KeySym, or None
`status`	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to an Latin-2 (ISO 8859-2) string, or to an ASCII control string.

`int` **`XmuLookupLatin3`**`(`*`event`*`, `*`buffer`*`, `*`nbytes`*`, `*`keysym`*`, `*`status`*`);`

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to an Latin-3 (ISO 8859-3) string, or to an ASCII control string.

`int` **`XmuLookupLatin4`**`(`*`event`*`, `*`buffer`*`, `*`nbytes`*`, `*`keysym`*`, `*`status`*`);`

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to an Latin-4 (ISO 8859-4) string, or to an ASCII control string.

`int` **`XmuLookupKana`**`(`*`event`*`, `*`buffer`*`, `*`nbytes`*`, `*`keysym`*`, `*`status`*`);`

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to a string in an encoding consisting of Latin-1 (ISO 8859-1) and ASCII control in the Graphics Left half (values 0 to 127), and Katakana in the Graphics Right half (values 128 to 255), using the values from JIS X201-1976.

`int` **`XmuLookupJISX0201`**`(`*`event`*`, `*`buffer`*`, `*`nbytes`*`, `*`keysym`*`, `*`status`*`);`

event	specifies the key event
buffer	returns the translated characters

nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to a string in the JIS X0201-1976 encoding, including ASCII control.

```
int XmuLookupArabic(event, buffer, nbytes, keysym, status);
```

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to a Latin/Arabic (ISO 8859-6) string, or to an ASCII control string.

```
int XmuLookupCyrillic(event, buffer, nbytes, keysym, status);
```

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to a Latin/Cyrillic (ISO 8859-5) string, or to an ASCII control string.

```
int XmuLookupGreek(event, buffer, nbytes, keysym, status);
```

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to a Latin/Greek (ISO 8859-7) string, or to an ASCII control string.

`int XmuLookupHebrew(event, buffer, nbytes, keysym, status);`

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to a Latin/Hebrew (ISO 8859-8) string, or to an ASCII control string.

`int XmuLookupAPL(event, buffer, nbytes, keysym, status);`

event	specifies the key event
buffer	returns the translated characters
nbytes	specifies the length of the buffer
keysym	returns the computed KeySym, or None
status	specifies or returns the compose state

This function is similar to `XLookupString`, except that it maps a key event to an APL string.

Compound Text Functions

The functions defined in this section are for parsing Compound Text strings, decomposing them into individual segments. Definitions needed to use these routines are in the include file <`X11/Xmu/Xct.h`> and link against the libXmu library.

Warning

The functions in this section are *deprecated* because they shift the burden for recently introduced locale encodings to the application. The use of the UTF8_STRING text encoding provides a better alternative.

A Compound Text string is represented as the following type:

```
 typedef unsigned char *XctString;
```

`XctData XctCreate(string, length, flags);`

`string`	the Compound Text string
`length`	the number of bytes in string
`flags`	parsing control flags

This function creates an XctData structure for parsing a Compound Text string. The string need not be null terminated. The following flags are defined to control parsing of the string:

XctSingleSetSegments	This means that returned segments should contain characters from only one set (C0, C1, GL, GR). When this is requested, XctSegment is never returned by `XctNextItem`, instead XctC0Segment, XctC1Segment, XctGlSegment, and XctGRSegment are returned. C0 and C1 segments are always returned as singleton characters.
XctProvideExtensions	This means that if the Compound Text string is from a higher version than this code is implemented to, then syntactically correct but unknown control sequences should be returned as XctExtension items by `XctNextItem`. If this flag is not set, and the Compound Text string version indicates that extensions cannot be ignored, then each unknown control sequence will be reported as an XctError.
XctAcceptC0Extensions	This means that if the Compound Text string is from a higher version than this code is implemented to, then unknown C0 characters should be treated as if they were legal, and returned as C0 characters (regardless of how XctProvideExtensions is set) by `XctNextItem`. If this flag is not set, then all unknown C0 characters are treated according to XctProvideExtensions.
XctAcceptC1Extensions	This means that if the Compound Text string is from a higher version than this code is implemented to, then unknown C1 characters should be treated as if they were legal, and returned as C1 characters (regardless of how XctProvideExtensions is set) by `XctNextItem`. If this flag is not set, then all unknown C1 characters are treated according to XctProvideExtensions.
XctHideDirection	This means that horizontal direction changes should be reported as XctHorizontal items by `XctNextItem`. If this flag is not set, then direction changes are not returned as items, but the current direction is still maintained and reported for other items. The current direction is given as an enumeration, with the values XctUnspecified, XctLeftToRight, and XctRightToLeft.
XctFreeString	This means that `XctFree` should free the Compound Text string that is passed to `XctCreate`. If this flag is not set, the string is not freed.
XctShiftMultiGRToGL	This means that `XctNextItem` should translate GR segments on-the-fly into GL segments for

the GR sets: GB2312.1980-1, JISX0208.1983-1, and KSC5601.1987-1.

`void` **`XctReset`**`(`*`data`*`);`

`data`	specifies the Compound Text structure

This function resets the XctData structure to reparse the Compound Text string from the beginning.

`XctResult` **`XctNextItem`**`(`*`data`*`);`

`data`	specifies the Compound Text structure

This function parses the next “item” from the Compound Text string. The return value indicates what kind of item is returned. The item itself, its length, and the current contextual state, are reported as components of the XctData structure. XctResult is an enumeration, with the following values:

XctSegment	the item contains some mixture of C0, GL, GR, and C1 characters.
XctC0Segment	the item contains only C0 characters.
XctGLSegment	the item contains only GL characters.
XctC1Segment	the item contains only C1 characters.
XctGRSegment	the item contains only GR characters.
XctExtendedSegment	the item contains an extended segment.
XctExtension	the item is an unknown extension control sequence.
XctHorizontal	the item indicates a change in horizontal direction or depth. The new direction and depth are recorded in the XctData structure.
XctEndOfText	The end of the Compound Text string has been reached.
XctError	the string contains a syntactic or semantic error; no further parsing should be performed.

The following state values are stored in the XctData structure:

```
XctString  item;  /* the action item */
unsigned  item_length; /* length of item in bytes */
int   char_size; /* the number of bytes per character in
  * item, with zero meaning variable */
char  *encoding; /* the XLFD encoding name for item */
XctHDirection horizontal; /* the direction of item */
```

```
    unsigned  horz_depth; /* the current direction nesting depth */
    char  *GL;  /* the "{I} F" string for the current GL */
    char  *GL_encoding; /* the XLFD encoding name for the current GL */
    int   GL_set_size; /* 94 or 96 */
    int   GL_char_size; /* the number of bytes per GL character */
    char  *GR;  /* the "{I} F" string for the current GR */
    char  *GR_encoding; /* the XLFD encoding name for the current GR */
    int   GR_set_size; /* 94 or 96 */
    int   GR_char_size; /* number of bytes per GR character */
    char  *GLGR_encoding; /* the XLFD encoding name for the current
      *  GL+GR, if known */
```

`void` **`XctFree`**`(`*`data`*`);`

`data`	specifies the Compound Text structure

This function frees all data associated with the XctData structure.

CloseDisplay Hook Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/CloseHook.h`> and link against the libXmu library.

`CloseHook` **`XmuAddCloseDisplayHook`**`(`*`dpy`*`, ( *func ), `*`arg`*`);`

`dpy`	specifies the connection to the X server
`func`	specifies the function to call at display close
`arg`	specifies arbitrary data to pass to *`func`*

This function adds a callback for the given display. When the display is closed, the given function will be called with the given display and argument as:

```
 (*func)(dpy, arg)
```

The function is declared to return an int even though the value is ignored, because some compilers used to have problems with functions returning void.

This routine returns NULL if it was unable to add the callback, otherwise it returns an opaque handle that can be used to remove or lookup the callback.

`Bool` **`XmuRemoveCloseDisplayHook`**`(`*`dpy`*`, `*`handle`*`, ( *func ), `*`arg`*`);`

`dpy`	specifies the connection to the X server
`handle`	specifies the callback by id, or NULL
`func`	specifies the callback by function

`arg` specifies the function data to match

This function deletes a callback that has been added with `XmuAddCloseDisplayHook`. If handle is not NULL, it specifies the callback to remove, and the func and arg parameters are ignored. If handle is NULL, the first callback found to match the specified func and arg will be removed. Returns True if a callback was removed, else returns False.

`Bool` **`XmuLookupCloseDisplayHook`**`(`*`dpy`*`, `*`handle`*`, `*`( *func )`*`, `*`arg`*`);`

`dpy`	specifies the connection to the X server
`handle`	specifies the callback by id, or NULL
`func`	specifies the callback by function
`arg`	specifies the function data to match

This function determines if a callback is installed. If handle is not NULL, it specifies the callback to look for, and the func and arg parameters are ignored. If handle is NULL, the function will look for any callback for the specified func and arg. Returns True if a matching callback exists, else returns False.

Display Queue Functions

To use the functions and types defined in this section, you should include the header file `<X11/Xmu/DisplayQue.h>` and link against the libXmu library. `DisplayQue.h` defines the following types:

```
typedef int (*XmuCloseDisplayQueueProc)(XmuDisplayQueue *queue,
                                        XmuDisplayQueueEntry *entry);

typedef int (*XmuFreeDisplayQueueProc)(XmuDisplayQueue *queue);

typedef struct _XmuDisplayQueueEntry {
 struct _XmuDisplayQueueEntry *prev, *next;
 Display *display;
 CloseHook closehook;
 XPointer data;
} XmuDisplayQueueEntry;

typedef struct _XmuDisplayQueue {
 int nentries;
 XmuDisplayQueueEntry *head, *tail;
 XmuCloseDisplayQueueProc closefunc;
 XmuFreeDisplayQueueProc freefunc;
 XPointer data;
} XmuDisplayQueue;
```

`XmuDisplayQueue *`**`XmuDQCreate`**`(`*`closefunc`*`, `*`freefunc`*`, `*`data`*`);`

`closefunc`	specifies the close function
`freefunc`	specifies the free function
`data`	specifies private data for the functions

This function creates and returns an empty XmuDisplayQueue (which is really just a set of displays, but is called a queue for historical reasons). The queue is initially empty, but displays can be added using `XmuAddDisplay`. The data value is simply stored in the queue for use by the closefunc and freefunc callbacks. Whenever a display in the queue is closed using `XCloseDisplay`, the *`closefunc`* (if non-NULL) is called with the queue and the display's `XmuDisplayQueueEntry` as follows:

```
(*closefunc)(queue, entry)
```

The *`freefunc`* (if non-NULL) is called whenever the last display in the queue is closed, as follows:

```
(*freefunc)(queue)
```

The application is responsible for actually freeing the queue, by calling `XmuDQDestroy`.

`XmuDisplayQueueEntry *`**`XmuDQAddDisplay`**`(`*`q`*`, `*`dpy`*`, `*`data`*`);`

`q`	specifies the queue
`dpy`	specifies the display to add
`data`	specifies private data for the free function

This function adds the specified display to the queue. If successful, the queue entry is returned, otherwise NULL is returned. The data value is simply stored in the queue entry for use by the queue's freefunc callback. This function does not attempt to prevent duplicate entries in the queue; the caller should use `XmuDQLookupDisplay` to determine if a display has already been added to a queue.

`XmuDisplayQueueEntry *`**`XmuDQLookupDisplay`**`(`*`q`*`, `*`dpy`*`);`

`q`	specifies the queue
`dpy`	specifies the display to lookup

This function returns the queue entry for the specified display, or NULL if the display is not in the queue.

`XmuDQNDisplays``(`*`q`*`);`

This macro returns the number of displays in the specified queue.

`Bool` **`XmuDQRemoveDisplay`**`(`*`q`*`, `*`dpy`*`);`

`q` specifies the queue

`dpy` specifies the display to remove

This function removes the specified display from the specified queue. No callbacks are performed. If the display is not found in the queue, False is returned, otherwise True is returned.

`Bool` **`XmuDQDestroy`**`(`*`q`*`, `*`docallbacks`*`);`

`q` specifies the queue to destroy

`docallbacks` specifies whether close functions should be called

This function releases all memory associated with the specified queue. If docallbacks is True, then the queue's closefunc callback (if non-NULL) is first called for each display in the queue, even though `XCloseDisplay` is not called on the display.

Toolkit Convenience Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/Initer.h`> and link against the libXmu library.

`void` **`XmuAddInitializer`**`(`*`( *func )`*`, `*`data`*`);`

`func` specifies the procedure to register

`data` specifies private data for the procedure

This function registers a procedure, to be invoked the first time `XmuCallInitializers` is called on a given application context. The procedure is called with the application context and the specified data:

```
 (*func)(app_con, data)
```

`void` **`XmuCallInitializers`**`(`*`app_con`*`);`

`app_con` specifies the application context to initialize

This function calls each of the procedures that have been registered with `XmuAddInitializer`, if this is the first time the application context has been passed to `XmuCallInitializers`. Otherwise, this function does nothing.

Standard Colormap Functions

To use the functions defined in this section, you should include the header file <`X11/Xmu/StdCmap.h`> and link against the libXmu library.

`Status` **`XmuAllStandardColormaps`**`(`*`dpy`*`);`

`dpy` specifies the connection to the X server

To create all of the appropriate standard colormaps for every visual of every screen on a given display, use `XmuAllStandardColormaps`.

This function defines and retains as permanent resources all standard colormaps which are meaningful for the visuals of each screen of the display. It returns 0 on failure, non-zero on success. If the property of any standard colormap is already defined, this function will redefine it.

This function is intended to be used by window managers or a special client at the start of a session.

The standard colormaps of a screen are defined by properties associated with the screen's root window. The property names of standard colormaps are predefined, and each property name except RGB_DEFAULT_MAP may describe at most one colormap.

The standard colormaps are: RGB_BEST_MAP, RGB_RED_MAP, RGB_GREEN_MAP, RGB_BLUE_MAP, RGB_DEFAULT_MAP, and RGB_GRAY_MAP. Therefore a screen may have at most 6 standard colormap properties defined.

A standard colormap is associated with a particular visual of the screen. A screen may have multiple visuals defined, including visuals of the same class at different depths. Note that a visual id might be repeated for more than one depth, so the visual id and the depth of a visual identify the visual. The characteristics of the visual will determine which standard colormaps are meaningful under that visual, and will determine how the standard colormap is defined. Because a standard colormap is associated with a specific visual, there must be a method of determining which visuals take precedence in defining standard colormaps.

The method used here is: for the visual of greatest depth, define all standard colormaps meaningful to that visual class, according to this order of (descending) precedence: DirectColor; PseudoColor; TrueColor and GrayScale; and finally StaticColor and StaticGray.

This function allows success, on a per screen basis. For example, if a map on screen 1 fails, the maps on screen 0, created earlier, will remain. However, none on screen 1 will remain. If a map on screen 0 fails, none will remain.

See `XmuVisualStandardColormaps` [29] for which standard colormaps are meaningful under these classes of visuals.

`Status` **`XmuVisualStandardColormaps`**`(`*`dpy`*`, `*`screen`*`, `*`visualid`*`, `*`depth`*`, `*`replace`*`, `*`retain`*`);`

`dpy`	specifies the connection to the X server
`screen`	specifies the screen of the display
`visualid`	specifies the visual type
`depth`	specifies the visual depth
`replace`	specifies whether or not to replace
`retain`	specifies whether or not to retain

To create all of the appropriate standard colormaps for a given visual on a given screen, use `XmuVisualStandardColormaps`.

This function defines all appropriate standard colormap properties for the given visual. If replace is True, any previous definition will be removed. If retain is True, new properties will be retained for the duration of the server session. This function returns 0 on failure, non-zero on success. On failure, no new properties will be defined, but old ones may have been removed if replace was True.

Not all standard colormaps are meaningful to all visual classes. This routine will check and define the following properties for the following classes, provided that the size of the colormap is not too small. For DirectColor and PseudoColor: RGB_DEFAULT_MAP, RGB_BEST_MAP, RGB_RED_MAP, RGB_GREEN_MAP, RGB_BLUE_MAP, and RGB_GRAY_MAP. For TrueColor and StaticColor: RGB_BEST_MAP. For GrayScale and StaticGray: RGB_GRAY_MAP.

`Status` **`XmuLookupStandardColormap`**`(`*`dpy`*`,` *`screen`*`,` *`visualid`*`,` *`depth`*`,` *`property`*`,` *`replace`*`,` *`retain`*`);`

`dpy`	specifies the connection to the X server
`screen`	specifies the screen of the display
`visualid`	specifies the visual type
`depth`	specifies the visual depth
`property`	specifies the standard colormap property
`replace`	specifies whether or not to replace
`retain`	specifies whether or not to retain

To create a standard colormap if one does not currently exist, or replace the currently existing standard colormap, use `XmuLookupStandardColormap`.

Given a screen, a visual, and a property, this function will determine the best allocation for the property under the specified visual, and determine the whether to create a new colormap or to use the default colormap of the screen.

If replace is True, any previous definition of the property will be replaced. If retain is True, the property and the colormap will be made permanent for the duration of the server session. However, pre-existing property definitions which are not replaced cannot be made permanent by a call to this function; a request to retain resources pertains to newly created resources.

This function returns 0 on failure, non-zero on success. A request to create a standard colormap upon a visual which cannot support such a map is considered a failure. An example of this would be requesting any standard colormap property on a monochrome visual, or, requesting an RGB_BEST_MAP on a display whose colormap size is 16.

`Status` **`XmuGetColormapAllocation`**`(`*`vinfo`*`, `*`property`*`, `*`red_max`*`, `*`green_max`*`, `*`blue_max`*`);`

vinfo	specifies visual information for a chosen visual
property	specifies one of the standard colormap property names
red_max	returns maximum red value
green_max	returns maximum green value
blue_max	returns maximum blue value

To determine the best allocation of reds, greens, and blues in a standard colormap, use `XmuGetColormapAllocation`.

`XmuGetColormapAllocation` returns 0 on failure, non-zero on success. It is assumed that the visual is appropriate for the colormap property.

`XStandardColormap *`**`XmuStandardColormap`**`(`*`dpy`*`, `*`screen`*`, `*`visualid`*`, `*`depth`*`, `*`property`*`, `*`cmap`*`, `*`red_max`*`, `*`green_max`*`, `*`blue_max`*`);`

dpy	specifies the connection to the X server
screen	specifies the screen of the display
visualid	specifies the visual type
depth	specifies the visual depth
property	specifies the standard colormap property
cmap	specifies the colormap ID, or None
red_max	specifies the red allocation
green_max	specifies the green allocation
blue_max	specifies the blue allocation

To create any one standard colormap, use `XmuStandardColormap`.

This function creates a standard colormap for the given screen, visualid, and visual depth, with the given red, green, and blue maximum values, with the given standard property name. Upon success, it returns a pointer to an `XStandardColormap` structure which describes the newly created colormap. Upon failure, it returns NULL. If cmap is the default colormap of the screen, the standard colormap will be defined on the default colormap; otherwise a new colormap is created.

Resources created by this function are not made permanent; that is the caller's responsibility.

`Status` **`XmuCreateColormap`**`(`*`dpy`*`, `*`colormap`*`);`

`dpy`	specifies the connection under which the map is created
`colormap`	specifies the map to be created

To create any one colormap which is described by an XStandardColormap structure, use `XmuCreateColormap`.

This function returns 0 on failure, and non-zero on success. The base_pixel of the colormap is set on success. Resources created by this function are not made permanent. No argument error checking is provided; use at your own risk.

All colormaps are created with read-only allocations, with the exception of read-only allocations of colors which fail to return the expected pixel value, and these are individually defined as read/write allocations. This is done so that all the cells defined in the colormap are contiguous, for use in image processing. This typically happens with White and Black in the default map.

Colormaps of static visuals are considered to be successfully created if the map of the static visual matches the definition given in the standard colormap structure.

`void` **`XmuDeleteStandardColormap`**`(`*`dpy`*`, `*`screen`*`, `*`property`*`);`

`dpy`	specifies the connection to the X server
`screen`	specifies the screen of the display
`property`	specifies the standard colormap property

To remove any standard colormap property, use `XmuDeleteStandardColormap`. This function will remove the specified property from the specified screen, releasing any resources used by the colormap(s) of the property, if possible.

Widget Description Functions

The functions defined in this section are for building a description of the structure of and resources associated with a hierarchy of widget classes. This package is typically used by applications that wish to manipulate the widget set itself.

The definitions needed to use these interfaces are in the header file <`X11/Xmu/WidgetNode.h`> . To call these functions, you need to link against the libXmu library. The following function must be called before any of the others described below:

`void` **`XmuWnInitializeNodes`**`(`*`node_array`*`, `*`num_nodes`*`);`

node_array	specifies a list of widget classes, in alphabetical order
num_nodes	specifies the number of widget classes in the node array

To determine the resources provided by a widget class or classes, use

```
void XmuWnFetchResources(node, toplevel, top_node);
```

node	specifies the widget class for which resources should be obtained.
toplevel	specifies the widget that should be used for creating an instance of `node` from which resources are extracted. This is typically the value returned by `XtAppInitialize`.
top_node	specifies the ancestor of `node` that should be treated as the root of the widget inheritance tree (used in determining which ancestor contributed which resources).

Each widget class inherits the resources of its parent. To count the number of resources contributed by a particular widget class, use:

```
int XmuWnCountOwnedResources(node, owner_node, constraints);
```

node	specifies the widget class whose resources are being examined.
owner_node	specifies the widget class of the ancestor of `node` whose contributions are being counted.
constraints	specifies whether or not to count constraint resources or normal resources.

This routine returns the number of resources contributed (or “owned”) by the specified widget class.

```
XmuWidgetNode *XmuWnNameToNode(node_list, num_nodes, name);
```

node_list	specifies a list of widget nodes
num_nodes	specifies the number of nodes in the list
name	specifies the name of the widget class in the node list to search for

This function returns the WidgetNode in the list that matches the given widget name or widget class name. If no match is found, it returns NULL.

Participation in the Editres Protocol

To participate in the editres protocol, applications which are not based on the Athena widget set should include the header file <`X11/Xmu/Editres.h`> and link against the libXmu library.

To participate in the editres protocol, Xt applications which do not rely on the Athena widget set should register the editres protocol handler on each shell widget in the application, specifying an event mask of 0, nonmaskable events, and client data as NULL:

```
        XtAddEventHandler(shell, (EventMask) 0, True, _XEditResCheckMessages, NULL);
```

Index